November 30, 2020

Submitted via email

Mr. Andrew Wheeler, Administrator US EPA
1200 Pennsylvania Avenue, N.W.
Mail Code 5304-P
Washington, DC 20460

Re: Northern Indiana Public Service Company LLC
RM Schahfer Generating Station, Wheatfield, IN
Demonstration – Addendum, Pursuant to 40 CFR Part 257.103(f)(2)

Dear Administrator Wheeler:

Northern Indiana Public Service Company LLC (NIPSCO LLC) is providing the enclosed *Demonstration of Site-Specific Alternative Deadline to Initiate Closure of CCR Surface Impoundment Due to Permanent Cessation of Coal-Fired Boilers by a Date Certain* (Demonstration) Addendum for approval by the U.S. Environmental Protection Agency (US EPA). Approval of NIPSCO LLC's 257.103(f)(2) Demonstration by US EPA will allow NIPSCO LLC to continue use of the Waste Disposal Area ash pond (WDA) located at the RM Schahfer Generating Station located in Wheatfield, IN (RMSGS, Site), after April 11, 2021. The approximately 80-acre pond will complete closure no later than October 17, 2028, as provided in the enclosed Demonstration.

Golder Associates Inc. (Golder) on behalf of NIPSCO LLC, RMSGS previously prepared an alternative closure request. That previous request, contained in the Demonstration was submitted by NIPSCO LLC to EPA October 30, 2020. As was believed to be the intent of 40 CFR §257.103(f)(2) at the time of preparation of the October 30 Demonstration, the document focused primarily on 40 CFR §257.103(f)(2)(v)(C) compliance documentation information specifically for the WDA. However, as noted in that submission, RMSGS also contains other CCR Rule-regulated units. Other than NIPSCO LLC's certification of facility-wide compliance, which remains unchanged, compliance documentation for these additional CCR units was not included in the October 30 Demonstration.

This Demonstration Addendum, dated November 30, 2020, provides 40 CFR §257.103(f)(2)(v)(C) compliance documentation information for the other CCR Rule-regulated units located at the RMSGS Site. Taken in conjunction with the WDA-focused compliance documentation provided by the October

30 Demonstration, the two documents thus address EPA's request for such documentation for all CCR management units at RMSGS.

Following US EPA guidance, the enclosed Demonstration Addendum was submitted via email to Richard Huggins, Frank Behan and Kirsten Hillyer. I may be contacted at (219) 680-8628 or mturman@nisource.com with questions or comments.

Sincerely,

Maureen Turman

Maureen Turman
NiSource Director Environmental Policy and Sustainability

Enclosure

CC: Richard Huggins, US EPA
Frank Behan, US EPA
Kirsten Hillyer, US EPA

REPORT

Northern Indiana Public Service Company LLC
R.M. Schahfer Generating Station
Wheatfield, Indiana

Demonstration of Site-Specific Alternative Deadline to Initiate Closure of CCR Surface Impoundment Due to Permanent Cessation of Coal-Fired Boilers by a Date Certain - Addendum

Pursuant to 40 CFR Part 257.103(f)(2)

Submitted to:

Northern Indiana Public Service Company LLC

801 East 86th Avenue
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Submitted by:

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November 2020

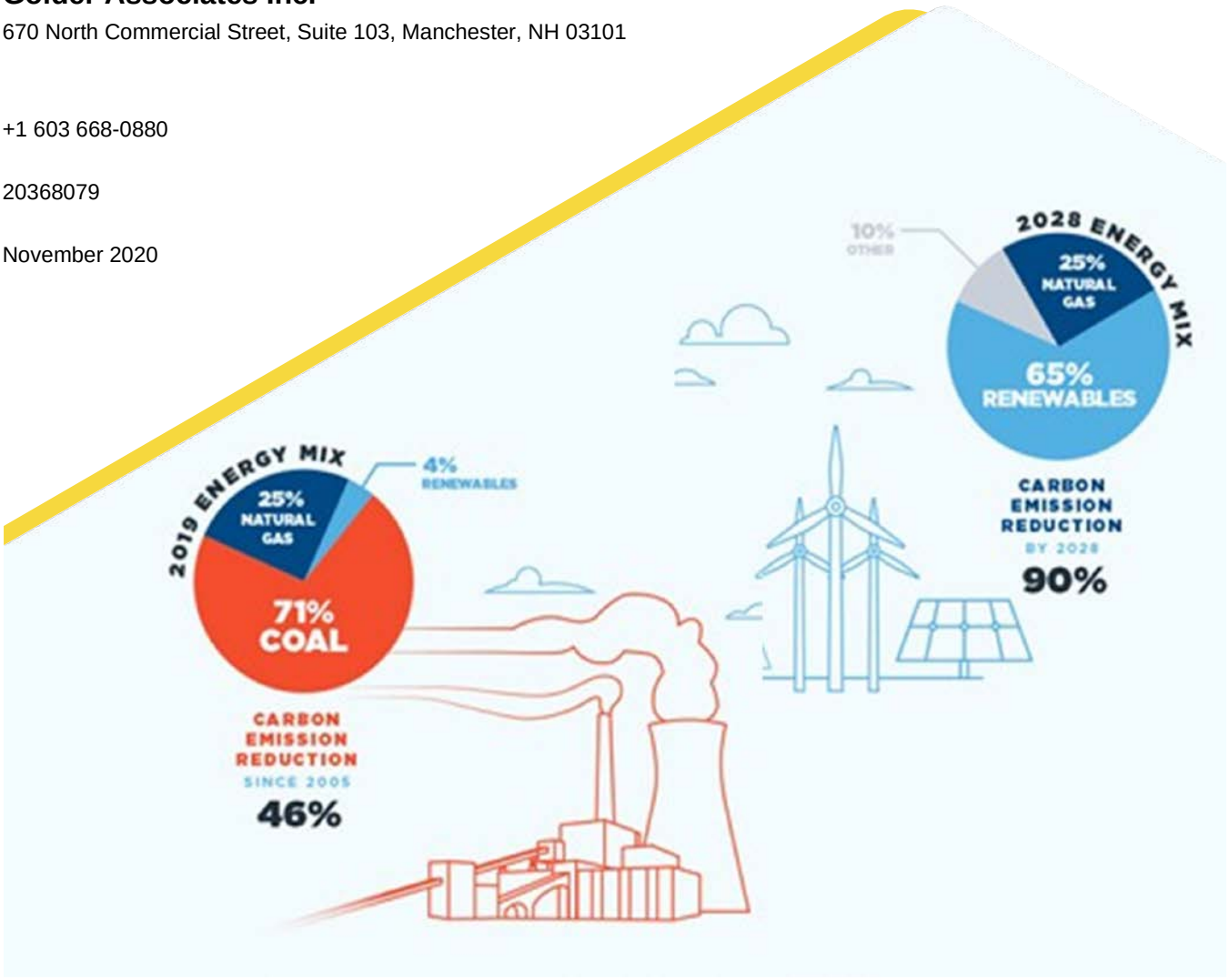


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ATTACHMENTS

Attachment 1 Multi-Cell Unit

MCU A Location Restriction Certification Report, NIPSCO R. M. Schahfer Generating Station Impoundments 40 CFR Part §257.60-64, Dated October 17, 2018

MCU B CCR Assessment of Corrective Measures 40 CFR Part §257.96, Dated April 19, 2019 (Amended November 2020)

MCU C Soil Borings and Monitoring Well Logs 40 CFR Part §257.103(f)(2)(v)(C)(2)(ii)

MCU D Multi-Cell Unit Analytical Data 40 CFR Part §257.103(f)(2)(v)(C)(3)

MCU E 2019 Annual Groundwater Monitoring and Corrective Action Report- Material Storage Runoff Basin, Metal Cleaning Waste Basin, Metal Cleaning Waste Basin, and Drying Area- January 2020

MCU F Corrective Measures Selection of Remedy, Semi-Annual Progress Report #19-01, October 2019

MCU G Corrective Measures Selection of Remedy, Semi-Annual Progress Report #20-01, April 2020

MCU H Corrective Measures Selection of Remedy, Semi-Annual Progress Report #20-02, October 2020

Attachment 2 Landfill – R.M. Schahfer Generating Station Restricted Waste Site (RWS) Type I

LF A Location Restriction Certification Report, NIPSCO R. M. Schahfer Generating Station Landfill Phase V and Phase VI, 40 CFR Part §257.64, Dated October 17, 2018

LF B R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- April 2018

LF C R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- August 2018

LF D R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- March 2019

LF E R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- September 2019

LF F R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- May 2020

LF G R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- September 2020

LF H Soil Borings and Monitoring Well Logs 40 CFR Part §257.103(f)(2)(v)(C)(2)(ii)

LF I Landfill Analytical Data 40 CFR Part §257.103(f)(2)(v)(C)(3)

LF J 2019 Annual Groundwater Monitoring and Corrective Action Report- Landfill Phase V and Phase VI January 2020

1.0 INTRODUCTION

On November 23, 2020, the U. S. Environmental Protection Agency (EPA) contacted Northern Indiana Public Service Company LLC (NIPSCO LLC) with respect to the requirements of 40 Code of Federal Regulations (CFR) §257.103(f)(2). Specifically, EPA indicated that, based on EPA's interpretation, the compliance documentation requirements of 40 CFR §257.103(f)(2)(v)(C) apply to **all** coal combustion residuals (CCR) management units at the facility in question, not just the Waste Disposal Area (WDA), a surface impoundment for which Golder Associates Inc. (Golder) on behalf of NIPSCO LLC, R. M. Schahfer Generating Station (RMSGS, Site) previously prepared an alternative closure request. That previous request, contained in the Demonstration of Site-Specific Alternative Deadline to Initiate Closure of CCR Surface Impoundment Due to Permanent Cessation of Coal-Fired Boilers by a Date Certain (Demonstration), was submitted by NIPSCO LLC to EPA October 30, 2020.

As was believed to be the intent of 40 CFR §257.103(f)(2) at the time of preparation of the October 30 Demonstration, the document focused primarily on 40 CFR §257.103(f)(2)(v)(C) compliance documentation information specifically for the WDA. However, as noted in that submission, RMSGS also contains other CCR Rule-regulated units including the soon-to-be-closed Material Storage Runoff Basin (MSRB), Metal Cleaning Waste Basin (MCWB), and Drying Area (collectively monitored and referred to as the Multi-Cell Unit (MCU), and the active multi-phase Schahfer Landfill (Landfill). Other than NIPSCO LLC's certification of facility-wide compliance, which remains unchanged, compliance documentation for these additional CCR units was not included in the October 30 Demonstration.

This Demonstration Addendum, dated November 30, 2020, provides 40 CFR §257.103(f)(2)(v)(C) compliance documentation information for the MCU and Landfill. Taken in conjunction with the WDA-focused compliance documentation provided by the October 30 Demonstration, the two documents thus address EPA's request for such documentation for all CCR management units at RMSGS. For ease of review and consistency, the Demonstration Addendum follows the general format of Section 5.0 of the October 30 document, with the exception that each subsection commensurate with the compliance documentation requirements of each of 40 CFR §257.103(f)(2)(v)(C)(2), (3), (4), (5), (6), (7) and (8) is further subdivided into a discussion of the MCU followed by a discussion of the Landfill. Data included in the Demonstration Addendum covers the time period consistent with that addressed by the October 30 Demonstration.

Analogous to the October 30 Demonstration, the Demonstration Addendum addresses two aspects of the regulatory compliance requirements in accordance with 40 CFR §257.103(f)(2)(iii). Section 2.0 identifies and briefly describes RMSGS' CCR Rule-regulated waste management units, summarizes their regulatory program status, and provides a certification of facility-wide (i.e., the entirety of RMSGS CCR Rule-regulated operations and activities) compliance with all applicable 40 CFR Part 257, Subpart D regulations, pursuant to 40 CFR §257.103(f)(2)(v)(C)(1). Sections 3.0 through 8.0 summarize and append information and supporting data detailing the status of the MCU and Landfill, respectively, with respect to Demonstration requirements for hydrogeologic setting and characterization, and the groundwater monitoring network, quality, and flow direction; corrective measures assessment and remedy selection; and structural stability and safety factor assessments, as appropriate and required for each CCR unit, pursuant to 40 CFR §257.103(f)(2)(v)(C)(2-8).

2.0 CERTIFICATION OF FACILITY STATUS

In accordance with 40 CFR §257.103(f)(2)(iii), this section of the Demonstration substantiates compliance with all other applicable requirements of 40 CFR §257. RMSGS contains three waste management areas subject to CCR Rule regulation (see Figure 1), two of which NIPSCO LLC will continue to operate for the foreseeable future and one of which is slated for closure in the near term. These include the WDA, which is the primary focus of the initial

October 30 Demonstration, the Landfill, and the MCU. On October 30, 2020, an authorized representative of NIPSCO LLC certified that the entire facility complies with the applicable requirements of the CCR Rule (see Appendix D of the Demonstration). That certification remains unchanged and valid as of the date of this Demonstration Addendum.

2.1 MCU

The following independent certifications specific to the MCU have been completed by a qualified professional engineer in accordance with the content and schedule requirements of the CCR Rule:

- Location restriction 40 CFR §257.60(a), 257.61(a), 257.62(a), 257.63(a), and 257.64(a) (Appendix MCU A)
- Documentation of liner type 40 CFR §257.71(b)
- Hazard potential classification 40 CFR §257.73(a)(2)
- Fugitive dust control plan 40 CFR §257.80(c)
- Design flood control system plan 40 CFR §257.82(c)
- Groundwater system certifications 40 CFR §257.91(f)
- Statistical method certification 40 CFR §257.93(f)(6)
- Assessment of corrective measures 40 CFR §257.96(a) (Appendix MCU B)

2.2 Landfill

The following independent certifications specific to the Landfill have been completed by a qualified professional engineer in accordance with the content and schedule requirements of the CCR Rule:

- Location restriction 40 CFR §257.64(a) (Appendix LF A)
- Design and construction certifications 40 CFR §257.70(e) and (f)
- Fugitive dust control plan 40 CFR §257.80(c)
- Run-off control system plans 40 CFR §257.81(c)
- Periodic inspection report 40 CFR §257.83(b)(2) and §257.84(b)(2)
- Groundwater system certifications 40 CFR §257.91(f)
- Statistical method certification 40 CFR §257.93(f)(6)
- ASDs for the Landfill Phases V and VI, Detection Monitoring 40 CFR §257.94(e)(2) (Appendix LF B-G)

The R.M. Schahfer Generating Station Restricted Waste Site (RWS) Type I Landfill received approval and renewal of operating permit SW Program ID 37-01 from Indiana Department of Environmental Management (IDEM) on May 27, 2020. IDEM maintains public records and documents related to this approval in their Virtual File Cabinet (VFC) at www.in.gov/idem.

3.0 HYDROGEOLOGIC INFORMATION

Groundwater elevation data collected to-date indicate that groundwater in the uppermost aquifer generally flows to the north/northeast with flow direction influenced by the presence of slurry walls surrounding the impoundments (Figure 2 and Figure 3). Golder's interpretation of the Site geology is based on soil borings, as provided in Appendix MCU C and Appendix LF H, bedrock geology maps, prior reports, CCR Rule-related well installation activities, and geotechnical borings. Golder's interpretation of the geology near the MCU is presented in cross-sections shown in Figure 4 and Figure 5, and geology near the Landfill is presented in cross-sections shown in Figure 6 and Figure 7. The Site geology is consistent across the Site and includes:

- Light to dark brown silty sand from the ground surface to approximately eight feet below ground surface (ft bgs).
- Light gray to brown fine to medium sand from approximately eight ft bgs to 18 ft bgs.
- Light gray to brown fine to coarse sand with little gravel from approximately 18 ft bgs to bedrock (34 to 36 ft bgs) (coarsens with depth)
- Black to dark gray shale with planar cleavage. Depth to bedrock is approximately 36 ft bgs near the impoundments and approximately 34 ft bgs near the Landfill.

The Site hydrogeologic information is described in more detail in Section 5.2 of the Demonstration. The CCR Unit-specific hydrogeological information and monitoring system design is described below for the MCU and the Landfill in Sections 3.1 and 3.2, respectively.

3.1 MCU Monitoring System Design

Design of a CCR Rule compliant monitoring program for the MCU, which is comprised of the MSRB, MWCB, and Drying Area, considered the component impoundments' sizes, disposal/operational history, the hydraulic influence of the perimeter slurry wall, locations relative to one another, and the lack of historical water quality data for CCR management units other than the Landfill. The surface impoundments are unlined but the MCU is surrounded by a slurry wall that extends from just below the ground surface to the underlying shale bedrock located at approximately 36 ft bgs. The slurry wall functions as a perimeter hydraulic barrier from ground surface to the underlying bedrock.

The MSRB and MCWB are two rectangular, approximately 14-acre unlined impoundments located adjacent to one another as shown in Figure 1. The Drying Area is an approximately 5.5-acre unlined impoundment that has been filled with CCR (see Figure 1). Previously, CCR-containing wastewaters from the Inactive Retired Waste Disposal Area (IRWDA) flowed through the Drying Area and then discharged to the MSRB or MCWB. The MCU impoundments are separated by interior earthen embankments. There is no indication of a slurry wall being constructed within the interior earthen embankments between the impoundments which constitute the MCU.

While design drawings exist, as-built drawings of the CCR units including construction details of the perimeter slurry wall are not available; therefore, it is unknown if the slurry wall was keyed into the underlying shale. Consequently, NIPSCO LLC's monitoring approach for the CCR surface impoundments featured the installation of well pairs including shallow (approximately 15 ft bgs) and deep (approximately 35 ft bgs – to the top of shale [signified with a "B"]) couplets at background and downgradient monitoring well locations outside of the perimeter slurry wall as shown in Figure 1. Deep monitoring wells, which are designed to monitor potential flow paths beneath the slurry wall into the aquifer, supplement the shallow wells, which are located to intersect potential flow paths through the slurry wall.

The presence and function of the slurry wall and locations of the impoundments in relation to one another influenced the positioning of monitoring wells. The downgradient edges of the MCWB, MSRB, and Drying Area cannot be monitored separately due to their position with respect to the location of the IRWDA and each other (i.e., these units are located immediately adjacent to one another); therefore, as allowed by the CCR Rule, NIPSCO LLC's approach for these CCR surface impoundments is monitoring the three separate CCR impoundments as one individual unit (i.e., the MCU). The monitoring well network contains the following wells:

- Existing Wells: Four previously existing monitoring wells designated GAMW04, GAMW07, GAMW08, and GAMW09 that are appropriately located and constructed to serve as CCR Rule-compliant monitoring wells.
- 2016 Wells: Installation of eight additional wells designated GAMW09B, GAMW15, GAMW15B, GAMW16, GAMW16B, GAMW17, GAMW17B, and GAMW18 upgradient and/or at the CCR Unit waste boundary.
- 2018 Wells: Installation of three additional deep wells designated GAMW07B, GAMW08B, and GAMW18B to supplement the monitoring network. The new deep wells are co-located with existing shallow wells GAMW07, GAMW08, and GAMW18 near the waste boundary. In addition, Golder installed five assessment monitoring well pairs designated GAMW52/52B, GAMW53/53B, GAMW54/54B, GAMW55/55B, and GAMW56/56B to assess the nature and extent of groundwater impacts downgradient of the CCR Unit and one assessment well pair designated GAMW46/46B on the northern side of the property boundary in accordance with 40 CFR §257.95(g)(1)(iii).
- 2019 Wells: Installation of replacement monitoring well GAMW55R. During the April 2019 groundwater monitoring event, Golder field personnel noted that monitoring well GAMW-55 sustained damage, which prohibited the collection of a groundwater sample. In June 2019, Golder installed monitoring well GAMW-55R to replace well GAMW-55, which is located approximately 10 ft east of the original GAMW-55. During the same mobilization, Golder installed two piezometers designated GAMW63B and GAMW64B located east of the CCR Unit to assess groundwater flow direction in this portion of the Site.
- 2020 Wells: Installation of replacement monitoring wells GAMW16R and GAMW16BR. NIPSCO LLC completed a re-piping project north of the CCR Unit that included the construction of a new concrete sump in 2020. During the sump construction activities, the contractor excavated near and destabilized monitoring wells GAMW16 and GAMW16B. Following the construction activities, Golder installed replacement wells GAMW16R and GAMW16BR approximately 10 feet south of the original wells in September 2020.

The monitoring wells and piezometers associated with the MCU are summarized below:

	Drying Area, MSRB, MCWB
Background Monitoring Wells	GAMW04, GAMW07, GAMW07B, GAMW15, and GAMW15B
Downgradient Monitoring Wells	GAMW08, GAMW08B, GAMW09, GAMW09B, GAMW16R, GAMW16BR, GAMW17, GAMW17B, GAMW17B, GAMW18, and GAMW18B
Assessment Monitoring Wells	GAMW46, GAMW46B, GAMW52, GAMW52B, GAMW53, GAMW53B, GAMW54, GAMW54B, GAMW55R, GAMW55B, GAMW56, and GAMW56B
Piezometers (non-CCR Monitoring Wells)	GAMW06, GAMW63B, and GAMW64B

A summary of the well construction information is provided in Table 1. The boring and well construction logs are provided in Appendix MCU C. The monitoring well locations are shown in Figure 1.

3.2 Landfill Monitoring System Design

NIPSCO LLC monitors the following three lined landfill cells are subject to the CCR Rule:

- Phase V - approximately 18-acre lined cell that closed April 1, 2017.
- Phase VI - approximately 15-acre lined cell located due north of Phase V, which began receiving ash on August 1, 2016.
- Phase VII – approximate 14-acre IDEM-permitted lined cell located due north of Phase VI. Construction completed in the fourth quarter of 2018 and will begin receiving waste in Q2 2021.

Closed non-regulated Landfill Phases I through IV are located east of the CCR Rule regulated landfill units. Phases I and II are unlined and Phases III through VI are lined. None of the landfill phases were designed or constructed with slurry walls as was the procedure used for the CCR Rule-regulated surface impoundments (see Figure 1).

According to historical groundwater monitoring reports completed to satisfy IDEM Solid Waste permit requirements since 2005, groundwater flow in the uppermost aquifer near the landfill is generally towards the north/northeast. Golder's interpretation of the groundwater flow regime in the area of the landfill is that Stahlbaum Ditch, which flows along the northern, western, and southern portions of the landfill boundaries, can influence groundwater flow direction (i.e., a potential localized flat to upward gradient, acting as a groundwater discharge point for the upper portion of the uppermost aquifer). Groundwater flow obtained from the newly installed CCR unit wells indicates that regionally groundwater near Landfill Phases V, VI, and VII flows towards the north/northeast (Figure 2).

Due to the design, construction, and proximity of historical landfill cells (i.e., Phases II and III) and because there is no practical means of monitoring between the CCR unit landfill cells, NIPSCO LLC's approach for the landfill CCR units includes monitoring Phases V, VI, and VII as a single CCR unit. Based on the historical groundwater data, NIPSCO LLC determined that future landfill groundwater monitoring should include multi-depth wells (similar to the CCR impoundments).

The well pairs consist of one shallow well that is constructed to an approximate depth of 18 ft bgs and a deep well installed to an approximate depth of 35 ft bgs or to the top of the shale bedrock. NIPSCO LLC began construction of a new landfill cell (Phase VII) immediately north of Phase VI in 2018 as shown in Figure 1. Due to the proximity of Phase VII to Phase VI, Golder decommissioned monitoring wells GAMW-21/21B, GAMW-22/22B, GAMW-23/23B, and GAMW-28/28B that were part of the original landfill monitoring network from 2016 to 2018. Golder installed monitoring wells GAMW-38/38B, GAMW-39/39B, GAMW-40/40B, and GAMW-41/41B downgradient and along the waste boundary of Phase VII to replace the decommissioned wells in 2018. Phase VII of the landfill is expected to begin receiving waste in Q2 2021. The updated groundwater monitoring system is adequate to monitor Phases V, VI, and VII as a single CCR unit.

The monitoring wells and piezometers associated with the Landfill are summarized in the following table:

	Phase V, VI, and VII
Background Monitoring Well	GAMW20, GAMW24, GAMW24B, GAMW25, and GAMW25B

	Phase V, VI, and VII
Downgradient Monitoring Well	GAMW26, GAMW26B, GAMW27, GAMW27B, GAMW38, GAMW38B, GAMW39, GAMW39B, GAMW40, GAMW40B, GAMW41, GAMW41B
Piezometers (non-CCR Monitoring Wells)	MW-1S/1D, MW-2S/2D, WM-3S/3D, MW-4S/4D, MW-5S/5D, MW-6S/6D, MW-7S/7D, MW-8S/8D, MW-9S/9D, MW-10S/10D, MW-11S/11D, MW-12S/12D, MW-13S/13D, MW-14S/14D, GAMW10, GAMW11, GAPIEZ07, GAMW20B, GAMW29/29B, GAMW30/30B, GAMW31/31B, GAMW32/32B, GAMW33/33B, GAMW34/34B, GAMW35B, GAMW36/36B, GAMW37B, GAMW48/48B, GAMW49/49B, GAMW50/50B

A summary of the well construction information is provided in Table 1. The boring and well construction logs are provided in Appendix LF H. The monitoring well locations are shown in Figure 1.

4.0 GROUNDWATER MONITORING RESULTS

Starting in July 2016 on behalf of NIPSCO LLC, in accordance with the requirements of the CCR Rule, Golder has performed monitoring of each well in the CCR groundwater monitoring network on at least a semi-annual basis. The monitoring well networks are described above in Section 3 and shown in Figure 1.

4.1 MCU Monitoring Program Status

Following the installation of a groundwater monitoring system in 2016 and throughout calendar year 2017, Golder collected background groundwater samples and performed Detection Monitoring around the MCU pursuant to the requirements of 40 CFR §257.94. Following receipt and validation of laboratory results, Golder evaluated the results of the first Detection Monitoring sampling event (October 2017) to compare the concentration of 40 CFR Part 257 Appendix III constituents relative to facility background concentrations. Due to the identification of statistically significant increases (SSIs), NIPSCO LLC established an Assessment Monitoring program in April 2018. In 2018, Golder performed the first and second Assessment Monitoring sampling events pursuant to the requirements of 40 CFR §257.95. Following the first Assessment Monitoring sampling event, including verification sampling, Golder determined that SSLs existed for the MCU and thus initiated the assessment of corrective measures (ACM) in November 2018. The constituents that were detected above the groundwater protection standard (GWPS) at statistically significant levels (SSL) included:

- Cobalt and Lithium at GAMW-08
- Molybdenum at GAMW-18

The GWPS is the larger value of the Maximum Contaminant Level (MCL) or the unit-specific background concentration for each analyte based on a tolerance/prediction limit statistical procedure. However, EPA amended the CCR Rule (i.e., Phase 1 Part 1 amendment) and created health-based standards for cobalt, lead, lithium, and molybdenum, constituents that do not have MCLs, as of August 29, 2018. Pursuant to 40 CFR §257.95(h)(2), the health-based standards can be used in place of background levels to calculate the GWPS. Consequently, after the second Assessment Monitoring event (October 2018), cobalt in monitoring well GAMW-08 remained as the only constituent detected at an SSL. In 2019, Golder completed the third and fourth Assessment Monitoring sampling events and in 2020, Golder completed the fifth Assessment Monitoring sampling event. The results from these sampling events confirm the SSL for cobalt.

A compilation of all groundwater data collected as part of the CCR program for the MCU is provided in Appendix MCU D. The most recent annual report (2019 Annual Report, submitted January 2020) for the MCU is provided in Appendix MCU E.

4.2 Landfill Monitoring Program Status

Following the installation of the groundwater monitoring system in 2016, and throughout 2017 Golder collected background groundwater samples. Golder performed the first Detection Monitoring event in October 2017, followed by a statistical evaluation and data analysis in January 2018. Golder determined that SSIs existed for Phases V and VI in January 2018. Golder identified a potential alternative source that could explain the SSIs and prepared an alternative source demonstration (ASD). A qualified Indiana-licensed professional engineer certified the ASD in April 2018 (Appendix LF B). The ASD supports the findings that the SSIs determined in January 2018 do not result from a release from the CCR Unit. The key supporting lines of evidence described in the ASD indicate that the closed, non-CCR Rule regulated phases of the landfill (i.e., Phases I and II) are the source of the SSIs. Therefore, no further action (i.e., Assessment Monitoring) is warranted, and Phases V and VI will remain in Detection Monitoring.

In 2018, Golder performed the second and third Detection Monitoring events. Results were consistent with the previous evaluation, and a qualified Indiana-licensed professional engineer recertified the ASD in August 2018 (Appendix LF C) and in March 2019 (Appendix LF D). In 2019, Golder performed the fourth and fifth Detection Monitoring events. Results were consistent with the previous evaluation, and a qualified Indiana-licensed professional engineer recertified the ASD in September 2019 (Appendix LF E) and in May 2020 (Appendix LF F).Golder performed the sixth Detection Monitoring event in March 2020. Results were consistent with the previous evaluation, and a qualified Indiana-licensed professional engineer recertified the ASD in May 2020 (Appendix LF G).

A compilation of all groundwater data collected as part of the CCR program for the Landfill is provided in Appendix LF I. The most recent annual report (2019 Annual Report, submitted January 2020) for the Landfill is provided in Appendix LF J.

5.0 CORRECTIVE MEASURES ASSESSMENT

Based upon CCR Rule groundwater monitoring results, NIPSCO LLC is only currently required to complete an Assessment of Corrective Measures (ACM) for the MCU. As summarized below, the ACM, which is provided in Appendix MCU B, was completed and posted to NIPSCO LLC's CCR Website in 2019. Neither the WDA, which is in Assessment Monitoring being performed consistent with 40 CFR §257.95, nor the Landfill, which remains in Detection Monitoring pursuant to 40 CFR §257.94, is subject to the ACM requirement.

5.1 MCU

In November 2018, NIPSCO LLC initiated the ACM, which included the identification of eight potential corrective measures and an evaluation of their appropriateness and expected relative effectiveness in accordance with the requirements of 40 CFR §257.96(c). In April 2019, RMSGS placed the completed ACM in the facility's operating record in accordance with the requirements of 40 CFR §257.96(d) and §257.105(h)(10). In May 2019, NIPSCO LLC posted the completed ACM to their CCR Website (Appendix MCU B) in accordance with the requirements of 40 CFR §257.107(h)(8).

As outlined in the ACM, NIPSCO LLC plans to close this CCR unit by removal in accordance with 40 CFR §257.102(c). NIPSCO LLC submitted a Closure Application to the IDEM in April 2019 and the application is currently under review by IDEM.

Subsequent to completion of the ACM and commensurate with the timing of IDEM's review of the Closure Application, Golder has performed additional field investigations beyond those typically associated with the design and implementation of CCR Rule groundwater Detection and Assessment Monitoring programs to collect Site- and CCR unit-specific data. These additional data collection efforts, which were specifically intended and developed to aid in the selection of the MCU closure approach and design of a groundwater remedy, are described in the semi-annual progress reports toward selecting a remedy as required by 40 CFR §257.97(a). The October 2019 Semi-Annual Progress Report #19-01 is included in Appendix MCU F, the April 2020 Semi-Annual Progress Report #20-01 is included in Appendix MCU G, and the October 2020 Semi-Annual Progress Report #20-02 is included in Appendix MCU H. These additional data collection efforts are summarized below:

- Supplemental assessment of the CCR unit with an emphasis on placement, location, thickness, total depth, and characteristics of the CCR impoundment materials that will be managed during the dewatering and excavation stages of the closure process.
- Aquifer test to 1) determine aquifer characteristics in the area of the CCR unit including storage characteristics and hydraulic conductivity values, 2) assess potential boundary conditions (e.g., effects of the slurry wall), and 3) support future groundwater modeling efforts (e.g., those associated with MNA Tier II and III evaluations).
- Supplemental aquifer test within one cell of the MCU to provide slurry wall performance and information on dewatering needs to the selected closure contractor.
- Installation of additional piezometers to refine understanding of local groundwater flow direction.
- Assessment of the CCR unit perimeter slurry wall including excavation of shallow pits to locate and observe the presence and performance characteristics of the slurry wall.

The 150-day (maximum) timing requirements for development of the ACM did not allow for investigation design, contractor procurement, scheduling, performance, and evaluation of the substantial amounts of data from the multi-phase assessment activities described above prior to the completion deadline specified by 40 CFR §257.96(a). Likewise, lack of substantive comments from or approval by IDEM on the proposed closure approach, with which the groundwater corrective measure must be aligned, affected the degree to which an extensive analysis of the potential corrective measures could be completed in the time-limited ACM stage. Furthermore, at the time of ACM preparation, although NIPSCO LLC was anticipating the shutdown and eventual demolition of RMSGS, no firm plans were yet in place regarding the fate of the substantial extents of underground utility (e.g., large diameter cooling water supply/return, ash slurry transport, wastewater discharge, gas and electric) lines, the locations of which with respect to the MCU and downgradient groundwater have significant ramifications for the design and placement of both active (e.g., groundwater extraction) and passive (e.g., permeable reactive barrier) corrective measure options.

As a result, and to assure that any reasonable potential remedies would not be prematurely eliminated from consideration during the subsequent Selection of Remedy process, Golder performed the ACM assessment with a primary focus on the following:

- Performing an initial screening to identify viable technologies/process options,

- Assembling corrective measures that incorporate the viable technologies/process options,
- Performing an initial evaluation of these corrective measures to identify potential corrective measures for more detailed engineering evaluation and further consideration in the selection of remedy process.

Since the completion of the initial ACM, Golder has further evaluated each of the potential corrective measures against the criteria included 40 CFR §257.96(c) and completed a Tier I, II, and III MNA evaluation, both of which are included in the November 2020 Addendum to the ACM (Appendix MCU A).

5.2 Landfill

Based upon groundwater monitoring results collected pursuant to the CCR Rule to date, corrective measures program requirements have neither been triggered nor implemented at this CCR Unit. In compliance with 40 CFR §257.95, NIPSCO LLC will continue groundwater monitoring on a semi-annual basis, evaluating results and performing statistical analyses of collected data. Should NIPSCO LLC detect exceedances of the GWPS that indicate releases attributable to the Landfill Phases V, VI, and VII, an ACM will be implemented pursuant to the requirements of 40 CFR §257.96.

6.0 REMEDY SELECTION

Based upon CCR Rule groundwater monitoring results, NIPSCO LLC is only currently required to complete remedy selection requirements pursuant to 40 CFR §257.97 or 257.98 for the MCU. Neither the WDA, which is in Assessment Monitoring being performed consistent with 40 CFR §257.95, nor the Landfill, which remains in Detection Monitoring pursuant to 40 CFR §257.94, is subject to the remedy selection requirement.

6.1 MCU

As described above in Section 5.1, based upon the ACM completed pursuant to 40 CFR §257.96(c), NIPSCO LLC is currently performing a more detailed evaluation and comparison of the eight potential groundwater corrective measures identified in the ACM. That detailed evaluation includes the development of conceptual designs and preparation of engineering cost estimates for each of the potential groundwater corrective measures. Golder will continue to perform the more detailed engineering evaluation of the eight potential corrective measures presented in the ACM by placing an emphasis on monitoring on-Site plume stability, identifying critical data gaps, understanding and reacting to impacts of newly gathered information on previous assumptions and/or conclusions, identifying and researching applicability of emerging technologies, and monitoring changing groundwater and operational conditions, if any, and future plans for the Site and their impacts on the selection of remedy process. Additionally, NIPSCO LLC is waiting on substantive comments from or approval by IDEM on the proposed closure approach with which the groundwater corrective measure must be aligned. Golder will continue to complete semi-annual progress reports (i.e., Appendix MCU F, Appendix MCU G, and Appendix MCU H) until a remedy can be selected.

6.2 Landfill

Based upon groundwater monitoring results collected pursuant to the CCR Rule to date, SSLs attributable to the Landfill Phases V, VI, and VII have not been detected nor has the requirement to conduct an ACM been triggered. Accordingly, remedy selection requirements pursuant to 40 CFR §257.97 or §257.98 are not applicable nor have they been implemented at the CCR Unit at this time. Should an ACM be necessary, NIPSCO LLC will complete it in accordance with the timeframes outlined in 40 CFR §257.96, following which NIPSCO LLC will implement the detailed remedy evaluation and selection processes.

7.0 STRUCTURAL STABILITY ASSESSMENT

7.1 MCU

The CCR Rule-regulated units (MCWB, MSRB, and Drying Area), collectively referred to as the MCU, do not fulfill the applicability requirements of 40 CFR §257.73(b)(1) or (2) and therefore, the MCU is not subject to the structural stability assessment requirement (40 CFR §257.73(d)).

7.2 Landfill

The CCR-Rule regulated Landfill unit does not qualify as an existing CCR surface impoundment (40 CFR §257.73) and therefore, the Landfill is not subject to the structural stability assessment requirement (40 CFR §257.73(d)).

8.0 SAFETY FACTOR ASSESSMENT

8.1 MCU

The CCR Rule-regulated units (MCWB, MSRB, and Drying Area), collectively referred to as the MCU, do not fulfil the applicability requirements of 40 CFR §257.73(b)(1) or (2) and therefore, the MCU is not subject to the safety factor assessment requirement (40 CFR §257.73(e)).

8.2 Landfill

The CCR-Rule regulated Landfill unit does not qualify as an existing CCR surface impoundment (40 CFR §257.73) and therefore, the Landfill is not subject to the safety factor assessment requirement (40 CFR §257.73(e)).

9.0 CLOSING

It is Golder's opinion that the information contained in this Demonstration Addendum is true, accurate and has been prepared in accordance with good engineering practices. Also, it is Golder's opinion that the additional compliance documentation provided herein further supports both the October 30 Demonstration and NIPSCO LLC's continued operation and alternative deadlines to initiate closure of the WDA, without consideration of increase in costs or inconvenience, in accordance with 40 CFR §257.103(f)(2).

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Tables

Table 1 Monitoring Well Construction Details
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

CCR Unit	Monitoring Well ID	Ground Surface Elevation (ft-amsl)	Total Borehole Depth (ft)	Top of Casing Elevation (ft-amsl)	Sounded Well Depth (ft-btoc)	Well Material	Screen Length (ft)	Screen Depth		Screen Elevation		
								Top (ft-bgs)	Bottom (ft-bgs)	Top (ft-amsl)	Middle (ft-amsl)	Bottom (ft-amsl)
WDA	GAMW01	664.90	15.00	668.19	18.86	2" Sch 40 PVC	10.00	5.00	15.00	659.90	654.90	649.90
	GAMW01B	665.20	36.00	667.87	37.80	2" Sch 40 PVC	10.00	26.00	36.00	639.20	634.20	629.20
	GAMW02	666.08	15.00	669.57	19.00	2" Sch 40 PVC	10.00	5.00	15.00	661.08	656.08	651.08
	GAMW03	665.14	15.00	668.77	18.30	2" Sch 40 PVC	10.00	5.00	15.00	660.14	655.14	650.14
	GAMW03B	665.29	35.00	668.16	37.79	2" Sch 40 PVC	10.00	25.00	35.00	640.29	635.29	630.29
	GAMW05	666.69	17.00	669.75	20.01	2" Sch 40 PVC	10.00	7.00	17.00	659.69	654.69	649.69
	GAMW12	664.35	15.00	667.29	18.17	2" Sch 40 PVC	10.00	5.00	15.00	659.35	654.35	649.35
	GAMW12B	664.23	35.00	666.81	37.82	2" Sch 40 PVC	10.00	25.00	35.00	639.23	634.23	629.23
	GAMW13	664.31	15.00	667.24	18.45	2" Sch 40 PVC	10.00	5.00	15.00	659.31	654.31	649.31
	GAMW13B	664.23	35.00	667.12	38.86	2" Sch 40 PVC	10.00	25.00	35.00	639.23	634.23	629.23
	GAMW14	664.76	15.00	667.96	18.43	2" Sch 40 PVC	10.00	5.00	15.00	659.76	654.76	649.76
	GAMW14B	664.62	35.00	667.94	39.19	2" Sch 40 PVC	10.00	25.00	35.00	639.62	634.62	629.62
	GAMW42	663.12	15.00	665.80	17.97	2" Sch 40 PVC	10.00	5.00	15.00	658.12	653.12	648.12
	GAMW42B	663.15	36.00	665.66	36.70	2" Sch 40 PVC	10.00	26.00	36.00	637.15	632.15	627.15
	GAMW42C	663.20	50.00	666.28	52.91	2" Sch 40 PVC	10.00	40.00	50.00	623.20	618.20	613.20
	GAMW43	663.14	15.00	665.59	16.29	2" Sch 40 PVC	10.00	5.00	15.00	658.14	653.14	648.14
	GAMW43B	663.12	26.00	665.53	32.28	2" Sch 40 PVC	10.00	16.00	26.00	647.12	642.12	637.12
	GAMW44	664.11	15.00	666.31	16.02	2" Sch 40 PVC	10.00	5.00	15.00	659.11	654.11	649.11
	GAMW44B	664.11	36.00	666.25	38.82	2" Sch 40 PVC	10.00	26.00	36.00	638.11	633.11	628.11
	GAMW51	666.15	15.00	668.77	18.58	2" Sch 40 PVC	10.00	5.00	15.00	661.15	656.15	651.15
	GAMW51B	666.03	37.00	668.79	39.99	2" Sch 40 PVC	10.00	27.00	37.00	639.03	634.03	629.03
	GAMW57	670.46	15.00	672.97	25.55	2" Sch 40 PVC	10.00	5.00	15.00	665.46	660.46	655.46
	GAMW57B	670.45	45.00	672.88	47.45	2" Sch 40 PVC	10.00	35.00	45.00	635.45	630.45	625.45
	GAMW58	664.99	15.00	667.54	17.58	2" Sch 40 PVC	10.00	5.00	15.00	659.99	654.99	649.99
	GAMW58B	664.88	35.00	667.59	37.81	2" Sch 40 PVC	10.00	25.00	35.00	639.88	634.88	629.88
	GAMW59	665.93	15.00	668.49	17.22	2" Sch 40 PVC	10.00	5.00	15.00	660.93	655.93	650.93
	GAMW59B	665.95	40.00	668.55	42.38	2" Sch 40 PVC	10.00	30.00	40.00	635.95	630.95	625.95
	GAMW60	665.08	15.00	667.50	17.39	2" Sch 40 PVC	10.00	5.00	15.00	660.08	655.08	650.08
	GAMW60B	665.06	40.00	667.50	42.59	2" Sch 40 PVC	10.00	30.00	40.00	635.06	630.06	625.06
	GAMW65B	665.45	35.00	668.67	37.95	2" Sch 40 PVC	10.00	25.00	35.00	640.45	635.45	630.45
	GAMW66B	669.20	44.00	672.99	47.80	2" Sch 40 PVC	10.00	34.00	44.00	635.20	630.20	625.20
	GAMW67B	664.65	40.50	667.97	43.75	2" Sch 40 PVC	10.00	30.50	40.50	634.15	629.15	624.15
	GAMW68	665.93	17.00	665.53	17.03	2" Sch 40 PVC	10.00	7.00	17.00	658.93	653.93	648.93
	GAMW68B	666.00	34.50	665.72	34.78	2" Sch 40 PVC	10.00	24.50	34.50	641.50	636.50	631.50
MSRB, MCWB, and Drying Area	GAMW04	665.81	15.00	669.21	17.86	2" Sch 40 PVC	10.00	5.00	15.00	660.81	655.81	650.81
	GAMW06	667.50	15.00	670.81	18.82	2" Sch 40 PVC	10.00	5.00	15.00	662.50	657.50	652.50
	GAMW07	666.55	15.00	669.89	18.89	2" Sch 40 PVC	10.00	5.00	15.00	661.55	656.55	651.55
	GAMW07B	666.83	40.00	669.39	42.40	2" Sch 40 PVC	10.00	30.00	40.00	636.83	631.83	626.83
	GAMW08	665.95	15.00	669.66	18.78	2" Sch 40 PVC	10.00	5.00	15.00	660.95	655.95	650.95
	GAMW08B	665.92	36.00	668.47	38.79	2" Sch 40 PVC	10.00	26.00	36.00	639.92	634.92	629.92
	GAMW09	665.10	15.00	668.99	18.48	2" Sch 40 PVC	10.00	5.00	15.00	660.10	655.10	650.10
	GAMW09B	665.35	35.00	668.29	37.42	2" Sch 40 PVC	10.00	25.00	35.00	640.35	635.35	630.35
	GAMW15	665.01	15.00	668.25	18.71	2" Sch 40 PVC	10.00	5.00	15.00	660.01	655.01	650.01
	GAMW15B	665.14	35.00	668.05	38.86	2" Sch 40 PVC	10.00	25.00	35.00	640.14	635.14	630.14
	GAMW16*	665.20	15.00	668.37	18.20	2" Sch 40 PVC	10.00	5.00	15.00	660.20	655.20	650.20
	GAMW16R	664.35	20.00	667.17	21.75	2" Sch 40 PVC	10.00	10.00	20.00	654.35	649.35	644.35
	GAMW16B*	665.16	35.00	667.76	40.13	2" Sch 40 PVC	10.00	25.00	35.00	640.16	635.16	630.16
	GAMW16BR	664.39	40.00	667.32	42.45	2" Sch 40 PVC	10.00	30.00	40.00	634.39	629.39	624.39
	GAMW17	668.81	15.00	671.93	18.00	2" Sch 40 PVC	10.00	5.00	15.00	663.81	658.81	653.81
	GAMW17B	668.86	35.00	670.60	40.34	2" Sch 40 PVC	10.00	25.00	35.00	643.86	638.86	633.86
	GAMW18	666.04	15.00	669.07	18.51	2" Sch 40 PVC	10.00	5.00	15.00	661.04	656.04	651.04
	GAMW18B	665.94	35.00	668.47	35.89	2" Sch 40 PVC	10.00	25.00	35.00	640.94	635.94	630.94
	GAMW46	661.99	15.00	664.80	17.50	2" Sch 40 PVC	10.00	5.00	15.00	656.99	651.99	646.99
	GAMW46B	661.98	32.00	664.79	33.00	2" Sch 40 PVC	10.00	22.00	32.00	639.98	634.98	629.98
	GAMW52	664.07	15.00	666.79	18.50	2" Sch 40 PVC	10.00	5.00	15.00	659.07	654.07	649.07
	GAMW52B	664.50	37.00	666.90	39.34	2" Sch 40 PVC	10.00	27.00	37.00	637.50	632.50	627.50
	GAMW53	664.68	15.00	667.24	17.49	2" Sch 40 PVC	10.00	5.00	15.00	659.68	654.68	649.68
	GAMW53B	664.62	36.00	667.29	40.10	2" Sch 40 PVC	10.00	26.00	36.00	638.62	633.62	628.62
	GAMW54	663.87	15.00	666.37	15.46	2" Sch 40 PVC	10.00	5.00	15.00	658.87	653.87	648.87
	GAMW54B	663.98	32.00	666.47	36.41	2" Sch 40 PVC	10.00	22.00	32.00	641.98	636.98	631.98
	GAMW55*	665.06	15.00	667.64	18.68	2" Sch 40 PVC	10.00	5.00	15.00	660.06	655.06	650.06
	GAMW55R	665.36	15.00	667.71	16.31	2" Sch 40 PVC	10.00	5.00	15.00	660.36	655.36	650.36
	GAMW55B	665.18	35.00	667.53	37.60	2" Sch 40 PVC	10.00	25.00	35.00	640.18	635.18	630.18
	GAMW56	665.43	15.00	667.91	15.56	2" Sch 40 PVC	10.00	5.00	15.00	660.43	655.43	650.43
	GAMW56B	665.33	35.00	667.82	36.84	2" Sch 40 PVC	10.00	25.00	35.00	640.33	635.33	630.33
	GAMW63B	666.31	33.00	668.74	35.43	2" Sch 40 PVC	10.00	23.00	33.00	643.31	638.31	633.31
	GAMW64B	664.42	31.00	666.83	33.26	2" Sch 40 PVC	10.00	21.00	31.00	643.42	638.42	633.42

Table 1 Monitoring Well Construction Details
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

CCR Unit	Monitoring Well ID	Ground Surface Elevation (ft-amsl)	Total Borehole Depth (ft)	Top of Casing Elevation (ft-amsl)	Sounded Well Depth (ft-btoc)	Well Material	Screen Length (ft)	Screen Depth		Screen Elevation		
								Top (ft-bgs)	Bottom (ft-bgs)	Top (ft-amsl)	Middle (ft-amsl)	Bottom (ft-amsl)
Landfill Phase V, Phase VI, and Phase VII	GAMW20	664.61	16.00	667.21	18.95	2" Sch 40 PVC	10.00	6.00	16.00	658.61	653.61	648.61
	GAMW20B	664.48	35.00	667.40	18.22	2" Sch 40 PVC	10.00	25.00	35.00	639.48	634.48	629.48
	GAMW21*	666.60	18.00	668.38	20.36	2" Sch 40 PVC	10.00	8.00	18.00	658.60	653.60	648.60
	GAMW21B*	666.66	37.00	669.37	36.34	2" Sch 40 PVC	10.00	27.00	37.00	639.66	634.66	629.66
	GAMW22*	666.33	18.00	668.64	20.38	2" Sch 40 PVC	13.00	5.00	18.00	661.33	654.83	648.33
	GAMW22B*	666.39	37.00	669.38	37.13	2" Sch 40 PVC	10.00	27.00	37.00	639.39	634.39	629.39
	GAMW23*	667.02	19.00	668.34	20.30	2" Sch 40 PVC	14.00	5.00	19.00	662.02	655.02	648.02
	GAMW23B*	667.03	38.00	670.02	37.92	2" Sch 40 PVC	10.00	28.00	38.00	639.03	634.03	629.03
	GAMW24	662.09	16.00	665.46	20.31	2" Sch 40 PVC	10.00	6.00	16.00	656.09	651.09	646.09
	GAMW24B	662.13	31.00	665.43	35.38	2" Sch 40 PVC	10.00	21.00	31.00	641.13	636.13	631.13
	GAMW25	665.26	16.00	668.07	19.43	2" Sch 40 PVC	10.00	6.00	16.00	659.26	654.26	649.26
	GAMW25B	665.26	35.00	667.97	37.00	2" Sch 40 PVC	10.00	25.00	35.00	640.26	635.26	630.26
	GAMW26	664.89	16.00	667.83	20.00	2" Sch 40 PVC	10.00	6.00	16.00	658.89	653.89	648.89
	GAMW26B	664.91	33.00	667.76	37.08	2" Sch 40 PVC	10.00	23.00	33.00	641.91	636.91	631.91
	GAMW27	662.68	16.00	665.57	20.00	2" Sch 40 PVC	10.00	6.00	16.00	656.68	651.68	646.68
	GAMW27B	662.65	31.00	665.52	34.73	2" Sch 40 PVC	10.00	21.00	31.00	641.65	636.65	631.65
	GAMW28*	662.24	16.00	665.56	20.15	2" Sch 40 PVC	10.00	6.00	16.00	656.24	651.24	646.24
	GAMW28B*	662.32	29.00	665.62	32.92	2" Sch 40 PVC	10.00	19.00	29.00	643.32	638.32	633.32
	GAMW29	666.58	16.00	669.48	20.39	2" Sch 40 PVC	10.00	6.00	16.00	660.58	655.58	650.58
	GAMW29B	666.64	36.00	669.43	40.52	2" Sch 40 PVC	10.00	26.00	36.00	640.64	635.64	630.64
	GAMW30	664.27	16.00	666.92	20.40	2" Sch 40 PVC	10.00	6.00	16.00	658.27	653.27	648.27
	GAMW30B	664.27	32.00	666.96	35.49	2" Sch 40 PVC	10.00	22.00	32.00	642.27	637.27	632.27
	GAMW31	662.68	16.00	665.39	19.26	2" Sch 40 PVC	10.00	6.00	16.00	656.68	651.68	646.68
	GAMW31B	662.69	30.00	665.40	32.10	2" Sch 40 PVC	10.00	20.00	30.00	642.69	637.69	632.69
	GAMW32	665.44	18.00	668.09	21.07	2" Sch 40 PVC	10.00	8.00	18.00	657.44	652.44	647.44
	GAMW32B	665.53	34.00	668.25	36.93	2" Sch 40 PVC	10.00	24.00	34.00	641.53	636.53	631.53
	GAMW33	662.63	16.00	665.24	20.33	2" Sch 40 PVC	10.00	6.00	16.00	656.63	651.63	646.63
	GAMW33B	662.43	31.00	665.25	35.35	2" Sch 40 PVC	10.00	21.00	31.00	641.43	636.43	631.43
	GAMW34	661.78	16.00	664.83	20.28	2" Sch 40 PVC	10.00	6.00	16.00	655.78	650.78	645.78
	GAMW34B	661.65	29.00	664.84	30.48	2" Sch 40 PVC	10.00	19.00	29.00	642.65	637.65	632.65
	GAMW35B	661.78	24.00	664.61	26.66	2" Sch 40 PVC	10.00	14.00	24.00	647.78	642.78	637.78
	GAMW36	662.24	16.00	664.97	20.28	2" Sch 40 PVC	10.00	6.00	16.00	656.24	651.24	646.24
	GAMW36B	662.35	25.50	665.04	35.33	2" Sch 40 PVC	1.00	24.50	25.50	637.85	637.35	636.85
	GAMW37B	662.68	25.00	665.36	27.78	2" Sch 40 PVC	10.00	15.00	25.00	647.68	642.68	637.68
	GAMW38	660.93	15.00	663.29	17.97	2" Sch 40 PVC	10.00	5.00	15.00	655.93	650.93	645.93
	GAMW38B	660.81	29.50	663.31	32.00	2" Sch 40 PVC	10.00	19.50	29.50	641.31	636.31	631.31
	GAMW39	661.04	15.00	663.53	17.95	2" Sch 40 PVC	10.00	5.00	15.00	656.04	651.04	646.04
	GAMW39B	660.96	29.50	663.49	31.15	2" Sch 40 PVC	10.00	19.50	29.50	641.46	636.46	631.46
	GAMW40	664.11	15.00	666.56	19.94	2" Sch 40 PVC	10.00	5.00	15.00	659.11	654.11	649.11
	GAMW40B	664.05	31.50	666.40	35.16	2" Sch 40 PVC	10.00	21.50	31.50	642.55	637.55	632.55
	GAMW41	660.09	15.00	662.43	16.40	2" Sch 40 PVC	10.00	5.00	15.00	655.09	650.09	645.09
	GAMW41B	660.08	27.00	662.17	30.04	2" Sch 40 PVC	10.00	17.00	27.00	643.08	638.08	633.08
	GAMW48	660.81	15.00	663.38	17.00	2" Sch 40 PVC	10.00	5.00	15.00	655.81	650.81	645.81
	GAMW48B	660.44	30.00	663.33	32.30	2" Sch 40 PVC	10.00	20.00	30.00	640.44	635.44	630.44
	GAMW49	662.00	15.00	664.64	14.18	2" Sch 40 PVC	10.00	5.00	15.00	657.00	652.00	647.00
	GAMW49B	662.12	33.00	664.52	34.82	2" Sch 40 PVC	10.00	23.00	33.00	639.12	634.12	629.12
	GAMW50	662.52	15.00	665.17	19.60	2" Sch 40 PVC	10.00	5.00	15.00	657.52	652.52	647.52
	GAMW50B	662.28	31.00	664.90	31.79	2" Sch 40 PVC	10.00	21.00	31.00	641.28	636.28	631.28
	GAMW10	663.99	15.00	667.83	18.75	2" Sch 40 PVC	10.00	5.00	15.00	658.99	653.99	648.99
	GAMW11	663.60	15.00	667.17	19.18	2" Sch 40 PVC	10.00	5.00	15.00	658.60	653.60	648.60
	MW-1D	666.36	NA	668.86	33.68	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-1S	666.43	NA	668.81	19.52	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA

Table 1 Monitoring Well Construction Details
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

CCR Unit	Monitoring Well ID	Ground Surface Elevation (ft-amsl)	Total Borehole Depth (ft)	Top of Casing Elevation (ft-amsl)	Sounded Well Depth (ft-btoc)	Well Material	Screen Length (ft)	Screen Depth		Screen Elevation		
								Top (ft-bgs)	Bottom (ft-bgs)	Top (ft-amsl)	Middle (ft-amsl)	Bottom (ft-amsl)
LANDFILL Phase V, Phase VI and Phase VII	MW-2S	662.10	NA	664.10	11.96	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-3D	664.84	NA	667.58	29.75	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-3S	664.82	NA	667.58	18.41	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-4D	664.13	NA	666.56	33.24	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-4S	664.26	NA	666.90	17.51	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-5D	662.75	NA	664.37	31.00	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-5S	662.72	NA	664.29	16.19	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-6D	661.79	NA	664.64	33.29	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-6S	662.01	NA	664.61	19.06	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-7D	662.01	NA	664.72	32.91	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-7S	661.99	NA	664.80	16.33	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-8D	661.34	NA	663.52	35.42	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-8S	661.42	NA	663.75	18.04	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-9D	661.84	NA	662.68	39.20	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-9S	661.83	NA	662.42	19.53	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-10D	662.20	NA	663.18	31.22	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-10S	661.95	NA	662.53	14.68	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-11D	661.51	NA	663.57	32.86	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-11S	661.46	NA	663.25	17.18	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-12D	661.58	NA	663.60	32.75	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-12S	661.54	NA	663.48	16.83	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-13D	662.03	NA	664.80	32.52	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-13S	662.22	NA	664.67	17.90	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-14D	662.64	NA	665.41	33.20	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	MW-14S	662.57	NA	665.24	17.72	2" Sch 40 PVC	NA	NA	NA	NA	NA	NA
	GAPIEZ07	665.15	15.00	668.77	18.91	2" Sch 40 PVC	10.00	5.00	15.00	660.15	655.15	650.15

Notes:

ft-bgs = Feet below ground surface

ft-amsl = Feet above mean sea level

ft-btoc = Feet below top of casing

WDA = Waste Disposal Area

MSRB = Material Storage Runoff Basin

MCWB = Metal Cleaning Waste Basin

No highlight indicates well is not part of the CCR monitoring program, however, water levels are measured in these wells to supplement groundwater contour maps.

Yellow highlight indicates a CCR background well

Green highlight indicates a CCR downgradient well

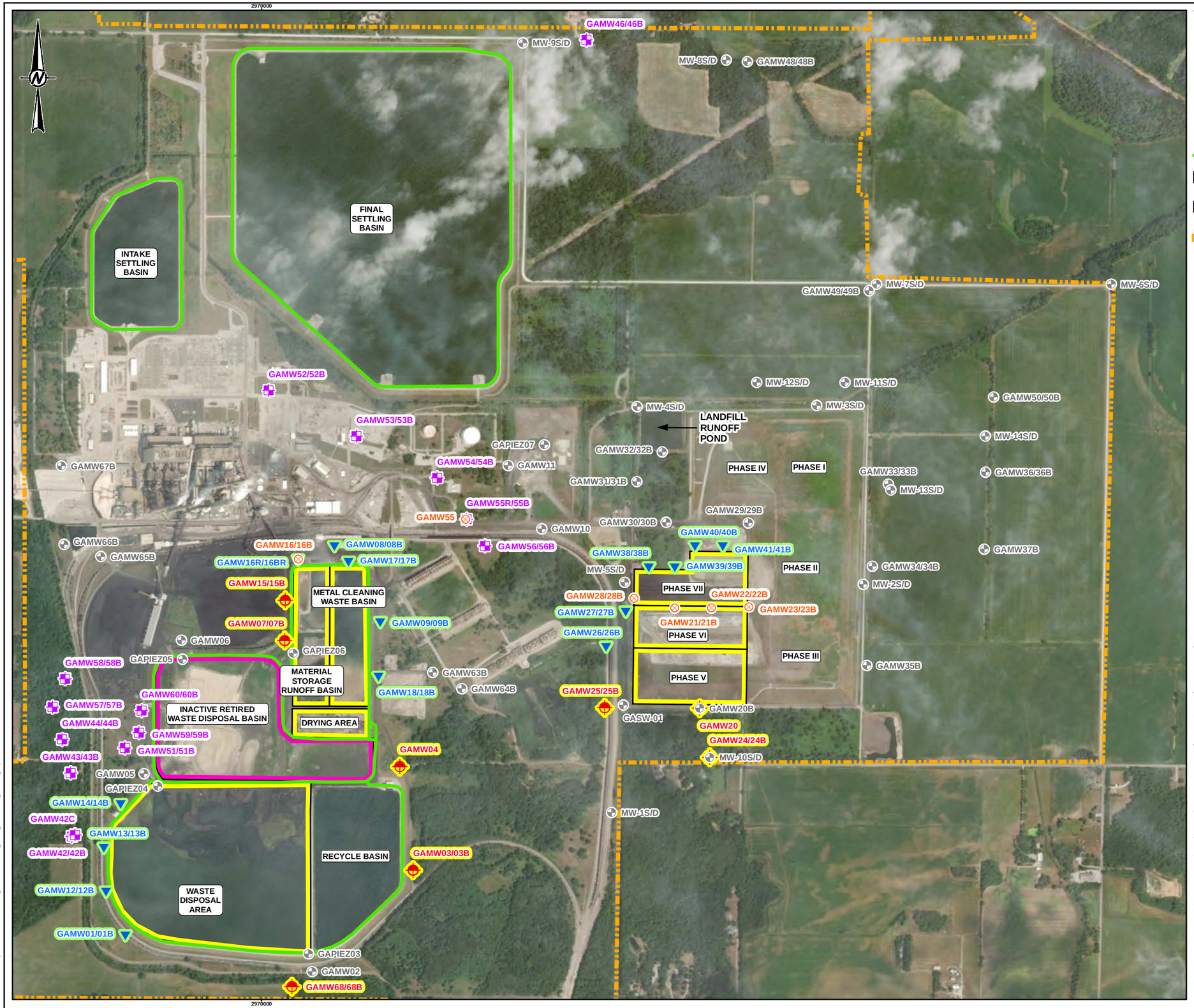
2" Sch 40 PVC = Two-inch diameter well, constructed of schedule 40 polyvinyl chloride materials

Survey elevations for new wells obtained from Marbach, Brady, and Weaver survey, June 2016, August 2018, June 2019, June 2020, and October 2020

*Decommissioned monitoring well.

Prepared by: DFSC
Checked by: KMC
Reviewed by: MAH

Figures



LEGEND

- Assessment Monitoring Well
- Background Monitoring Well
- Decommissioned CCR Monitoring Well
- Downgradient Monitoring Well
- Non-CCR
- Earth-Fill Dike with One-Foot Slurry Trench Core
- CCR Units
- Approximate Extent of Inactive Retired Waste Disposal Basin
- Approximate Property Line

0 1,000 2,000

1 " = 1,050 feet Feet

NOTE(S)

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

WDA ALTERNATIVE CLOSURE DEMONSTRATION
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

MONITORING WELL LOCATION MAP

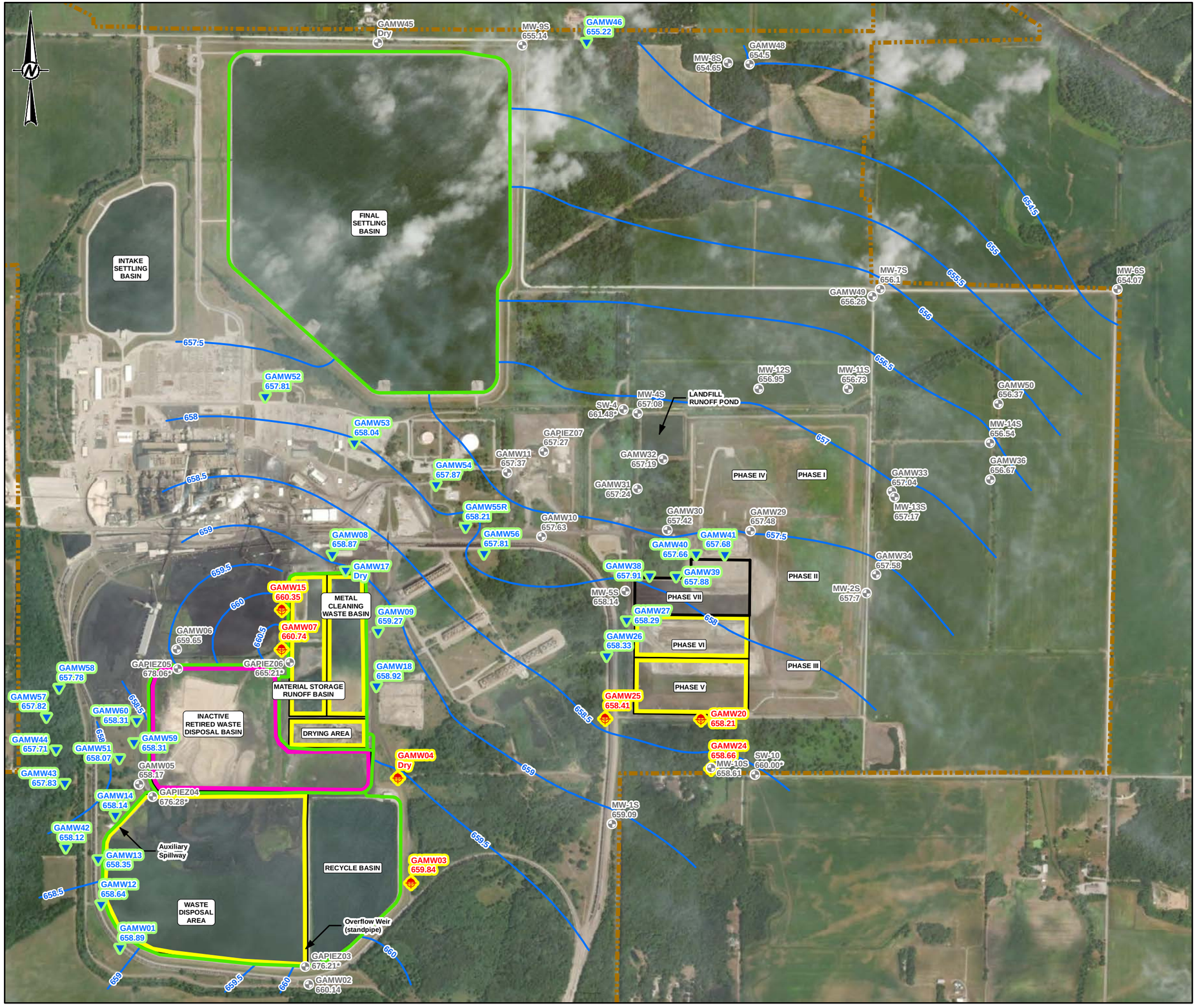
CONSULTANT

GOLDER

YYYY-MM-DD	11/6/2020
DESIGNED	DFS
PREPARED	SHL
REVIEWED	MAH
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
20368079	A	0	1

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B
1in
0



LEGEND

- Background Monitoring Well
- Downgradient Monitoring Well
- Non-CCR Well
- September 2019 Groundwater Elevation Contour (0.5 ft interval)
- Slurry Wall
- Approximate Property Line
- CCR Units
- Approximate Extent of Inactive Retired Waste Disposal Basin
- Phase VII

0 2,100

1 " = 1,050 feet Feet

NOTE(S)

1. WATER LEVEL MEASUREMENTS COLLECTED ON SEPTEMBER 25TH, 2019.
2. * INDICATES WELL NOT USED FOR CONTOURING.

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

WDA ALTERNATIVE CLOSURE DEMONSTRATION
R. M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

SEPTEMBER 2019 GROUNDWATER ELEVATION CONTOURS

CONSULTANT

GOLDER

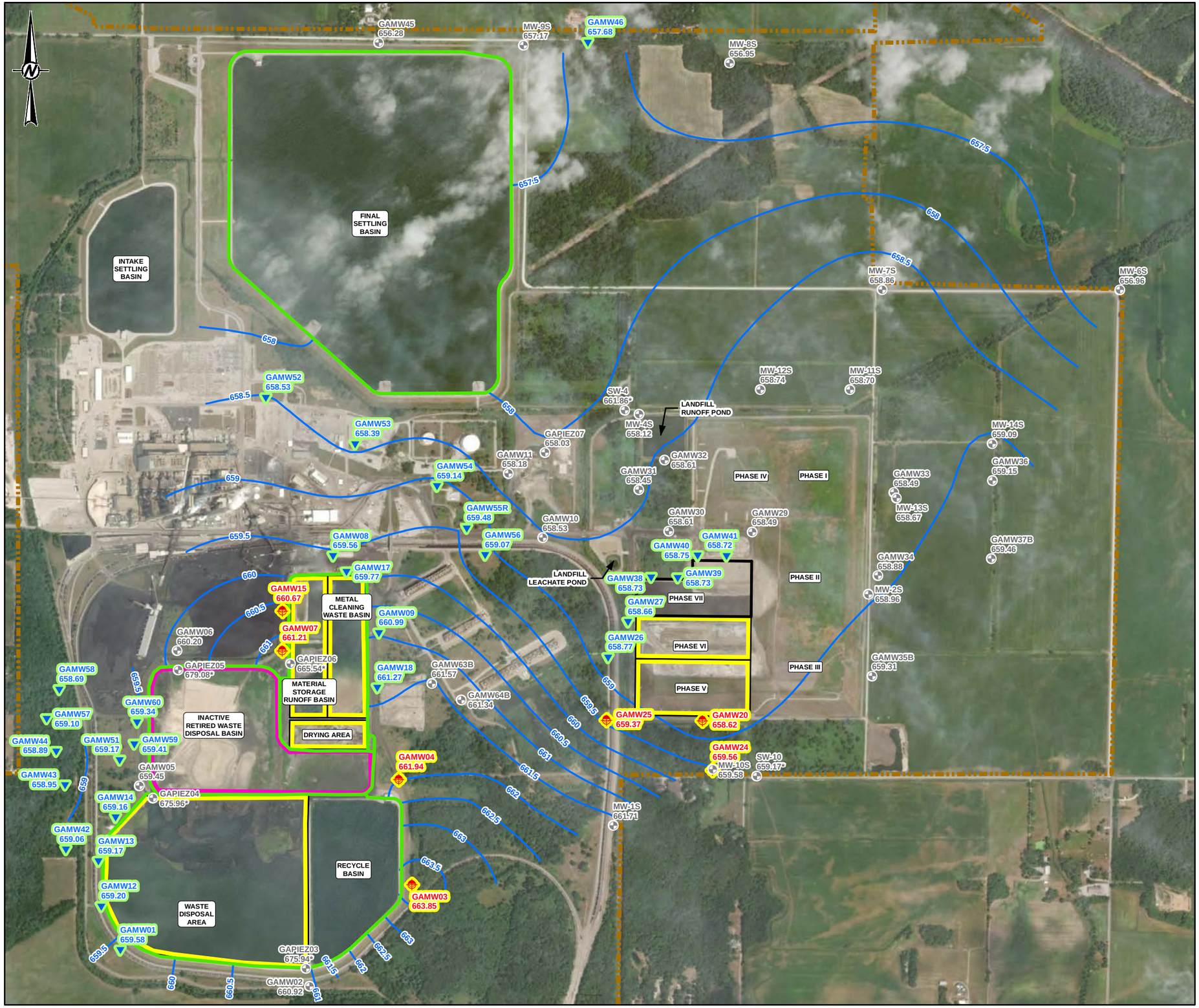
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DESIGNED	JSP
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 1in

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LEGEND

- Background Monitoring Well
- Downgradient Monitoring Well
- Non-CCR Well
- March 2020 Groundwater Elevation Contour (0.5 ft interval)
- Slurry Wall
- Approximate Property Line
- CCR Units
- Inactive Retired Waste Disposal Basin
- Phase VII

0 2,100

1 " = 1,050 feet Feet

NOTE(S)

1. WATER LEVEL MEASUREMENTS COLLECTED ON MARCH 13TH 2020.
2. * INDICATES WELL NOT USED FOR CONTOURING.

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

WDA ALTERNATIVE CLOSURE DEMONSTRATION
R. M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

APRIL 2020 GROUNDWATER ELEVATION CONTOURS

CONSULTANT

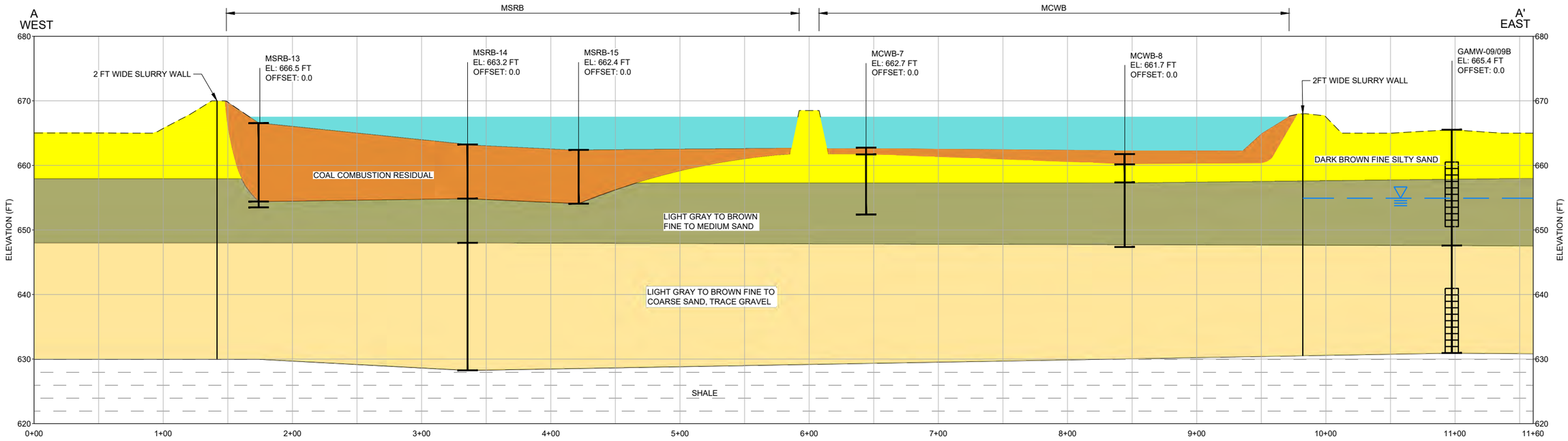
GOLDER

YYYY-MM-DD	2020-09-30
DESIGNED	JSP
PREPARED	TBH
REVIEWED	JSP
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
20368079	A	0	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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SCALE 1" = 80' (A / 4) MULTI-CELL UNIT CROSS SECTION A-A'

LEGEND

GAMW-09/09B	=	LOCATION I.D.
EL: 665.4 FT OFFSET: 0.0	=	GROUND SURFACE ELEVATION OFFSET DISTANCE
	=	APPROXIMATE GROUNDWATER ELEVATION
	=	WELL SCREEN
	=	END OF BORING LOCATION
		WATER
		COAL COMBUSTION RESIDUAL
		DARK BROWN FINE SILTY SAND
		LIGHT GRAY TO BROWN FINE TO MEDIUM SAND
		LIGHT GRAY TO BROWN FINE TO COARSE SAND, TRACE GRAVEL
		SHALE

KEY MAP



NOTE(S)

1. GOLDER DEVELOPED THE GEOLOGIC CROSS SECTION USING BORING LOGS COMPLETED BY GOLDER BETWEEN JULY 2016 AND NOVEMBER 2019. WHERE NECESSARY, GOLDER ADJUSTED CONTACTS USING PROFESSIONAL JUDGEMENT.
2. GEOLOGIC CONTACTS ILLUSTRATED BETWEEN AND BELOW BORINGS ARE INFERRED AND SHOULD NOT BE INTERPRETED AS EXACT INDICATORS OF GEOLOGIC CONDITIONS AT, BETWEEN, OR BELOW BORINGS.

VERTICAL SCALE: 0 8 16 — 1" = 16' FEET

HORIZONTAL SCALE: 0 40 80 — 1" = 80' FEET

CLIENT
NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

CONSULTANT
GOLDER

YYYY-MM-DD	2020-11-24
DESIGNED	JSP
PREPARED	AAZ
REVIEWED	JSP
APPROVED	MAH

PROJECT
WDA ALTERNATIVE CLOSURE DEMONSTRATION
R.M. SCHAHFER GENERATING STATION
WHEATFEILD, INDIANA

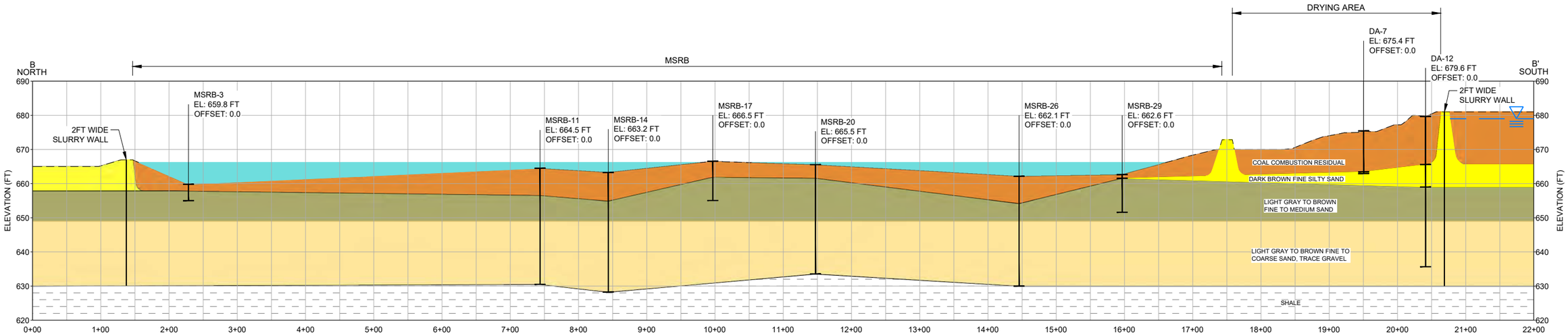
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MULTI-CELL UNIT HYDROGEOLOGICAL CROSS SECTION A-A'

PROJECT NO.	CONTROL	REV.	FIGURE
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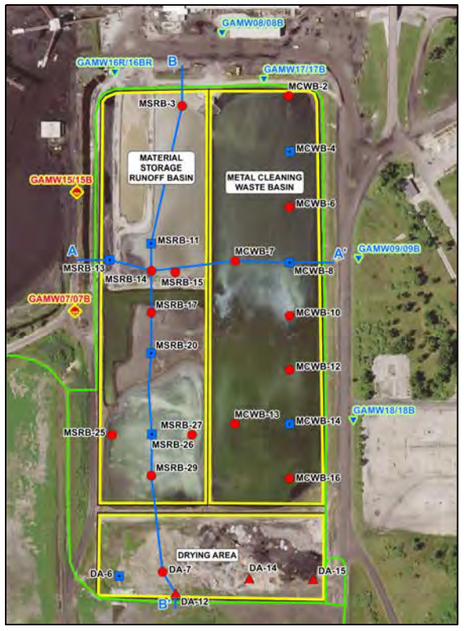


SCALE 1" = 80' (A / 5) MULTI-CELL UNIT CROSS SECTION B-B'

LEGEND

MSRB-20 EL: 665.2 FT OFFSET: 0.0	=	LOCATION I.D. GROUND SURFACE ELEVATION OFFSET DISTANCE
	=	APPROXIMATE GROUNDWATER ELEVATION
	=	WELL SCREEN
	=	END OF BORING LOCATION
		WATER
		COAL COMBUSTION RESIDUAL
		DARK BROWN FINE SILTY SAND
		LIGHT GRAY TO BROWN FINE TO MEDIUM SAND
		LIGHT GRAY TO BROWN FINE TO COARSE SAND, TRACE GRAVEL
		SHALE

KEY MAP



NOTE(S)

1. GOLDER DEVELOPED THE GEOLOGIC CROSS SECTION USING BORING LOGS COMPLETED BY GOLDER BETWEEN JULY 2016 AND NOVEMBER 2019. WHERE NECESSARY, GOLDER ADJUSTED CONTACTS USING PROFESSIONAL JUDGEMENT.
2. GEOLOGIC CONTACTS ILLUSTRATED BETWEEN AND BELOW BORINGS ARE INFERRED AND SHOULD NOT BE INTERPRETED AS EXACT INDICATORS OF GEOLOGIC CONDITIONS AT, BETWEEN, OR BELOW BORINGS.

VERTICAL SCALE: 0 8 16 — 1" = 16' FEET

HORIZONTAL SCALE: 0 40 80 — 1" = 80' FEET

CLIENT
NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

CONSULTANT
GOLDER

YYYY-MM-DD	2020-11-24
DESIGNED	JSP
PREPARED	AAZ
REVIEWED	JSP
APPROVED	MAH

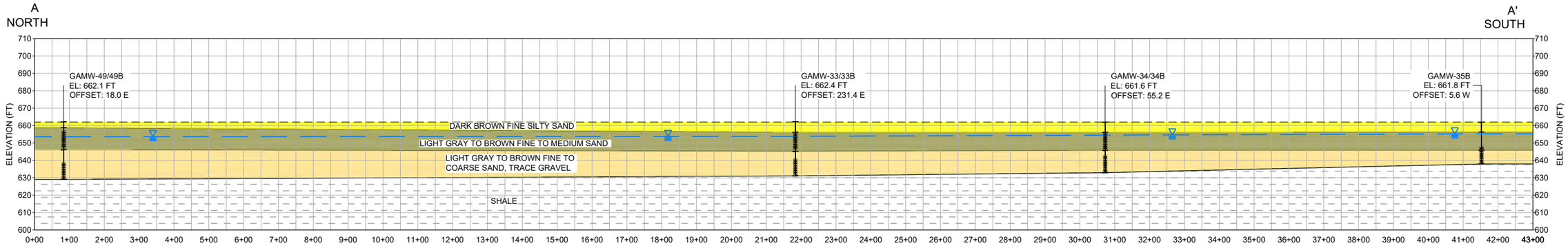
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WDA ALTERNATIVE CLOSURE DEMONSTRATION
R.M. SCHAHFER GENERATING STATION
WHEATFEILD, INDIANA

TITLE
MULTI-CELL UNIT HYDROGEOLOGICAL CROSS SECTION B-B'

PROJECT NO.	CONTROL	REV.	FIGURE
20360525	201	0	5

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SCALE 1" = 300' — A/6 — LANDFILL CROSS SECTION A-A'

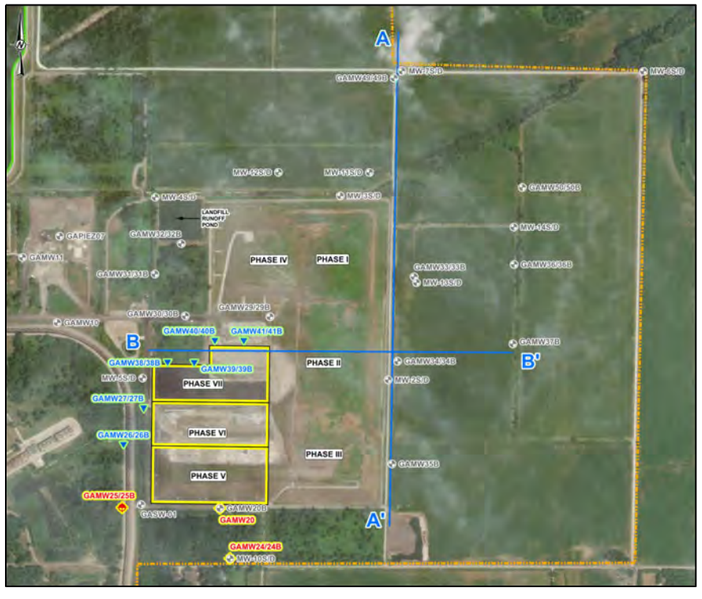
LEGEND

GAMW-34/34B	=	WELL I.D.
EL: 661.6 FT	=	GROUND SURFACE ELEVATION
OFFSET: 55.2 E	=	OFFSET DISTANCE
	=	APPROXIMATE GROUNDWATER ELEVATION
	=	WELL SCREEN
	=	END OF BORING LOCATION
		COAL COMBUSTION RESIDUAL
		DARK BROWN FINE SILTY SAND
		LIGHT GRAY TO BROWN FINE TO MEDIUM SAND
		LIGHT GRAY TO BROWN FINE TO COARSE SAND, TRACE GRAVEL
		SHALE

NOTE(S)

1. GOLDER DEVELOPED THE GEOLOGIC CROSS SECTION USING BORING LOGS COMPLETED BY GOLDER BETWEEN SEPTEMBER 2016 TO JULY 2018. WHERE NECESSARY, GOLDER ADJUSTED CONTACTS USING PROFESSIONAL JUDGEMENT.
2. GEOLOGIC CONTACTS ILLUSTRATED BETWEEN AND BELOW BORINGS ARE INFERRED AND SHOULD NOT BE INTERPRETED AS EXACT INDICATORS OF GEOLOGIC CONDITIONS AT, BETWEEN, OR BELOW BORINGS.

KEY MAP



VERTICAL SCALE: 0 40 80 — 1" = 80' FEET

HORIZONTAL SCALE: 0 150 300 — 1" = 300' FEET

CLIENT
NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

CONSULTANT
GOLDER

YYYY-MM-DD	2020-11-24
DESIGNED	JSP
PREPARED	AAZ
REVIEWED	JSP
APPROVED	MAH

PROJECT
WDA ALTERNATIVE CLOSURE DEMONSTRATION
R.M. SCHAHFER GENERATING STATION
WHEATFEILD, INDIANA

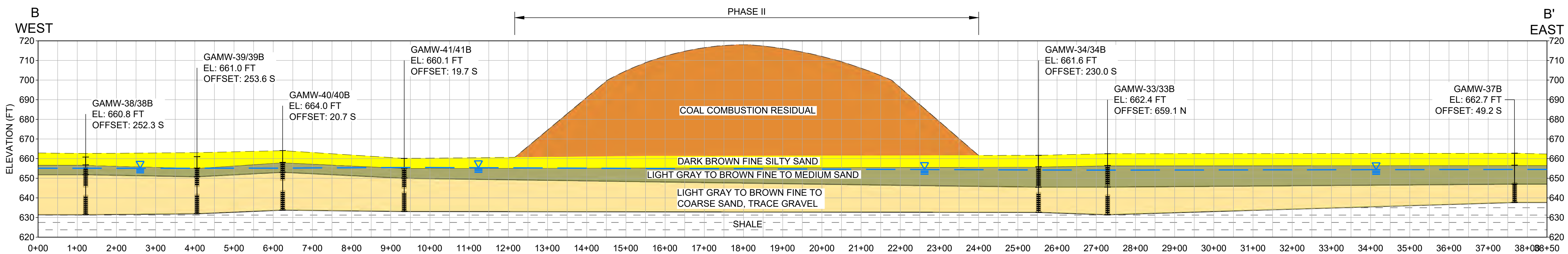
TITLE
LANDFILL HYDROGEOLOGICAL CROSS SECTION A-A'

PROJECT NO.	CONTROL	REV.	FIGURE
20360525	201	0	6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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SCALE 1" = 300' A/7 LANDFILL CROSS SECTION B-B'

LEGEND

GAMW-34/34B	=	WELL I.D.
EL: 661.6 FT	=	GROUND SURFACE ELEVATION
OFFSET: 55.2 E	=	OFFSET DISTANCE
	=	APPROXIMATE GROUNDWATER ELEVATION
	=	WELL SCREEN
	=	END OF BORING LOCATION
		COAL COMBUSTION RESIDUAL
		DARK BROWN FINE SILTY SAND
		LIGHT GRAY TO BROWN FINE TO MEDIUM SAND
		LIGHT GRAY TO BROWN FINE TO COARSE SAND, TRACE GRAVEL
		SHALE

NOTE(S)

1. GOLDER DEVELOPED THE GEOLOGIC CROSS SECTION USING BORING LOGS COMPLETED BY GOLDER BETWEEN SEPTEMBER 2016 TO JULY 2018. WHERE NECESSARY, GOLDER ADJUSTED CONTACTS USING PROFESSIONAL JUDGEMENT.
2. GEOLOGIC CONTACTS ILLUSTRATED BETWEEN AND BELOW BORINGS ARE INFERRED AND SHOULD NOT BE INTERPRETED AS EXACT INDICATORS OF GEOLOGIC CONDITIONS AT, BETWEEN, OR BELOW BORINGS.

KEY MAP



VERTICAL SCALE: 0 40 80 1" = 80' FEET

HORIZONTAL SCALE: 0 150 300 1" = 300' FEET

CLIENT	NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC
CONSULTANT	GOLDER
YYYY-MM-DD	2020-11-24
DESIGNED	JSP
PREPARED	AAZ
REVIEWED	JSP
APPROVED	MAH

PROJECT
WDA ALTERNATIVE CLOSURE DEMONSTRATION
R.M. SCHAHFER GENERATING STATION
WHEATFEILD, INDIANA

TITLE
LANDFILL HYDROGEOLOGICAL CROSS SECTION B-B'

PROJECT NO.	CONTROL	REV.	FIGURE
20360525	201	0	7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
1 in

Attachment 1 Multi-Cell Unit

Appendices

MCU A Location Restriction Certification Report, NIPSCO R. M. Schahfer Generating Station Impoundments 40 CFR Part §257.60-64, Dated October 17, 2018

MCU B CCR Assessment of Corrective Measures 40 CFR Part §257.96, Dated April 19, 2019 (Amended November 2020)

MCU C Soil Borings and Monitoring Well Logs 40 CFR Part §257.103(f)(2)(v)(C)(2)(ii)

MCU D Multi-Cell Unit Analytical Data 40 CFR Part §257.103(f)(2)(v)(C)(3)

MCU E 2019 Annual Groundwater Monitoring and Corrective Action Report- Material Storage Runoff Basin, Metal Cleaning Waste Basin, Metal Cleaning Waste Basin, and Drying Area- January 2020

MCU F Corrective Measures Selection of Remedy, Semi-Annual Progress Report #19-01, October 2019

MCU G Corrective Measures Selection of Remedy, Semi-Annual Progress Report #20-01, April 2020

MCU H Corrective Measures Selection of Remedy, Semi-Annual Progress Report #20-02, October 2020

MCU A Location Restriction Certification Report, NIPSCO R. M. Schahfer Generating Station Impoundments 40 CFR Part §257.60-64, Dated October 17, 2018

Location Restrictions Certification Report

NIPSCO R. M. Schahfer Generating Station Impoundments

Pursuant to:

40 CFR §257.60
40 CFR §257.61
40 CFR §257.62
40 CFR §257.63
40 CFR §257.64

Submitted to:

Northern Indiana Public Service Company
R. M. Schahfer Generating Station
Wheatfield, Indiana

Submitted by:

Golder Associates Inc.
15851 South US 27, Suite 50
Lansing, Michigan, USA 48906
+1 517 482-2262

Project No. 164817101

October 17, 2018

CERTIFICATION

Professional Engineer Certification Statement [40 CFR §257.60-64(b)]

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations, Sections 257.60 through 64 (40 CFR §257.60-64), I attest that this NIPSCO R. M. Schahfer Generating Station Impoundments Location Restrictions Certification Report is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR §257.60-64.

Golder Associates Inc.

Signature



10/17/18

Date of Report Certification

Tiffany D. Johnson, P.E.

Name

PE11500730

Indiana Professional Engineer Certification Number

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CERTIFICATION **C-1**

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2.3 Fault Areas [40 CFR §257.62] 2

2.4 Seismic Impact Zones [40 CFR §257.63] 2

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Figure 1 Site Location Map

Figure 2 CCR Unit Location Map

1.0 INTRODUCTION

1.1 Background

40 Code of Federal Regulations (CFR) Parts 257 and 261, “Hazardous and Soil Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule” (CCR Final Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1 place requirements on the location of CCR management units. Golder Associates Inc. (Golder) on behalf of Northern Indiana Public Service Company (NIPSCO) evaluated the location criteria and prepared this Location Restrictions Certification Report for the R. M. Schahfer (RMSGS) Waste Disposal Area (WDA), Material Storage Runoff Basin (MSRB), Metal Cleaning Waste Basin (MCWB), and the Drying Area (together, the CCR Units). RMSGS occupies an area of approximately four-square miles located at 2723 E 1500 N Road, Wheatfield, Jasper County, Indiana (Latitude 41° 12' 36" and Longitude 87° 01' 48", see Figure 1). WDA is an approximately 80-acre impoundment that is surrounded by a slurry wall and located in the southwest region of RMSGS. The Drying Area is an approximately 5.5-acre impoundment that is surrounded by a slurry wall and located north-northeast of the WDA. The Drying Area has been completely filled with CCR. The MSRB and MCWB consist of two rectangular, approximately 15-acre impoundments located adjacent to one another. The ponds are separated by a narrow berm. While there is a perimeter slurry wall around the basins, there is no slurry wall within the narrow berm between the basins. These ponds are located north of the Drying Area. The location of all of the CCR Units is shown on Figure 2.

1.2 Purpose

The purpose of this Location Restrictions Certification Report is to provide demonstrations for the certification required by 40 CFR §257.60-64. Location Restrictions criteria include:

- §257.60 Placement above the uppermost aquifer
- §257.61 Wetlands
- §257.62 Fault areas
- §257.63 Seismic impact zones
- §257.64 Unstable areas

2.0 LOCATION RESTRICTIONS

The following sections outline NIPSCO’s (“owner’”) requirements as presented in 40 CFR §257 Subpart D, Location Restrictions regulations.

2.1 Placement Above the Uppermost Aquifer [40 CFR §257.60]

NIPSCO has collected groundwater elevation data from monitoring wells surrounding the CCR Units. The data collected indicate the maximum upper limit of the upper most aquifer was approximately 660 feet mean sea level (ft msl). Golder reviewed construction drawings, advanced 10 soil borings within the CCR Units, and completed 28 geophysical lines to better understand the presence and thickness of CCR and thus, the bottom elevation (base) of the CCR Units. Results of these activities indicate the elevation of the bottom of CCR (and, thus, the base) of the WDA to be between 635 ft msl and 665 ft msl, the MSRB and Drying Area to be between 657 ft msl and 660 ft msl, and the MCWB to be between 661 ft msl and 664 ft msl. This separation distance does not satisfy the requirements set forth in 40 CFR 257.60(a).

2.2 Wetlands [40 CFR §257.61]

To evaluate the location of the RMSGS CCR Units relative to wetlands, Golder reviewed readily available information:

- US Geological Survey (USGS) topographic map
- National Wetland Inventory (NWI) map
- US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey map
- Aerial imagery
- Federal Emergency Management Agency (FEMA) floodplain map

In addition to the desktop data review, Golder staff completed a field reconnaissance to evaluate the presence or absence of wetlands at the Site. Wetlands are mapped in areas adjacent to the Site (NWI Map). Visual observation during the Site visit indicated that there were no wetlands within the footprint of the WDA, MSRB, MCWB and the Drying Area. Based on Site reconnaissance and information compiled by Golder, the RMSGS CCR Units are not located within wetlands and meet the requirements of 40 CFR §257.61.

2.3 Fault Areas [40 CFR §257.62]

Based on Indiana Geological Survey Miscellaneous Map 85 (Gray and Steinmetz, 2012), the closest fault that has displaced during Holocene time is the 'Royal Center Fault' which is located approximately 35 miles southeast of the RMSGS. Therefore, the CCR units at the Site are not located within 200 feet of the outermost damage zone of a Holocene fault.

2.4 Seismic Impact Zones [40 CFR §257.63]

The United Stated Geological Survey (USGS) reports peak horizontal ground acceleration (PGA) at RMSGS to be approximately 0.06 g with a 2% probability of exceedance in 50 years using the values from the 2015 National Earthquake Hazards Reduction Program Recommended Seismic Provisions for New Buildings and Other Structures (USGS, 2018). Therefore, the CCR units at the Site are not located within a seismic impact zone as defined by 40 CFR §257.63, thereby meeting this requirement.

2.5 Unstable Areas [40 CFR §257.64]

Based on research conducted through the Indiana Geological Survey information website (http://igs.indiana.edu/), the USGS, and historical reports prepared by Golder and others for the RMSGS site, the following unstable areas information was identified.

2.5.1 Petroleum Fields/Wells

There is a 400 feet deep petroleum well identified 0.5 miles north and west of the Site.

2.5.2 Sand and Gravel Pit

The closest identified pit is located approximately two miles east of the Site.

2.5.3 Active Mineral

There are no active industrial minerals sites identified within three miles of the Site.

2.5.4 Karst

There are no karst terrain locations mapped near the Site.

2.5.5 Liquefaction Potential

Based on the historical information prepared for the site (Golder, 2016), the embankments and foundation soils for the RMSGS CCR Units are not susceptible to seismically induced liquefaction.

2.5.6 Surface Mine

There are no surface coal mines identified near the Site.

2.5.7 Underground Mine

There are no underground coal mines identified near the Site.

2.5.8 Steep Slope

There are embankments with notable steep slopes for the CCR Units. Golder performed a slope stability analysis and the results of the slope stability analysis indicate that the CCR Unit slopes have an acceptable factor of safety (Golder, 2011, 2016).

2.5.9 Abandoned Quarries

There are no abandoned quarries identified near the Site.

2.5.10 Differential Settlement

Differential settlement is not expected in the foundation soils for the CCR Units at RMSGS (Golder, 2011).

Based on Golder's evaluation of the data resources available, the CCR Units at the RMSGS meet the stability requirements under 40 CFR §257.64.

3.0 CONCLUSION AND SUMMARY

This report has been prepared in general accordance with normally accepted civil engineering practices to fulfill the reporting requirements of 40 CFR §257.60-257.64. Based on the review of the available information provided by NIPSCO, the CCR Units the WDA, Drying Area, MSRB, and the MCWB do not meet the requirements for the minimum separation between the CCR Unit base and the upper limit of the uppermost aquifer and therefore is subject to 40 CFR §257.101(b)(1).

This report will be placed in the facility's operating record in accordance with 40 CFR 257.105(e) and will be made available on the facility's publicly accessible internet site in accordance with 40 CFR 257.107(e).

4.0 REFERENCES

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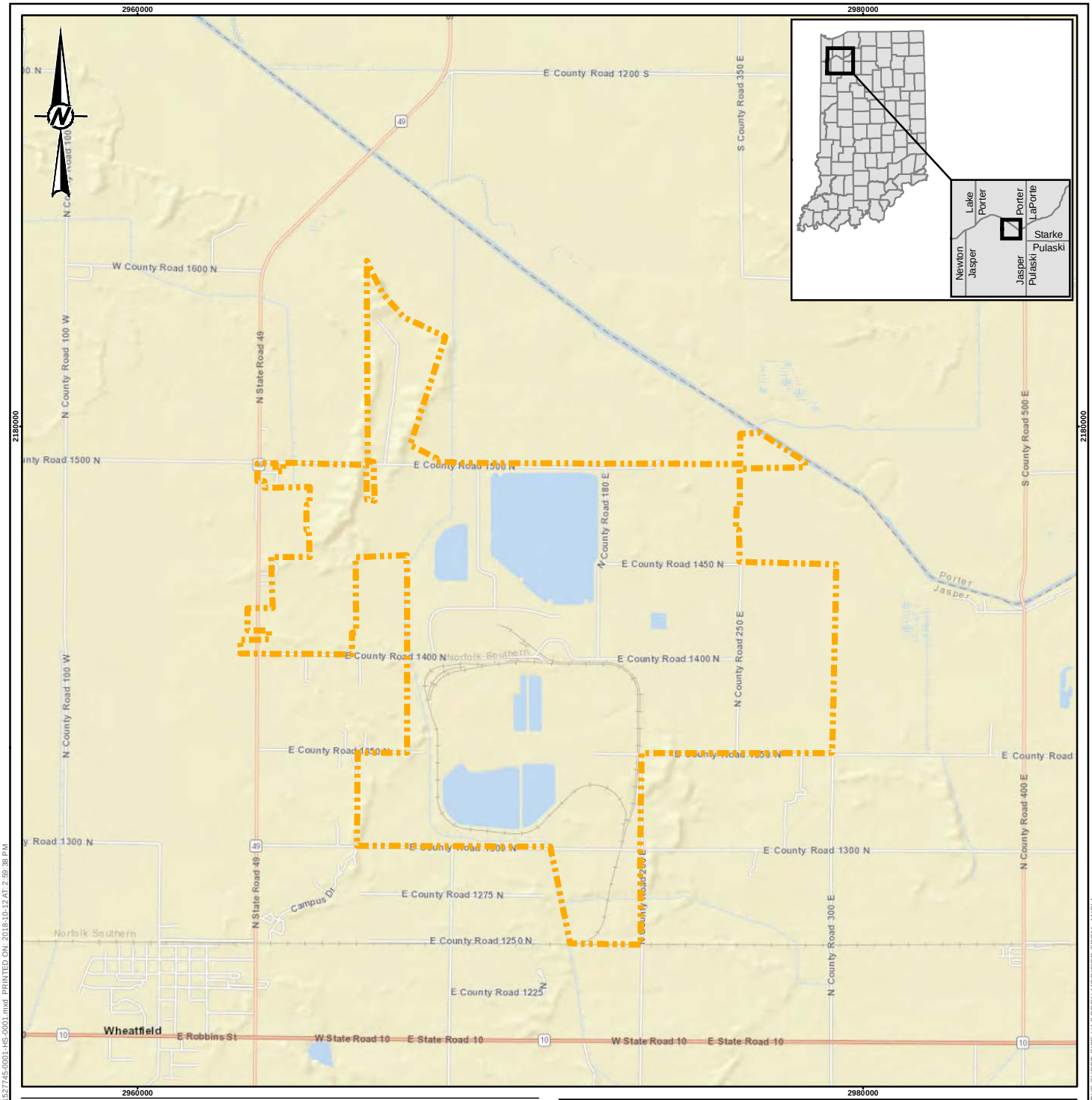
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LEGEND

Approximate Property Line

0 0.75 1.5

1 " = 0.75 miles Miles

NOTE(S)

REFERENCE(S)

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

SITE LOCATION MAP

CONSULTANT

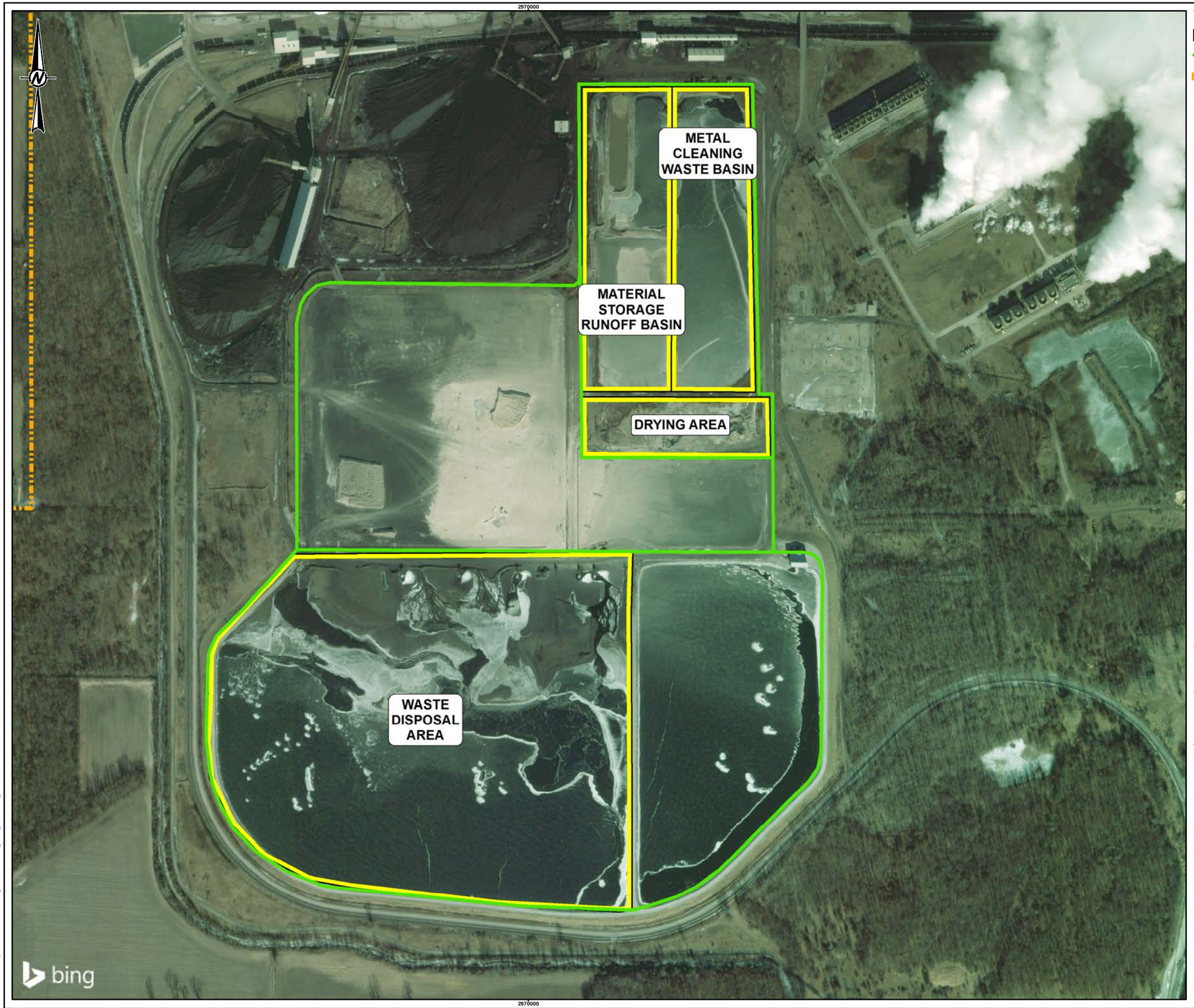
GOLDER

YYYY-MM-DD	10/12/2018
DESIGNED	DFS
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

- CCR Units
- Slurry Wall
- Approximate Property Line

0 500 1,000

1 " = 500 feet Feet

NOTE(S)

REFERENCE(S)

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CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

CCR UNIT LOCATION MAP

CONSULTANT

GOLDER

YYYY-MM-DD	10/12/2018
DESIGNED	JSP
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

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MCU B CCR Assessment of Corrective Measures 40 CFR Part §257.96, Dated April 19, 2019 (Amended November 2020)

Northern Indiana Public Service Company LLC (NIPSCO)

R. M. Schahfer Generating Station – MSRB, MCWB and DA (collectively the CCR Unit)

Wheatfield, Indiana

Certification of CCR Assessment of Corrective Measures Report - Addendum

40 CFR §257.96 & Corresponding Regulations under Indiana Administrative Code

I have personally reviewed this Addendum to the assessment of corrective measures (ACM) report, the subject of which is three impoundments (the Material Storage Runoff Basin (MSRB), Metal Cleaning Waste Basin (MCWB), and Drying Area (DA)), which are collectively referred to as the CCR Unit, at the NIPSCO R. M. Schahfer Generating Station, prepared by Golder Associates Inc. and dated November 2020. Based on an inquiry of those individuals immediately responsible and on supporting data that I understand to be true, accurate, and complete, I verify the information in this Addendum to the ACM Report is accurate and meets the applicable requirements of the CCR Final Rule. In consideration of the above, I certify to the best of my knowledge, information, and belief, that the Addendum to the ACM Report for the regulated CCR management unit referred to as the CCR Unit has been prepared and meets the applicable requirements of 40 CFR §257.96 and corresponding State of Indiana requirements.



Joseph Bernard Gormley, Jr.
Indiana Professional Engineer
License #: PE11900213

11/30/2020
Date

REPORT

Northern Indiana Public Service Company LLC
R.M. Schahfer Generating Station
Wheatfield, Indiana

CCR Assessment of Corrective Measures Report - Addendum

Submitted to:

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November 2020

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Acronyms

ACM	Assessment of Corrective Measures
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
cm/sec	Centimeter per second
COC	Constituents of Concern
CSM	Conceptual Site Model
DA	Drying Area
FGD	flue gas desulphurization
ft amsl	feet above mean sea level
ft bgs	feet below ground surface
GMPIM	Groundwater Monitoring Program Implementation Manual
gpm	gallons per minute
GWPS	Groundwater Protection Standards
IAC	Indiana Administrative Code
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
ISS	In situ Stabilization/Solidification
IRWDA	Inactive Retired Waste Disposal Area
MCL	Maximum Contaminant Level
MCWB	Metal Cleaning Waste Basin
mg/L	milligram per liter
MNA	Monitored Natural Attenuation
MSRB	Material Storage Runoff Basin
MW	megawatt
NIPSCO	Northern Indiana Public Service Company
NPDES	National Pollutant Discharge Elimination System
O&M	Operations & Maintenance
POC	Point of Compliance
POTW	Publicly Owned Treatment Works
PRB	Permeable Reactive Barrier
RCG	Remediation Closure Guide
RMSGS	Rollin. M. Schahfer Generating Station
SSL	Statistically Significant Level
ug/L	microgram per liter
USEPA	United States Environmental Protection Agency
WDA	Waste Disposal Area

1.0 INTRODUCTION

Golder has prepared this Addendum to supplement the findings of the April 2019 CCR Assessment of Corrective Measures Report for the Rollin M. Schahfer Generating Station (RMSGS, Site) (ACM Report, Golder 2019), which was completed on behalf of the Northern Indiana Public Service Company LLC (NIPSCO LLC).

This Addendum was prepared to provide further details of Golder's evaluation of the potential corrective measures for RMSGS and specifically focuses on addressing the following requirements under 40 Code of Federal Regulations (CFR) §257.96(c)

> *"The assessment under paragraph (a) of this section must include an analysis of the effectiveness of potential corrective measures in meeting all of the requirements and objectives of the remedy as described under §257.97 addressing at least the following:*
>
> *1) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies including safety impacts, cross-media impacts, and control of exposure to any residual contamination;*
>
> *2) The time required to begin and complete the remedy;*
>
> *3) The institutional requirements, such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s)."*

This Addendum and the ACM Report (Golder 2019) should be consulted in combination with one another.

2.0 BACKGROUND

NIPSCO LLC operates the RMSGS located at 2723 E 1500 N Road, in Wheatfield, Jasper County, Indiana. RMSGS manages coal combustion residuals (CCR) in surface impoundments subject to applicable requirements of 40 CFR Part 257 as amended (CCR Rule). Pursuant to 40 CFR §257.96(a), three impoundments, the Material Storage Runoff Basin (MSRB), Metal Cleaning Waste Basin (MCWB), and Drying Area (DA), collectively the CCR Unit, were subject to an ACM, the results of which were presented in the ACM Report (Golder 2019).

NIPSCO LLC plans to close this CCR Unit by removal in accordance with 40 CFR §257.102(c) and an approved Indiana Department of Environmental Management (IDEM) Closure Application. In order to meet the requirements of 40 CFR §257.97-98, NIPSCO's approach combines CCR source removal followed by groundwater corrective measures and monitoring to demonstrate achievement of applicable cleanup standards.

In the ACM Report (Golder 2019), Golder identified eight potential groundwater corrective measures for further consideration following the excavation and closure of the CCR Unit. The potential corrective measures and their key components are summarized in Table 5 of the ACM Report (Golder 2019) and discussed in detail in Section 4.0 below.

3.0 IDENTIFICATION OF POTENTIAL CORRECTIVE MEASURES

3.1 Source Material

As discussed in the ACM Report (Golder 2019), NIPSCO LLC plans to close this CCR Unit by removal in accordance with 40 CFR §257.102(c) and an approved IDEM Closure Application. NIPSCO's approach combines CCR source removal and groundwater remediation and monitoring to demonstrate achievement of applicable cleanup standards. The multi-part corrective action approach will be integrated, but may be sequenced, to allow

for monitoring of early-stage post-closure results and optimization of subsequent steps following completion of the initial stages.

The first phase of the integrated corrective action approach is closure by removal of the CCR Unit. Following dewatering activities, the three impoundments will be excavated. In accordance with the Closure Application, excavations are being planned to remove CCR and non-CCR materials to the original design limits (sides and bottom) of the impoundments, plus an additional one-foot of material from the floor of each impoundment. Satisfactory excavation will be confirmed by a visual determination that the CCR materials have been removed (Wood 2019). Following removal, a soil cover with a permeability less than or equal to 1×10^{-5} centimeters per second (cm/sec) will be placed over the closed CCR Unit (Wood 2020).

In addition to traditional long-term post-closure monitoring during closure implementation and in the early stages of post-closure, NIPSCO LLC will perform remedy-focused groundwater monitoring activities. NIPSCO LLC will use the monitoring results to evaluate the impacts of source removal and associated closure construction activities and help inform and refine the groundwater remedy selection process as needed.

3.2 Groundwater Impacts

Following closure of the CCR Unit by removal, NIPSCO LLC will address the residual impacts in groundwater below and downgradient of the CCR Unit. In the ACM Report (Golder 2019), Golder identified and preliminarily evaluated the following eight groundwater corrective measure alternatives for further consideration in accordance with the provisions of §257.96(c).

- Alternative 1 - Monitored Natural Attenuation (MNA)
- Alternative 2 - Capping and MNA
- Alternative 3 - Vertical Barrier and MNA
- Alternative 4 - In situ Stabilization/Solidification (ISS) and MNA
- Alternative 5 - Pump-and-Treat and MNA
- Alternative 6 - Capping, Pump-and-Treat, and MNA
- Alternative 7 - Vertical Barrier, Pump-and-Treat, and MNA
- Alternative 8 - ISS, Pump-and-Treat, and MNA

Golder's evaluation of the potential corrective measures and their key components are summarized in Table 5 of the ACM Report (Golder 2019). For this Addendum, Golder provided further supporting evaluation details with respect to each of these potential corrective measure alternatives.

The remedial components of the groundwater corrective measure alternatives are described further in Section 4.

4.0 EVALUATION OF POTENTIAL CORRECTIVE MEASURES

4.1 Evaluation Criteria

In conformance with the applicable requirements of 40 CFR §257.96 and 40 CFR §257.97, Golder evaluated the effectiveness of each of the eight potential corrective measures identified in the ACM Report (Golder 2019) using the following criteria:

- **Performance** - Potential corrective measures were evaluated for their relative performance based on the magnitude of reduction of existing risks, ability to obtain the groundwater protection standard (GWPS) at the point of compliance (POC), the magnitude of residual risks in terms of likelihood of future releases due to remaining CCR following implementation of remedy, and the required type and degree of long-term management including monitoring, operation, and maintenance associated with the corrective measure.
- **Reliability** - Potential corrective measures were evaluated for their relative reliability based on the long-term reliability of engineering and institutional controls, potential need for the replacement of the remedy, extent to which containment practices will reduce further releases, and extent to which the treatment technologies may be used.
- **Ease of Implementation** - Potential corrective measures were evaluated based on their relative ease of implementation based on difficulty associated with construction of the technology, operational reliability of the technology(ies), coordination of regulatory approvals and permits from pertinent agencies, availability of necessary equipment and specialists, and availability capacity and location of needed treatment, storage, and disposal services.
- **Potential Impacts** - Potential corrective measures were evaluated based on their relative potential impacts based on safety impacts, cross-media impacts, and control of exposure. Exposure controls include short-term risks during implementation of a remedy and potential exposure to remaining wastes to the community or environment including potential threats associated with excavation, transportation, re-disposal of CCR, or contaminant.
- **Time Requirements** - Potential corrective measures were evaluated based on the time required to initiate, construct, and complete the remedy.
- **Institutional Requirements** - Potential corrective measures were evaluated based on their institutional requirements including local, state, and federal permit needs.

4.2 Evaluation Summaries

The following sections present brief summaries of the proposed groundwater corrective measure alternatives relative to the evaluation criteria. In addition, the summaries highlight areas where a particular remedy may perform well or poorly relative to other alternatives.

4.2.1 Alternative 1: Monitored Natural Attenuation

Golder evaluated MNA as a potential corrective measure for the Site COCs. The MNA Evaluation (Golder 2020) is presented in Appendix D. The results of the evaluation indicate that MNA is a technically feasible corrective measure for groundwater at the Site based on the following factors:

- Attenuation is already occurring at the Site at a reasonable rate
- The dissolved plume is stable
- The aquifer has the long-term capacity to attenuate COCs

Based on the results of the Tier I, II, and III MNA evaluations for the Site, Golder concluded that MNA is expected to provide good long-term performance. MNA alone will not substantially affect groundwater concentrations in the

short-term, however, it may show some progress within a few months of source material removal during closure of the CCR Unit.

For the MNA evaluation, Golder conducted a point decay evaluation at monitoring wells downgradient of the CCR Unit. Based on the results of the evaluation, maximum concentrations of boron and cobalt observed in downgradient wells over the period of monitoring would take approximately 41 and 39 years, respectively, to attenuate to concentrations below the GWPS (or health-based standard for boron) (Golder 2020).

For the evaluation, Golder also considered the following factors:

- The low groundwater flow velocities observed at the Site
- The distance from the CCR Unit to the property boundary and lack of off-Site migration of groundwater impacts
- The lack of potable water supply wells at the Site in the vicinity of the CCR Unit and the downgradient plume
- Planned institutional controls prohibiting use of groundwater at the Site for drinking water
- Lower observed boron concentrations at monitoring wells further downgradient from the CCR Unit

Based on these other factors, MNA is expected to be protective of human health and reduce environmental degradation until the wells near the CCR Unit achieve the cleanup criteria.

Because there is an existing monitoring well network downgradient of the CCR Unit, implementation of an MNA program is unlikely to require any component construction/installation. In addition, it does not require disturbance of the complex subsurface utility network located hydraulically downgradient of the CCR Unit. Therefore, MNA will be relatively easy to implement following regulatory approval and poses no short-term safety risks. Long-term operation and maintenance (O&M) will include routine groundwater sampling and potentially periodic well redevelopment.

4.2.2 Alternative 2: Capping and MNA

The Capping and MNA Alternative Installation would consist of an enhanced low-permeability cap (e.g., permeability less than or equal to 1 x 10^{-7} cm/sec) that would augment reduction of contaminant concentrations downgradient of the closed CCR Units by further reducing infiltration of rainwater that could contact residual CCR-impacted materials over the standard soil cap proposed for every remedial alternative. In doing so it may further reduce the volume of impacted groundwater requiring natural attenuation.

The Capping and MNA Alternative will have similar long- and short-term effects to MNA. However, because of the existing slurry wall surrounding the CCR Unit that is keyed into the underlying bedrock, installation of an enhanced cap will increase the possibility of creating a cell of isolated groundwater that will not be recharged through migration of un-impacted groundwater or infiltrating rainwater. Due to the history of CCR loading, the capacity of the saturated zone within the slurry wall to naturally attenuate CCR impacts has likely been depleted relative to the aquifer outside the slurry wall. Because a cap will not affect the mass of residual contamination, installation of a cap will likely result in a zone of impacted groundwater that could potentially be released when the slurry wall exceeds its operational lifetime. This potential release could result in re-contamination of the surrounding aquifer, which would presumably have undergone significant natural attenuation in the interim.

Enhanced cap construction would not require significant additional time and effort to accomplish over the soil cap that will be incorporated into each alternative. It will have little additional impact to the surrounding community. It will require periodic inspections and O&M costs to maintain the surface of the cap as well as capital costs to replace the cap every 30 years.

4.2.3 Alternative 3: Vertical Barrier/Hydraulic Control and MNA

For the Vertical Barrier/Hydraulic Control and MNA Alternative, hydraulic controls within the existing slurry wall would be added to the MNA alternative. The Vertical Barrier/Hydraulic Control and MNA alternative would be implemented to reduce or eliminate downgradient migration of groundwater impacted by residual CCR material that may be remaining in the CCR Unit area following closure by removal. This alternative assumes that the existing slurry wall is intact and that implementation of this alternative involves installation and operation of a pump-and-treat system within the former impoundment areas to prevent over-topping of the slurry wall due to groundwater recharge by precipitation.

The Vertical Barrier/Hydraulic Control and MNA Alternative would have a similar effect as the capping alternative on MNA downgradient of the closed CCR Unit. It would reduce or eliminate the volume of impacted groundwater overtopping the slurry wall, thus removing a source of contamination, and allowing for more efficient natural attenuation. This remedy would also result in removal of contaminant mass through groundwater extraction and treatment with boron-specific ion exchange resin, which would reduce the potential for future releases of impacted groundwater if/when the slurry wall fails.

Because there is an existing and functional slurry wall around the CCR Unit, corrective measure implementation would include design, well installation, enclosure construction, and treatment system assembly/construction. Some treatment system components may require lead times prior to delivery; however, most components should be readily available. An amendment to the Site's National Pollutant Discharge Elimination System (NPDES) permit would likely be required to discharge treated water to an on-site stormwater pond, which could delay implementation while awaiting regulatory review.

Resin regeneration requires concentrated sodium hydroxide and hydrochloric acid, which could be released and cause damage to the environment in the event of a containment breach. Likewise, in the event of unidentified contaminant breakthrough, there is the potential for treated water containing unacceptable contaminant levels to be discharged in the treatment system effluent. However, both of these events are unlikely to occur as the reagents will be stored in secondary containment and resin regeneration will be completed automatically on a regular basis to maintain the resin at a high level of removal efficiency.

The pump-and-treat system will require a higher level of periodic O&M compared to capping as influent and effluent samples will likely need to be collected monthly and there is significant potential for shut-downs due to the number of different components (filter vessels, ion-exchange columns, slurry dryer, pH adjustment system, etc.) that are needed to keep the system operational. Most or all of these components will also need replacement over the 30-year design lifetime of the system.

4.2.4 Alternative 4: ISS and MNA

For the ISS and MNA Alternative, ISS within the existing slurry wall would be added to the MNA alternative. The purpose of implementing an ISS solution would be to reduce the potential for residual CCR materials to contact infiltrating rainwater and subsequently leaches to groundwater. Similar to the capping alternatives, ISS reduces

the volume of infiltrating rainwater that can come into contact with underlying impacted soil and groundwater. Furthermore, it reduces the mobility of any COCs that may still come into contact with rainwater.

The ISS and MNA Alternative presents a similar level of short- and long-term performance as a cap. The stabilized layer will reduce potential leaching to infiltrating rainwater and provide a low-permeability surface that reduces the volume of rainwater contacting underlying material, thus reducing the volume of impacted groundwater overtopping the slurry wall and migrating downgradient.

Similar to the capping alternative, because the stabilized layer will be effectively impermeable and will extend laterally to the existing slurry wall, which reaches the underlying bedrock, the ISS alternative will also create an isolated cell of impacted groundwater with a reduced potential for recharge through migration of un-impacted groundwater or infiltrating rainwater. This isolated cell will have a lowered capacity for natural attenuation and could re-contaminate the outside aquifer upon failure of the slurry wall. In addition, while ISS will not remove or destroy contaminants of concern, it will reduce the mobility of contaminants in the stabilized layer.

ISS would require a higher level of effort than the cap to implement including a pilot-scale study during design to evaluate stabilizing mixes, equipment mobilization, and mixing of the stabilizing agent with Site soil using large-diameter mixing augers. The mixing augers are specialized equipment that may not be readily available in the project area, which would increase the time to implementation and associated mobilization costs. The stabilization work would also take a significant amount of time to complete, likely three months to a year or more depending on the number of mixing augers available. .

4.2.5 Alternative 5: Pump-and-Treat and MNA

For the Pump-and-Treat and MNA Alternative, a pump-and-treat system would be implemented to capture contaminated groundwater present in the vicinity of the CCR Unit and/or potentially leaking through/under the CCR slurry wall, to prevent downgradient off-Site migration. The captured groundwater would then be treated to reduce concentrations to an acceptable concentration and discharged to surface water or groundwater.

The Pump-and-Treat and MNA Alternative offers a higher level of short- and long-term protection than capping and ISS as it removes contaminant mass through treatment of extracted water using ion-exchange resin. This will help reduce contaminant concentrations and thereby enhance natural attenuation downgradient of the capture zone. The capture zone is extensive enough that continued operation of the pump-and-treat system will also contain any future groundwater releases if/when the slurry wall fails.

Some treatment system components may require lead times prior to delivery, but most components should be readily available. An amendment to the Site's NPDES permit would likely be required to discharge treated water to an on-site stormwater pond, which could delay implementation while awaiting regulatory review. Resin regeneration requires concentrated sodium hydroxide and hydrochloric acid, which could be released and cause damage to the environment in the event of a containment breach. Likewise, in the event of unidentified contaminant breakthrough, there is the potential for treated water containing unacceptable contaminant levels to be discharged. However, both of these events are unlikely to occur as the any reagents will be stored in secondary containment and resin regeneration will be completed automatically on a regular basis to maintain the resin at a high level of removal efficiency. The system will require a higher level of periodic O&M compared to capping and ISS as effluent samples will likely need to be collected monthly and there is significant potential for shut-downs due to the number of different components (filter vessels, ion-exchange columns, slurry dryer, pH adjustment system, etc.) that are needed to keep the system operational. Most or all of these components will also need replacement over the 30-year design lifetime of the system.

4.2.6 Alternative 6: Capping, Pump-and-Treat, and MNA

For the Capping, Pump-and-Treat, and MNA Alternative, the capping and pump-and-treat systems would be implemented simultaneously to generate a more protective remedy. The combination alternative would increase short-term performance of both remedial controls by reducing the volume of impacted water leaving the slurry wall containment and entering the pump-and-treat capture zone, allowing the pump-and-treat system to treat only the impacted water outside of the former CCR Unit. This should increase the efficiency of natural attenuation downgradient of the capture zone while reducing the overall mass of contamination. Operation of the pump-and-treat system would also contain any future groundwater releases if/when the slurry wall fails.

The capping and pump-and-treat system installations would face similar challenges and present similar risks as those presented above in section 4.2.2 and 4.2.5:

- High level of effort and construction impacts during cap construction
- Lead times on pump-and-treat system components
- Significant pump-and-treat system discharge permitting hurdles
- High level of O&M for cap and pump-and-treat system monitoring

4.2.7 Alternative 7: Vertical Barrier/Hydraulic Control, Pump-and-Treat, and MNA

The Vertical Barrier/Hydraulic Control, Pump-and-Treat, and MNA Alternative, which includes a pump-and-treat system pumping from wells both inside and downgradient of the slurry wall, would offer a high level of short- and long-term protection. The downgradient well field would remove impacted groundwater allowing for higher-efficiency natural attenuation downgradient of the capture zone while the well field inside the slurry wall would remove more highly-impacted material and reduce the potential for future releases if/when the wall fails. This alternative would also result in the highest level of contaminant mass removal.

Construction/implementation of this corrective measure alternative would face similar construction/permitting hurdles as the Vertical Barrier/Hydraulic Control and Pump-and-Treat Alternatives in Sections 4.2.3 and 4.2.5, most significantly lead times on components and discharge permitting. Operation and maintenance for this remedy would also be similar to these alternatives with frequent influent/effluent sampling and component monitoring and maintenance, however, the treatment system could be contained in a single enclosure and have a single set of components for treating extracted water from both capture areas. Because of the shared treatment system, the O&M level of effort would likely not be significantly higher than that presented in Section 4.2.5 for the Pump-and-Treat Alternative (as opposed to an additive level of effort for the combined remedial alternatives).

4.2.8 Alternative 8: ISS, Pump-and-Treat, and MNA

Similar to Alternative 6, the ISS and Pump-and-Treat Alternative would be implemented simultaneously to generate a more protective remedy. This alternative would present similar levels of short- and long-term effectiveness as the ISS and Pump-and-Treat Alternatives presented in Sections 4.2.4 and 4.2.5. The combined alternative would reduce the volume of impacted water leaving the slurry wall containment and entering the pump-and-treat capture zone, allowing the pump-and-treat system to treat only the impacted water outside of the CCR Unit. This should increase the efficiency of natural attenuation downgradient of the capture zone while removing contaminant mass. Operation of the pump-and-treat system will also contain any future groundwater releases if/when the slurry wall fails.

Corrective measure implementation would combine the levels of effort required for both the ISS and pump-and-treat remedial components resulting in the most difficult and time-consuming construction and O&M for any of the corrective measure alternatives presented. As discussed above, implementing ISS would require a pilot-scale study during design to evaluate stabilizing mixes, equipment mobilization, and mixing of the stabilizing agent with Site soil using large-diameter mixing augers. ISS requires specialized equipment that may not be readily available in the project area that would increase the mobilization costs and implementation time. The ISS work would also take a significant amount of time to complete, likely three months to a year or more depending on the number of large-diameter mixing augers available. Due to the length of ISS implementation/mixing, permitting for the pump-and-treat system would likely not delay the overall implementation of the corrective measure. O&M of the treatment system would still require frequent influent/effluent sampling, and equipment monitoring, maintenance, and periodic replacement.

5.0 SUMMARY AND NEXT STEPS

This Addendum supplements the ACM Report (Golder 2019) by providing additional details regarding the eight potential groundwater corrective measures identified in the report and by evaluating those corrective measures in accordance with the performance requirements identified in 40 CFR §257.96(c).

Based on the findings of the ACM Report and Addendum, Golder will prepare a detailed evaluation/comparison of the groundwater corrective measure alternatives, including conceptual designs and engineering cost estimates, that provides NIPSCO LLC with sufficient information to select a remedy that effectively meets the requirements of 40 CFR §257.97 including protection of public health and the environment. This detailed evaluation/comparison of corrective measures will be documented in a Selection of Remedy Report for the RMSGS.

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Tables

Table 1: Applicable Groundwater Cleanup Standards
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL (mg/L)	GWPS (mg/L)	IDEM RCG (mg/L)
Appendix III Constituents			
Boron	-	NA	4
Calcium	-	NA	-
Chloride	-	NA	-
Fluoride	4	4	0.8
pH	-	NA	-
Sulfate	-	NA	-
Total Dissolved Solids	-	NA	-
Appendix IV Constituents			
Antimony	0.006	0.006	0.006
Arsenic	0.01	0.078	0.01
Barium	2	2	2
Beryllium	0.004	0.004	0.004
Cadmium	0.005	0.005	0.005
Chromium	0.1	0.1	0.1
Cobalt(1)	0.006(2)	0.01	0.006
Fluoride	4	4	0.8
Lead(1)	0.015(2)	0.0007	0.015
Lithium(1)	0.04(2)	0.0082	0.04
Mercury	0.002	0.002	0.002
Molybdenum(1)	0.1(2)	0.036	0.1
Radium 226+228	5	5	-
Selenium	0.05	0.05	0.05
Thallium	0.002	0.002	0.002

Prepared by: DFS
Checked by: KMC
Reviewed by: MAH

Notes:
MCL= Environmental Protection Agency Maximum Contaminant Level
GWPS= Groundwater Protection Standard calculated August 23, 2018.
Revision
mg/L= milligrams per liter
NA= not applicable; GWPS are calculated for Appendix IV constituents only
1) These four constituents do not have an established MCL. Prior to the Phase 1 Part 1 amendment, effective August 29, 2018, the GWPS was calculated based on background concentrations according to the CCR Final Rule.
2) The Phase 1 Part 1 amended health-based standard, effective August 29, 2018 pursuant to 40 CFR §257.95(h)(2)

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW04														
				2016-07-12	2016-09-08	2016-11-09	2017-01-10	2017-01-10	2017-03-01	2017-04-26	2017-06-28	2017-08-22	2017-10-04	2018-03-13	2018-03-14	2018-04-20	2018-04-20	2018-10-25
				N	N	N	FD	N	N	N	N	N	N	FD	N	FD	N	N
Appendix III Parameters																		
Boron		4	mg/L	0.48	1.4	2.4 O	1.1	1	1.2	0.74	0.92	1.2	0.54			0.74	0.72	0.78
Calcium			mg/L	110	230	300 O	270	240	230	220	200	200	140			140	140	210
Chloride			mg/L	2.2	27	69 O	13	14	13	5.4	12	13	4.5			3.7 J	4.4	10
Fluoride	4	0.8	mg/L	0.92 J+	0.2 J	10 UO	0.19 J	0.17 J	5 U	5 U	0.19 J	0.21 J	0.24 J	0.15 J	5 U	5 U	0.17 J-	0.26
pH			SU	7.22	6.83	6.75		6.93	7.01	6.76	6.88	7.21	7.28		6.95		7.2	6.39
Sulfate			mg/L	140 J-	460	480 O	460	470	390	470	370	440	250			220	210	530
Total Dissolved Solids			mg/L	420	990	1400 O	1000	1000	890	870	880	920	610			580 J	580	980
Appendix IV Parameters																		
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.00027 JO	0.002 U	0.00057 J	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U			0.002 U
Arsenic	0.01	0.01	mg/L	0.0059	0.013	0.0052 O	0.0058	0.0072	0.005 U	0.0099	0.012	0.012		0.004 J	0.0054			0.014
Barium	2	2	mg/L	0.041	0.077	0.11 O	0.095	0.079	0.089	0.069	0.084	0.09		0.11	0.077			0.074
Beryllium	0.004	0.004	mg/L	0.00027 J	0.001 U	0.001 UO	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.00048 J
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 UO	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.00036 JO	0.00036 J	0.0052 JO	0.002 U	0.002 U	0.002 U	0.002 U		0.0011 J	0.0012 J			0.002 U
Cobalt		0.006	mg/L	0.001 U	0.00031 J	0.00064 JO	0.0061	0.0058	0.0038	0.0049	0.003	0.0023		0.0028	0.0031			0.0026
Fluoride	4	0.8	mg/L	0.92 J+	0.2 J	10 UO	0.19 J	0.17 J	5 U	5 U	0.19 J	0.21 J	0.24 J	0.15 J	5 U	5 U	0.17 J-	0.26
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 UO	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U
Lithium		0.04	mg/L	0.0018 J	0.008 U	0.008 UO	0.0021 J	0.0023 J	0.0033 J	0.0033 J	0.0062 J	0.0062 J		0.008 U	0.008 U			0.0023 J
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 UO	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U	0.0002 U			0.0002 U
Molybdenum		0.1	mg/L	0.0075 J	0.023	0.073 O	0.037	0.038	0.034	0.016	0.02	0.034		0.0048 J	0.024			0.039
Radium 226 + 228	5		pCi/L	5 U	0.583	0.697 O	0.804	0.515 U	0.362 U	0.379 U	0.364 U	0.352 U						0.473
Radium-226			pCi/L	1 U	0.138 U	0.346 UO	0.301 U	0.242 U	0.121 U	0.117 U	0.119 J+	0.118						0.306
Radium-228			pCi/L	1 U	0.498 U	0.495 UO	0.677 J+	0.515 U	0.362 U	0.379 U	0.364 U	0.352 U						0.462 U
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.00064 JO	0.0017 J	0.0021 J	0.005 U	0.005 U	0.005 U	0.005 U		0.001 J	0.001 J			0.005 U
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 UO	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U
Field Parameters																		
Dissolved Oxygen			mg/L	0.09	0.58	0.37		1.82	1.47	0.12	0.3	0.52	0.09		0.66		2.3	0.15
Oxidation-Reduction Potential			millivolts	59.6	-24	-6.9		-31.7	14	-57.8	-45	-27	-105.8		-181.8		-81.2	-58.1
pH			SU	7.22	6.83	6.75		6.93	7.01	6.76	6.88	7.21	7.28		6.95		7.2	6.39
Specific Conductance			uS/cm	595	1345	1681		1109	910	1137	911	1153	813		562		770	1311
Temperature			deg C	13	17.3	16.3		10.5	8.05	10.2	13.1	15.9	16.1		7.55		3.5	15.5
Turbidity			NTU	4.04	1.48	2.21		2.28	4.26	4.04	4.88	1.65	0.51		4.92		3.12	1.92

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW07													GAMW07B	
				2016-07-12	2016-09-08	2016-11-09	2017-01-10	2017-03-01	2017-04-26	2017-06-29	2017-08-23	2017-10-03	2017-10-03	2018-03-15	2018-04-23	2018-10-26	2018-09-06	2018-10-26
				N	N	N	N	N	N	N	N	FD	N	N	N	N	N	N
Appendix III Parameters																		
Boron		4	mg/L	1.2	1	0.91	0.91	1	0.68	0.67	0.68	0.71	0.72		1.2	1.3	20	23
Calcium			mg/L	170	190	200	170	170	190	220	190	220	220		210	230	370	430
Chloride			mg/L	7.8	6.6	5.3	6	7.6	2.8	3 J	3.2 J	3 J	3.6 J		4.7 J	6.3	10 U	250
Fluoride	4	0.8	mg/L	0.72 J+	0.91 J	0.8 J	0.85 J	0.66 J	0.76 J	0.79 J	0.66 J	1.1 J	0.93 J	0.58 J	0.57 J	0.73	10 U	1.5
pH			SU	7.03	7.27	7.04	7.15	7.2	7.17	6.57	7.2		7.1	7.28	7.35	5.71	8.29	6.78
Sulfate			mg/L	310 J-	330	320	320	290	310	360	380	460	450		450	530	10 U	1600
Total Dissolved Solids			mg/L	770	830	840	750	710	810	970	910	970	1000		900	970	2700	2600
Appendix IV Parameters																		
Antimony	0.006	0.006	mg/L	0.00035 J	0.00039 J	0.00035 J	0.00028 J	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U
Arsenic	0.01	0.01	mg/L	0.0013 J	0.0016 J	0.0018 J	0.0028 J	0.005 U	0.0028 J	0.0025 J	0.0016 J			0.005 U		0.0012 J	0.0028 J	0.0015 J
Barium	2	2	mg/L	0.052	0.055	0.056	0.042	0.05	0.05	0.059	0.059			0.056		0.064	0.072	0.063
Beryllium	0.004	0.004	mg/L	0.00011 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.001 U	0.001 U
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0003 J	0.00022 J			0.001 U		0.00047 J	0.001 U	0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.00047 J	0.00046 J	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U
Cobalt		0.006	mg/L	0.0056	0.0077	0.0055	0.0038	0.0044	0.0063	0.01	0.0095			0.006		0.01	0.00074 J	0.001 U
Fluoride	4	0.8	mg/L	0.72 J+	0.91 J	0.8 J	0.85 J	0.66 J	0.76 J	0.79 J	0.66 J	1.1 J	0.93 J	0.58 J	0.57 J	0.73	10 U	1.5
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0007 J			0.001 U		0.001 U	0.001 U	0.001 U
Lithium		0.04	mg/L	0.0034 J	0.008 U	0.008 U	0.0035 J	0.0031 J	0.0041 J	0.0037 J	0.0038 J			0.0024 J		0.0054 J	0.0043 J	0.0045 J
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ			0.0002 U		0.0002 U	0.0002 U	0.0002 U
Molybdenum		0.1	mg/L	0.0084 J	0.0098 J	0.0095 J	0.01 U	0.01 U	0.0083 J	0.0081 J	0.007 J			0.0066 J		0.0087 J	0.015	0.017
Radium 226 + 228	5		pCi/L	1.59	0.696	0.548	0.412 U	0.42 U	0.371 U	0.45	0.588					0.823 J+	2.63	2.6 J+
Radium-226			pCi/L	0.667 J+	0.289	0.374	0.237 U	0.186	0.155	0.232 J+	0.3					0.483 J+	1.16	1.56 J+
Radium-228			pCi/L	0.923	0.406	0.462 U	0.412 U	0.42 U	0.371 U	0.262 U	0.413 U					0.365 U	1.47	1.04
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.003 J	0.003 J	0.005 U	0.008	0.0054	0.005			0.0028 J		0.0016 J	0.0012 J	0.005 U
Thallium	0.002	0.002	mg/L	0.00011 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.00024 J	0.001 U	0.001 U
Field Parameters																		
Dissolved Oxygen			mg/L	0.6	1.81	0.59	0.52	0.51	1.96	1.02	0.84		0.48	0.8	3.52	2.64	0.13	0.67
Oxidation-Reduction Potential			millivolts	111.2	64.2	-6.4	71.3	65.3	76.9	291.1	8.5		95.4	-55	-98.7	-233.3	-197.6	-230.2
pH			SU	7.03	7.27	7.04	7.15	7.2	7.17	6.57	7.2		7.1	7.28	7.35	5.71	8.29	6.78
Specific Conductance			uS/cm	966	1072	1106	928	832	1121	1151	1157		1273	760	1060	1240	5178	3237
Temperature			deg C	14.4	19.2	16.7	12.9	10.63	11.8	14.6	16.5		18	10	10	16.95	15.03	13.86
Turbidity			NTU	4.6	4.51	1.26	3.2	4.76	2.17	2.87	0.9		0.49	1.3	1.75	1.08	4.48	3.01

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW08												GAMW08B	
				2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-02	2017-04-27	2017-06-29	2017-08-23	2017-10-04	2018-03-14	2018-04-23	2018-10-26	2018-09-07	2018-10-26
				N	N	N	N	N	N	N	N	N	N	N	N	N	N
Appendix III Parameters																	
Boron		4	mg/L	3.5	3.9	3.2	3.4	3.3	3.2	2.9	2.2	3.7		2.4	1.8	18	15
Calcium			mg/L	310	310	300	260	270	310	340	270	290		360	230	380	370
Chloride			mg/L	88	71	89	99	110	86	83	39	87		64	56	240	180
Fluoride	4	0.8	mg/L	1 J+	1.2 J	0.73 J	0.87 J	0.94 J	0.92 J	1.3 J	2 J	0.68 J	1.2 J	1.3 J-	1.6	1.6 J	1.5
pH			SU	6.92	7.03	6.85	7.02	7.09	6.93	7	7.27	6.89	7.41	7.41	6.99	7.7	7.45
Sulfate			mg/L	770 J-	690	680	610	630	770	800	640	670		800	460	1500	1500
Total Dissolved Solids			mg/L	1600	1500	1600	1300	1400	1700	2000	1400	1500		1700	1100	1900 J+	2300
Appendix IV Parameters																	
Antimony	0.006	0.006	mg/L	0.00073 J	0.00069 J	0.0014 J	0.00041 J	0.00043 J	0.002 U	0.00059 J	0.00075 J		0.002 U		0.00082 J	0.002 U	0.002 U
Arsenic	0.01	0.01	mg/L	0.0018 J	0.0019 J	0.0018 J	0.0027 J	0.0016 J	0.0031 J	0.0027 J	0.0023 J		0.005 U		0.0011 J	0.005 U	0.005 U
Barium	2	2	mg/L	0.068	0.065	0.065	0.05	0.055	0.064	0.074	0.077		0.066	0.069	0.053	0.042	0.03
Beryllium	0.004	0.004	mg/L	0.00017 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Cadmium	0.005	0.005	mg/L	7.4E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.00037 J	0.001 U	0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.002 U	0.00029 J	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U
Cobalt		0.006	mg/L	0.036	0.034	0.059	0.047	0.05	0.037	0.047	0.02		0.022	0.027	0.011	0.00066 J	0.001 U
Fluoride	4	0.8	mg/L	1 J+	1.2 J	0.73 J	0.87 J	0.94 J	0.92 J	1.3 J	2 J	0.68 J	1.2 J	1.3 J-	1.6	1.6 J	1.5
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Lithium		0.04	mg/L	0.0098	0.012	0.009	0.0098	0.0093	0.012	0.011	0.012		0.0089	0.009	0.011	0.0098	0.0073 J
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U
Molybdenum		0.1	mg/L	0.034	0.036	0.024	0.02	0.019	0.038	0.049	0.083		0.058	0.058	0.059	0.037	0.039
Radium 226 + 228	5		pCi/L	1.07	1.08	1.09	0.581	0.777	0.632	1.11	0.762			0.99	1 J+	1.67 J+	1.02 J+
Radium-226			pCi/L	0.501 J+	0.469	0.557	0.375	0.368	0.383	0.613 J+	0.591			0.437	0.582 J+	1.09 J+	0.596 J+
Radium-228			pCi/L	1 U	0.609	0.533	0.43 U	0.423 U	0.365 U	0.499	0.341 U			0.552	0.423	0.579	0.454 U
Selenium	0.05	0.05	mg/L	0.005 U	0.0065	0.0033 J	0.0014 J	0.0032 J	0.011	0.0088	0.0081		0.024	0.022	0.0021 J	0.0014 J	0.005 U
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Field Parameters																	
Dissolved Oxygen			mg/L	1.9	0.38	1.62	1.27	0.96	0.63	1.96	0.93	0.21	0.97	5.09	0.21	0.42	0.12
Oxidation-Reduction Potential			millivolts	159.7	64.6	-8	58.4	49.9	60.4	242.5	61.9	-15.9	110.1	-106.4	27.7	-185.5	-67
pH			SU	6.92	7.03	6.85	7.02	7.09	6.93	7	7.27	6.89	7.41	7.41	6.99	7.7	7.45
Specific Conductance			uS/cm	1925	1807	1664	1517	1494	2098	1834	1713	1840	1121	1732	1440	2538	2375
Temperature			deg C	15.5	18.78	17.75	12.2	10.06	11.1	15.8	18.5	18.3	9.6	10.2	17.2	14.6	14.5
Turbidity			NTU	2.3	3.22	0.58	1.26	1.56	1.1	2.41	0.68	4.38	1.11	1.54	1.4	3.4	1.63

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW09													
				2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-01	2017-03-01	2017-04-26	2017-04-26	2017-06-28	2017-08-23	2017-10-03	2018-03-14	2018-04-23	2018-10-25
				N	N	N	N	FD	N	FD	N	N	N	N	N	N	N
Appendix III Parameters																	
Boron		4	mg/L	5.7	4.7	7.3	5.3	7.7	7.6	5.9	6.1	4.9	7.9	7.3		4.9	6.3
Calcium			mg/L	320	240	210	210	200	200	220	240	270	280	220		220	220
Chloride			mg/L	63	55	58	58	75	73	71	67	53	39	64		58	82
Fluoride	4	0.8	mg/L	0.15 J+	10 U	10 U	0.22 J	0.13 J	0.14 J	0.16 J	0.13 J	0.18 J	2 J	0.21 J	5 U	0.26 J-	0.28
pH			SU	7.27	7.25	7.12	6.68		7.44		7.15	7.25	7.31	7.3	7.28	6.87	6.88
Sulfate			mg/L	910 J-	570	360	500	440	420	460	460	600	740	540		510	510 J-
Total Dissolved Solids			mg/L	1500	1100	880	980	1000	990	1000	960	1300	1400	1100		930	1100
Appendix IV Parameters																	
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U
Arsenic	0.01	0.01	mg/L	0.0015 J	0.0013 J	0.00076 J	0.0031 J	0.005 U	0.005 U	0.0028 J	0.0029 J	0.002 J	0.0027 J		0.005 U		0.005 U
Barium	2	2	mg/L	0.059	0.043	0.036	0.039	0.035	0.037	0.039	0.042	0.047	0.054		0.041	0.039	0.039
Beryllium	0.004	0.004	mg/L	0.00012 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00036 J	0.001 U	0.001 U	0.001 U		0.001 UO		0.00092 J
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.00033 J
Chromium	0.1	0.1	mg/L	0.0036	0.002 U	0.00062 J	0.0013 J	0.002 U	0.002 U	0.002 U	0.002 U	0.0011 J	0.0015 J		0.0016 J		0.002 U
Cobalt		0.006	mg/L	0.001 U	0.00018 J	0.0002 J	0.0002 J	0.001 U	0.001 U	0.00029 J	0.00025 J	0.001 U	0.001 U		0.001 U		0.00038 J
Fluoride	4	0.8	mg/L	0.15 J+	10 U	10 U	0.22 J	0.13 J	0.14 J	0.16 J	0.13 J	0.18 J	2 J	0.21 J	5 U	0.26 J-	0.28
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U
Lithium		0.04	mg/L	0.0019 J	0.008 U	0.008 U	0.0016 J	0.0011 J	0.0012 J	0.008 U	0.008 U	0.0017 J	0.0018 J		0.008 U		0.008 U
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U
Molybdenum		0.1	mg/L	0.02	0.017	0.029	0.023	0.027	0.027	0.021	0.021	0.028	0.032		0.025	0.035	0.04
Radium 226 + 228	5		pCi/L	1.5	0.568	0.477 U	0.467 U	0.55	0.469	0.593	0.414	0.707	0.803			0.096	0.679
Radium-226			pCi/L	0.506 J+	0.231	0.397 U	0.257	0.134	0.166	0.194	0.205	0.255 J+	0.357			0.204	0.446
Radium-228			pCi/L	0.994	0.349 U	0.477 U	0.467 U	0.427 U	0.432 U	0.398	0.36 U	0.452	0.446			-0.108	0.361 U
Selenium	0.05	0.05	mg/L	0.014	0.0091	0.0049 J	0.011	0.014	0.014	0.019	0.02	0.013	0.027		0.0082	0.011	0.0098
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U
Field Parameters																	
Dissolved Oxygen			mg/L	3.59	6.69	1.98	6.1		3.41		3.92	5.27	3.24	5.98	6.71	5.43	0.22
Oxidation-Reduction Potential			millivolts	-1.4	75.7	27.6	236		90.5		152.6	280.8	58.9	139.5	-116.3	-90.8	-48.8
pH			SU	7.27	7.25	7.12	6.68		7.44		7.15	7.25	7.31	7.3	7.28	6.87	6.88
Specific Conductance			uS/cm	1671	736	1110	822		1041		1209	702	1542	1331	600	1156	1274
Temperature			deg C	14.4	18.4	16.9	11.9		10.75		11.9	14.7	17.2	18.2	10.2	10.6	17.9
Turbidity			NTU	1.59	3.92	1.15	1.34		3.12		1.88	1.91	0.91	0.39	0.82	2.44	2.41

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW09B														
				2016-07-13	2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-01	2017-04-26	2017-06-28	2017-08-23	2017-08-23	2017-10-03	2018-03-14	2018-04-23	2018-09-06	2018-10-26
				FD	N	N	N	N	N	N	N	FD	N	N	N	N	N	N
Appendix III Parameters																		
Boron		4	mg/L	24	25	25	16	11	11	11	12	16	16	16		14	12	12
Calcium			mg/L	260	280	270	190	200	170	170	180	180	180	160		160	150	180
Chloride			mg/L	210	180	190	130	110	120	130	150	170	160	140		150	180	150
Fluoride	4	0.8	mg/L	0.54 J+	0.55 J+	0.67 J	0.68 J	0.1 J	1.3 J	1.2 J	1.4 J	1.2 J	0.37 J	1.5 J	1.4 J	1.6 J	1.8 J	1.6
pH			SU		7.08	7.15	6.96	7.36	7.44	7.29	7.36		7.46	7.36	7.56	7.43	7.32	7.46
Sulfate			mg/L	970 J-	1000 J-	960	740	670 J+	550	570	640	630	650	550		430	570	580
Total Dissolved Solids			mg/L	2100	2000	2100	1700	1300	1200	1200	1500	1500	1500	1300		990	1300	1200
Appendix IV Parameters																		
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U
Arsenic	0.01	0.01	mg/L	0.0024 J	0.0026 J	0.002 J	0.0014 J	0.0027 J	0.005 U	0.004 J	0.004 J	0.0031 J	0.0031 J		0.0054	0.0064	0.0044 J	0.004 J
Barium	2	2	mg/L	0.069	0.071	0.076	0.062	0.048	0.04	0.046	0.055	0.062	0.058		0.045	0.04	0.049	0.047
Beryllium	0.004	0.004	mg/L	0.00012 J	9.1E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Cadmium	0.005	0.005	mg/L	0.00027 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U
Cobalt		0.006	mg/L	0.001 U	0.001 U	0.00069 J	0.00028 J	0.00045 J	0.001 U	0.00028 J	0.00045 J	0.00041 J	0.00041 J		0.001 U		0.00058 J	0.00028 J
Fluoride	4	0.8	mg/L	0.54 J+	0.55 J+	0.67 J	0.68 J	0.1 J	1.3 J	1.2 J	1.4 J	1.2 J	0.37 J	1.5 J	1.4 J	1.6 J	1.8 J	1.6
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.00017 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Lithium		0.04	mg/L	0.0055 J	0.0065 J	0.008 U	0.008 U	0.0049 J	0.0045 J	0.0056 J	0.0054 J	0.0047 J	0.0042 J		0.0031 J		0.0037 J	0.0052 J
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U
Molybdenum		0.1	mg/L	0.01 U	0.0079 J	0.0075 J	0.0097 J	0.013	0.015	0.015	0.013	0.0094 J	0.01		0.014	0.012	0.01	0.011
Radium 226 + 228	5		pCi/L	1.12	1.86	1.65	1.14	0.453	1.09	0.774	1.85	1.01	1.27			0.868	1.04	1.24 J+
Radium-226			pCi/L	0.809 J+	0.947 J+	0.907	0.579	0.476	0.585	0.316	0.781 J+	0.585	0.709			0.301	0.653	0.69 J+
Radium-228			pCi/L	1 U	0.913	0.743	0.559	0.41 U	0.508	0.458	1.07	0.422	0.563			0.567	0.386	0.546
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.002 J	0.005 U	0.0014 J	0.001 J	0.0015 J	0.0016 J		0.005 U		0.002 J	0.0019 J
Thallium	0.002	0.002	mg/L	0.0003 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Field Parameters																		
Dissolved Oxygen			mg/L		0.44	1.06	0.43	0.38	0.44	0.61	0.71		0.57	0.45	0.1	0.04	0.61	0.28
Oxidation-Reduction Potential			millivolts		-57.7	67.3	-76.4	-100.1	-80.6	-102.6	68.2		19.7	-46.8	-121.6	-130.5	-100.5	-101.1
pH			SU		7.08	7.15	6.96	7.36	7.44	7.29	7.36		7.46	7.36	7.56	7.43	7.32	7.46
Specific Conductance			uS/cm		2356	2435	2088	1559	1352	1592	1561		1922	1722	1053	1301	1556	1693
Temperature			deg C		14.1	14.7	15.1	13.6	13.45	14.5	14.8		15.5	16	14	14.4	16.1	16
Turbidity			NTU		3.48	4.29	2.17	0.99	2.58	1.88	1.69		2.54	1.96	4.18	4.11	2.96	1.39

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW15												
				2016-07-13	2016-09-08	2016-09-08	2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-23	2017-10-03	2018-03-15	2018-04-24	2018-10-26
				N	FD	N	N	N	N	N	N	N	N	N	N	N
Appendix III Parameters																
Boron		4	mg/L	0.75	0.45 J	1 J	1.1	0.6	0.44	0.45	0.87	0.91	0.66		0.72	0.76
Calcium			mg/L	100	130	120	100	82	81	95	160	150	77		170	120
Chloride			mg/L	28	31	31	27	28	27	27	27	25	19		24	21
Fluoride	4	0.8	mg/L	1.2 J+	0.85 J	0.85 J	0.74 J	0.8 J	0.77 J	0.74 J	0.82 J	0.82 J	0.93 J	0.67 J	0.76 J	0.69
pH			SU	6.88		6.98	6.83	6.96	6.99	6.76	6.61	6.96	6.88	6.95	6.89	5.2
Sulfate			mg/L	160 J-	260	260	150	140	140	160	300	330	260		410	240
Total Dissolved Solids			mg/L	570	660	630	520	400	400	420	780	750	660		790	5900
Appendix IV Parameters																
Antimony	0.006	0.006	mg/L	0.002 U	0.00041 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U
Arsenic	0.01	0.01	mg/L	0.056	0.072	0.069	0.078	0.076	0.054	0.062	0.059	0.066		0.058		0.091
Barium	2	2	mg/L	0.044	0.053	0.053	0.039	0.032	0.031	0.034	0.054	0.058		0.047		0.046
Beryllium	0.004	0.004	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.002 U	0.00027 J	0.00028 J	0.00029 J	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U
Cobalt		0.006	mg/L	0.0019	0.0022	0.0022	0.0021	0.0019	0.0018	0.0022	0.0029	0.0027		0.0025		0.0023
Fluoride	4	0.8	mg/L	1.2 J+	0.85 J	0.85 J	0.74 J	0.8 J	0.77 J	0.74 J	0.82 J	0.82 J	0.93 J	0.67 J	0.76 J	0.69
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U
Lithium		0.04	mg/L	0.0053 J	0.008 U	0.008 U	0.008 U	0.004 J	0.0024 J	0.0041 J	0.0058 J	0.005 J		0.0023 J		0.0054 J
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U
Molybdenum		0.1	mg/L	0.02	0.027	0.026	0.023	0.022	0.022	0.026	0.017	0.019		0.029		0.016
Radium 226 + 228	5		pCi/L	5 U	0.479	0.513	0.646 U	0.555 J+	0.339 U	0.463 U	0.335	0.342 U				0.858 J+
Radium-226			pCi/L	1 U	0.202	0.145	0.337 U	0.38	0.127 U	0.1	0.0965 J+	0.104				0.527 J+
Radium-228			pCi/L	1 U	0.397 U	0.382 U	0.646 U	0.401 U	0.339 U	0.463 U	0.278 U	0.342 U				0.407 U
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U		0.005 U
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U
Field Parameters																
Dissolved Oxygen			mg/L	0.48		0.48	0.14	0.25	0.16	0.19	1	0.32	0.29	0.06	0.02	1.97
Oxidation-Reduction Potential			millivolts	-79.2		-60.1	-111	-114.3	-104.1	-104.4	-46.9	-43.7	-13.8	-56.8	-99.1	-254.7
pH			SU	6.88		6.98	6.83	6.96	6.99	6.76	6.61	6.96	6.88	6.95	6.89	5.2
Specific Conductance			uS/cm	779		909	733	594	584	674	9.32	1004	901	581	933	855
Temperature			deg C	15.3		20.3	19.9	14.6	12.1	11.6	14.6	16.6	18.1	10.8	10.6	17.1
Turbidity			NTU	4.48		2.96	3.41	3.98	4.4	4.92	4.2	3.1	4.11	3.98	4.29	3.1

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW15B												
				2016-07-13	2016-09-08	2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-03	2018-03-15	2018-04-24	2018-09-06	2018-10-26
				N	N	N	N	N	N	N	N	N	N	N	N	N
Appendix III Parameters																
Boron		4	mg/L	1.1	1.7	2	3.7	3.3	3.6	3.1	2.1	2.1		4.4	4.1	4.9
Calcium			mg/L	160	160	160	180	160	170	190	170	73		230	200	210
Chloride			mg/L	52	58	62	81	64	65	71	64	64		87	89	93
Fluoride	4	0.8	mg/L	0.65 J+	0.62 J	0.46 J	0.74 J	0.77 J	0.75 J	0.72 J	0.61 J	0.5 J	0.69 J	0.79 J	0.6 J	0.6
pH			SU	7.81	7.49	7.04	7.52	7.48	7.11	7.26	7.37	7.42	7.45	7.36	7.8	6.74
Sulfate			mg/L	380 J-	390	340	500	390	460	530	540	500		790	720	770
Total Dissolved Solids			mg/L	830	800	840	1000	890	980	1200	1100	1100		1400	1400	1400
Appendix IV Parameters																
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U
Arsenic	0.01	0.01	mg/L	0.003 J	0.0011 J	0.0014 J	0.0022 J	0.0011 J	0.00098 J	0.00084 J	0.00081 J		0.005 U		0.005 U	0.005 U
Barium	2	2	mg/L	0.054	0.053	0.056	0.056	0.051	0.052	0.064	0.069		0.068		0.07	0.064
Beryllium	0.004	0.004	mg/L	7.8E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Chromium	0.1	0.1	mg/L	0.00062 J	0.002 U	0.002 U	0.00033 J	0.00034 J	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U
Cobalt		0.006	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.00016 J	0.001 U	0.001 U	0.001 U		0.00029 J		0.00037 J	0.001 U
Fluoride	4	0.8	mg/L	0.65 J+	0.62 J	0.46 J	0.74 J	0.77 J	0.75 J	0.72 J	0.61 J	0.5 J	0.69 J	0.79 J	0.6 J	0.6
Lead		0.015	mg/L	0.001 U	0.001 U	0.00023 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Lithium		0.04	mg/L	0.0069 J	0.008 U	0.008 U	0.0077 J	0.0053 J	0.0082	0.0082	0.0077 J		0.007 J		0.008	0.0096
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U
Molybdenum		0.1	mg/L	0.011	0.013	0.01	0.012	0.015	0.014	0.014	0.012		0.011		0.01	0.011
Radium 226 + 228	5		pCi/L	1.26	0.594	0.61	1.14 J+	0.876	0.687	0.789	0.872				1.31	1.51 J+
Radium-226			pCi/L	0.607 J+	0.442	0.361 U	0.785	0.441	0.442	0.537 J+	0.547				0.711	0.837 J+
Radium-228			pCi/L	1 U	0.389 U	0.498 U	0.502 U	0.435	0.378 U	0.329 U	0.363 U				0.603	0.676
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U		0.0017 J	0.005 U
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Field Parameters																
Dissolved Oxygen			mg/L	0.22	0.91	0.56	0.22	0.46	0.3	0.43	0.64	0.23	0.08	0.04	0.29	2.06
Oxidation-Reduction Potential			millivolts	-129.7	-21.6	-94.6	-132.6	-81.7	-79.6	-21.3	-36.5	-42.6	-64	-102.4	-91.2	-256.1
pH			SU	7.81	7.49	7.04	7.52	7.48	7.11	7.26	7.37	7.42	7.45	7.36	7.8	6.74
Specific Conductance			uS/cm	834	1049	1060	1237	940	1096	1099	1110	1294	1255	1612	2757	1889
Temperature			deg C	12.71	15.9	16.1	13.9	13.6	13	13.8	14.2	14.5	13.3	13	14.13	13.6
Turbidity			NTU	4.72	1.56	1.48	3.8	2.23	3.65	3.16	1.78	0.4	4.59	4.88	3.59	1.35

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW16												
				2016-07-13	2016-09-08	2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-04	2018-03-15	2018-04-24	2018-10-29	2018-10-29
				N	N	N	N	N	N	N	N	N	N	N	FD	N
Appendix III Parameters																
Boron		4	mg/L	1.1	1.8	1.6	1.2	0.89	1.3	1	1.4	1.1		1.4	1.4	1.4
Calcium			mg/L	230	180	170	120	160	210	220	240	57		220	160	160
Chloride			mg/L	53	37	30	28	24	25	28	31	42		58	36	36
Fluoride	4	0.8	mg/L	1.4 J+	1.6 J	1.3 J	1.5	1.3 J	1.3 J	1.2 J	1.3 J	1.5 J	1 J	1.2 J	1.1	1.1
pH			SU	7.92	7.18	7.48	7.5	7.58	7.17	7.36	7.06	7.62	7.41	7.67		7.28
Sulfate			mg/L	530 J-	400	320	47 O	300	500	480	630	520		530	340	350
Total Dissolved Solids			mg/L	1100	810	790	570	670	930	1000	1100	980		1100	740	730
Appendix IV Parameters																
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.00028 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U
Arsenic	0.01	0.01	mg/L	0.011	0.0077	0.012	0.0084	0.0079	0.006	0.008	0.0096		0.002 J	0.0065	0.01	0.0098
Barium	2	2	mg/L	0.049	0.042	0.035	0.024	0.029	0.043	0.044	0.054		0.057	0.045	0.035	0.035
Beryllium	0.004	0.004	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Chromium	0.1	0.1	mg/L	0.00062 J	0.002 U	0.002 U	0.0031	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U
Cobalt		0.006	mg/L	0.001 U	0.00068 J	0.00051 J	0.00046 J	0.00055 J	0.00092 J	0.00094 J	0.0011		0.0013		0.00059 J	0.00061 J
Fluoride	4	0.8	mg/L	1.4 J+	1.6 J	1.3 J	1.5	1.3 J	1.3 J	1.2 J	1.3 J	1.5 J	1 J	1.2 J	1.1	1.1
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Lithium		0.04	mg/L	0.00043 J	0.008 U	0.008 U	0.00023 J	0.008 U	0.008 U	0.008 U	0.008 U		0.008 U		0.008 U	0.008 U
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U
Molybdenum		0.1	mg/L	0.024	0.036	0.045	0.044	0.03	0.027	0.023	0.024		0.027	0.031	0.033	0.033
Radium 226 + 228	5		pCi/L	1.68	0.543	0.527 U	0.629 U	0.648	0.392 U	0.339 U	0.429			0.29	0.862 J+	1.32 J+
Radium-226			pCi/L	0.537 J+	0.249	0.363 U	0.256 U	0.129 U	0.094	0.106 J+	0.246			0.0822	0.214 J+	0.278 J+
Radium-228			pCi/L	1.14	0.395 U	0.527 U	0.629 U	0.528	0.392 U	0.339 U	0.322 U			0.208	0.648 J+	1.04 J+
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.0005 J	0.0005 J	0.005 U	0.0012 J	0.005 U	0.005 U		0.0015 J		0.005 U	0.005 U
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Field Parameters																
Dissolved Oxygen			mg/L	0.16	0.27	0.48	0.31	0.36	0.14	0.5	0.14	0.06	0.22	0.22		1.27
Oxidation-Reduction Potential			millivolts	-18.06	711.6	-124.8	-78.8	-136.9	-73.6	-114.2	9.6	-158.4	-55.9	-106.5		-216.8
pH			SU	7.92	7.18	7.48	7.5	7.58	7.17	7.36	7.06	7.62	7.41	7.67		7.28
Specific Conductance			uS/cm	1331	1112	927	751	821	1257	1123	1406	1254	1029	1239		1046
Temperature			deg C	15.02	18.8	18.15	12.1	9.72	10.6	15.41	18	17.8	8.71	9.2		17.81
Turbidity			NTU	3.89	2.16	1.93	3.16	4.14	3.25	4.33	2.45	4.95	4.62	12.81		3.64

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW16B													
				2016-07-13	2016-09-08	2016-11-09	2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-04	2018-03-15	2018-04-24	2018-09-07	2018-10-29
				N	N	FD	N	N	N	N	N	N	N	N	N	N	N
Appendix III Parameters																	
Boron		4	mg/L	1.8	1.6	1.4	1.4	1.4	1.4	1.1	3.4	6.5	2.9		4.1	7.6	9.7
Calcium			mg/L	230	190	180	180	210	210	270	220	260	100		250	310	350
Chloride			mg/L	63	56	57	55	57	47	71	71	120	78		140	160	150
Fluoride	4	0.8	mg/L	1.1 J+	1.1 J	0.84 J	0.73 J	0.99 J	0.87 J	0.83 J	0.76 J	0.78 J	1 J	0.8 J	0.76 J	0.73 J	0.64
pH			SU	7.76	7.47		7.41	7.57	7.55	7.3	7.51	7.28	7.54	7.6	7.65	7.97	7.02
Sulfate			mg/L	580 J-	480	500	440	50 O	470	730	720	640	580		690	760	890
Total Dissolved Solids			mg/L	1100	1000	1000	1000	1000	1000	1300	1200	1400	1200		1400	20 U	1600
Appendix IV Parameters																	
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.00057 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.00095 J		0.002 U	0.002 U
Arsenic	0.01	0.01	mg/L	0.0068	0.0064	0.011	0.011	0.012	0.0095	0.012	0.0096	0.0081		0.0099	0.0097	0.011	0.0088
Barium	2	2	mg/L	0.072	0.04	0.036	0.035	0.038	0.039	0.055	0.043	0.046		0.053	0.058	0.068	0.071
Beryllium	0.004	0.004	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.00022 J		0.001 U	0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.00029 J	0.002 U	0.00026 J	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U
Cobalt		0.006	mg/L	0.001 U	0.00016 J	0.00019 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.0003 J		0.00054 J	0.001 U
Fluoride	4	0.8	mg/L	1.1 J+	1.1 J	0.84 J	0.73 J	0.99 J	0.87 J	0.83 J	0.76 J	0.78 J	1 J	0.8 J	0.76 J	0.73 J	0.64
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Lithium		0.04	mg/L	0.0055 J	0.008 U	0.0032 J	0.0022 J	0.0058 J	0.0035 J	0.0072 J	0.006 J	0.0061 J		0.007 J		0.0059 J	0.0059 J
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U
Molybdenum		0.1	mg/L	0.013	0.012	0.012	0.012	0.012	0.013	0.023	0.016	0.013		0.016	0.015	0.012	0.011
Radium 226 + 228	5		pCi/L	1.31	1.05	0.866	0.794	0.998 J+	0.577	1.23	0.795	1.21			0.99	1.17 J+	1.64 J+
Radium-226			pCi/L	0.651 J+	0.458	0.427	0.412 U	0.507	0.348	0.635	0.54 J+	0.559			0.535	0.724 J+	0.719 J+
Radium-228			pCi/L	0.66	0.59	0.467 U	0.435 U	0.491 J+	0.399 U	0.597	0.287 U	0.647			0.455	0.522 U	0.919 J+
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.00061 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U		0.005 U	0.005 U
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Field Parameters																	
Dissolved Oxygen			mg/L	1.23	1.63		0.39	0.3	0.21	0.12	0.32	0.16	0.15	0.28	0.25	1.02	4.23
Oxidation-Reduction Potential			millivolts	-122.6	-89		-126.3	-148.5	-132.2	-130.2	-123.1	-32.7	-135.8	-75.5	-117.8	-101.5	-166.8
pH			SU	7.76	7.47		7.41	7.57	7.55	7.3	7.51	7.28	7.54	7.6	7.65	7.97	7.02
Specific Conductance			uS/cm	1147	1297		1158	1230	1192	1645	1333	1665	1461	1142	1653	3104	2098
Temperature			deg C	13.04	14.44		15.27	14.3	13.37	12.3	13.48	14.3	15	12.6	12.3	15	17.7
Turbidity			NTU	4.1	3.99		1.8	2.76	4.21	4.58	3.27	2.48	3.9	4.08	4.2	4.99	3.49

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW17													
				2016-07-14	2016-09-08	2016-11-09	2017-01-10	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-04	2018-03-14	2018-03-14	2018-04-23	2018-04-23	2018-10-29
				N	N	N	N	N	N	N	N	N	FD	N	FD	N	N
Appendix III Parameters																	
Boron		4	mg/L	12	12	11	11	11	8.9	7.6	12	12			5.8	5.8	16
Calcium			mg/L	150	160	170	180	200	180	120	150	64			110	110	200
Chloride			mg/L	110	100	130	150	140	81	170	130	160			40	38	150
Fluoride	4	0.8	mg/L	1.8 J+	2.2 J	2 J	1.9 J	1.6 J	1.6 J	0.79 J	1.9 J	2.4 J	5 U	1.7 J	1.9 J	1.9 J-	1.7
pH			SU	7.56	7.27	7.21	7.33	7.54	7.23	7.4	7.16	7.22		7.62		7.82	6.85
Sulfate			mg/L	330 J-	330	360	390	390	390	520	250	350			240	220	430
Total Dissolved Solids			mg/L	940	920	940	1000	1100	950	1400	890	1000			630	620	1100
Appendix IV Parameters																	
Antimony	0.006	0.006	mg/L	0.00034 J	0.00032 J	0.00032 J	0.002 U	0.00028 J	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U			0.002 U
Arsenic	0.01	0.01	mg/L	0.0054	0.0056	0.0042 J	0.0069	0.0055	0.0054	0.0035 J	0.0028 J		0.005 U	0.0027 J			0.004 J
Barium	2	2	mg/L	0.047	0.056	0.054	0.05	0.054	0.048	0.044	0.06		0.041	0.058		0.029	0.073
Beryllium	0.004	0.004	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U
Chromium	0.1	0.1	mg/L	0.0015 J	0.002 U	0.0011 J	0.0011 J	0.0012 J	0.0012 J	0.002 U	0.002 U		0.0017 J	0.0014 J			0.002 U
Cobalt		0.006	mg/L	6.3E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U
Fluoride	4	0.8	mg/L	1.8 J+	2.2 J	2 J	1.9 J	1.6 J	1.6 J	0.79 J	1.9 J	2.4 J	5 U	1.7 J	1.9 J	1.9 J-	1.7
Lead		0.015	mg/L	0.00018 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U
Lithium		0.04	mg/L	0.0047 J	0.008 U	0.0036 J	0.0047 J	0.0024 J	0.0045 J	0.0058 J	0.0076 J		0.008 U	0.0035 J			0.0066 J
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U	0.0002 U			0.0002 U
Molybdenum		0.1	mg/L	0.015	0.012	0.011	0.01 U	0.01	0.011	0.018	0.024		0.024	0.024		0.02	0.017
Radium 226 + 228	5		pCi/L	0.569	0.451 U	0.447 U	0.553 U	0.428	0.477	0.403 U	0.71					0.205	1.1 J+
Radium-226			pCi/L	1 U	0.331	0.415 U	0.246 U	0.222	0.23	0.191 J+	0.215					0.0399	0.315 J+
Radium-228			pCi/L	1 U	0.451 U	0.447 U	0.553 U	0.402 U	0.406 U	0.403 U	0.495					0.166	0.783 J+
Selenium	0.05	0.05	mg/L	0.019	0.03	0.018	0.023	0.028	0.026	0.0081	0.0032 J		0.0074	0.021		0.015	0.022
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U
Field Parameters																	
Dissolved Oxygen			mg/L	5.78	1.7	1.8	1.01	2.35	7.33	3.18	4.33	3.3		4.99		9	1.78
Oxidation-Reduction Potential			millivolts	45.8	825.9	6.1	82.3	6.6	67.9	23.3	8	57.9		-90.2		-90.2	-237
pH			SU	7.56	7.27	7.21	7.33	7.54	7.23	7.4	7.16	7.22		7.62		7.82	6.85
Specific Conductance			uS/cm	1059	1287	1141	1272	1541	1290	902	1151	1357		832		675	1513
Temperature			deg C	17.23	20.6	18.63	13.6	10.95	11.8	17.71	24.4	22.3		10.9		11.4	20
Turbidity			NTU	1.56	1.09	0.58	2.58	0.44	2.21	1.02	1.5	2.51		0.54		1.19	0.45

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW17B												
				2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-02	2017-04-27	2017-06-29	2017-08-23	2017-10-04	2018-03-14	2018-04-23	2018-09-06	2018-10-29
				N	N	N	N	N	N	N	N	N	N	N	N	N
Appendix III Parameters																
Boron		4	mg/L	18	19	19	21	22	20	16	13	11		13	10	12
Calcium			mg/L	230	250	240	250	270	250	240	160	57		180	150	150
Chloride			mg/L	180	170	180	190	200	200	71	99	130		140	120	110
Fluoride	4	0.8	mg/L	0.9 J+	0.98 J	0.68 J	0.58 J	0.6 J	0.6 J	2.1 J	1.3 J	1.1 J	0.55 J	0.58 J	0.84 J	0.71
pH			SU	7.43	7.37	7.1	7.24	7.44	7.02	7.25	7.19	7.38	7.48	7.39	7.63	7.4
Sulfate			mg/L	710 J-	680	710	740	710	680	300	380	420		520	350	350
Total Dissolved Solids			mg/L	1500	1400	1400	1500	1700	1500	660	1000	960		1100	940	950
Appendix IV Parameters																
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U
Arsenic	0.01	0.01	mg/L	0.0024 J	0.0021 J	0.0024 J	0.0035 J	0.0023 J	0.0022 J	0.0023 J	0.0026 J		0.0011 J		0.0017 J	0.0023 J
Barium	2	2	mg/L	0.078	0.079	0.086	0.092	0.1	0.089	0.065	0.06		0.085	0.069	0.066	0.073
Beryllium	0.004	0.004	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U
Cobalt		0.006	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.0003 J	0.001 U
Fluoride	4	0.8	mg/L	0.9 J+	0.98 J	0.68 J	0.58 J	0.6 J	0.6 J	2.1 J	1.3 J	1.1 J	0.55 J	0.58 J	0.84 J	0.71
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Lithium		0.04	mg/L	0.0017 J	0.008 U	0.008 U	0.0019 J	0.00046 J	0.0021 J	0.0019 J	0.008 U		0.008 U		0.008 U	0.008 U
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U
Molybdenum		0.1	mg/L	0.024	0.021	0.013	0.011	0.012	0.011	0.017	0.021		0.017	0.016	0.01	0.011
Radium 226 + 228	5		pCi/L	1.79	1.84	2.53	2.58	1.25	1.94	1.03	2.4			1.21	1.47	2.48 J+
Radium-226			pCi/L	0.882 J+	0.864	1.28	1.4	1.01	1.09	0.639 J+	0.867			0.518	0.945	1.15 J+
Radium-228			pCi/L	0.913	0.98	1.25	1.17	0.423 U	0.846	0.395	1.53			0.696	0.524	1.33 J+
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.005 U	0.00053 J	0.00051 J	0.005 U	0.005 U	0.005 U		0.005 U		0.0011 J	0.005 U
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U
Field Parameters																
Dissolved Oxygen			mg/L	0.33	0.24	0.67	0.36	0.13	0.13	0.18	0.14	0.09	0.16	0.11	0.2	0.88
Oxidation-Reduction Potential			millivolts	-115	654	-100.8	-119.6	-91.8	102.3	-98.6	-51.1	-129.4	-95.2	-131.9	-91.9	-244.5
pH			SU	7.43	7.37	7.1	7.24	7.44	7.02	7.25	7.19	7.38	7.48	7.39	7.63	7.4
Specific Conductance			uS/cm	1525	1734	1568	171.9	2251	1950	1488	1244	1337	1235	1463	2077	1380
Temperature			deg C	15.29	16.16	15.77	15	14.8	14.4	15.62	16.5	16.6	15.2	15.2	16.55	16.1
Turbidity			NTU	4.09	2.48	0.62	0.92	0.58	2.11	2.35	1.86	3.45	3.76	3.88	3.55	4.86

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW18														
				2016-07-13	2016-09-08	2016-11-09	2016-11-09	2017-01-10	2017-03-01	2017-04-26	2017-07-12	2017-07-12	2017-08-23	2017-10-03	2017-10-03	2018-03-14	2018-04-23	2018-10-25
				N	N	FD	N	N	N	N	FD	N	N	FD	N	N	N	N
Appendix III Parameters																		
Boron		4	mg/L	1.8	3.5	1.9	1.8	1.3	1	0.77	1.2	1.2	1.5	1.9	1.9		1.2	1.7
Calcium			mg/L	320	610 O	370	360	330	280	210	280	290	300	380 J	64 J		320	230
Chloride			mg/L	17	39	17	17	9.3	5	4.3	10	10	11	23	23		7.3	22
Fluoride	4	0.8	mg/L	0.047 J+	0.036 J	10 U	10 U	5 U	5 U	2 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.057
pH			SU	6.95	6.83		6.7	6.88	7.11	6.6		6.96	7.02		6.91	7.2	7.21	6.54
Sulfate			mg/L	760 J-	1400	850	830	640	540	370	600	610	690	960	950		670	550
Total Dissolved Solids			mg/L	1300	2200	1500	1500	1200	1000	730	1100	1100	1300	1600	1500		2400	1100
Appendix IV Parameters																		
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.00096 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U
Arsenic	0.01	0.01	mg/L	0.0014 J	0.0023 J	0.0014 J	0.00091 J	0.0014 J	0.005 U	0.0015 J	0.0021 J	0.0021 J	0.0011 J			0.005 U		0.005 U
Barium	2	2	mg/L	0.038	0.047	0.041	0.039	0.037	0.024	0.021	0.051	0.052	0.055			0.048	0.035	0.037
Beryllium	0.004	0.004	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U
Cadmium	0.005	0.005	mg/L	8.1E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.00067 J	0.00046 J	0.0005 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U
Cobalt		0.006	mg/L	0.001 U	0.00023 J	0.00047 J	0.0002 J	0.00024 J	0.001 U	0.00023 J	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U
Fluoride	4	0.8	mg/L	0.047 J+	0.036 J	10 U	10 U	5 U	5 U	2 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.057
Lead		0.015	mg/L	0.001 U	0.001 U	0.00051 J	0.00025 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.00067 J		0.001 U
Lithium		0.04	mg/L	0.00096 J	0.008 U	0.008 U	0.008 U	0.00042 J	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U			0.008 U		0.008 U
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ			0.0002 U		0.0002 U
Molybdenum		0.1	mg/L	0.11	0.18 O	0.14 O	0.13 O	0.094	0.1	0.1	0.1	0.11	0.1			0.097	0.085	0.057
Radium 226 + 228	5		pCi/L	5 U	0.803	0.474	0.449	0.581 U	0.398 U	0.384 U	0.493	0.337 U	0.629				0.259	0.477
Radium-226			pCi/L	1 U	0.348	0.334 U	0.33 U	0.325	0.13	0.131 U	0.166 J+	0.179 J+	0.332				0.0715	0.291
Radium-228			pCi/L	1 U	0.49 U	0.455 U	0.413 U	0.581 U	0.398 U	0.384 U	0.381 U	0.337 U	0.369 U				0.187	0.357 U
Selenium	0.05	0.05	mg/L	0.01	0.018	0.0065	0.0052	0.0099	0.011	0.0053	0.012	0.012	0.006			0.009	0.0084	0.015
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U
Field Parameters																		
Dissolved Oxygen			mg/L	4.83	4.77		5.93	7.52	8.86	7.79		6.04	4.52		5.32	6.5	8.49	3.78
Oxidation-Reduction Potential			millivolts	98.9	76.8		28.7	106.8	97.9	209.2		203.2	24.7		121.9	-129.6	-51.6	-36.6
pH			SU	6.95	6.83		6.7	6.88	7.11	6.6		6.96	7.02		6.91	7.2	7.21	6.54
Specific Conductance			uS/cm	1474	2362		1740	1255	986	970		1299	1414		1760	905	1170	1230
Temperature			deg C	16.3	20.1		16.6	9.65	8.47	11.2		17.9	19.8		19.3	8.1	8.9	17.4
Turbidity			NTU	3.32	1.63		2.38	3.05	4.44	2.48		1.71	1.03		4.16	4.59	0.71	1.29

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

GAMW53/53B CCR results switched due to sampler error

Analyte	MCL	IDEM RCG	Unit	GAMW18B			GAMW46	GAMW46B	GAMW52		GAMW52B		GAMW53		GAMW53B		GAMW54	
				2018-09-10	2018-10-25	2018-10-25	2018-06-13	2018-06-13	2018-09-10	2018-10-31	2018-09-11	2018-10-31	2018-09-11	2018-10-30	2018-09-11	2018-10-30	2018-09-10	2018-10-31
				N	FD	N	N	N	N	N	N	N	N	N	N	N	N	N
Appendix III Parameters																		
Boron		4	mg/L	13	12	13	0.055 J	0.05 J	0.34	0.17	0.75	0.8	0.19	0.25	2.5	3.1	0.84	0.77
Calcium			mg/L	260	200	220	56	25	75	59	160	160	45	53	180	190	93	88
Chloride			mg/L	150	140	140	8.4	3	34	9.1	530	470	4.9	4.6	90	85	15	10
Fluoride	4	0.8	mg/L	0.77 J	0.74	0.73	0.052 J	0.048 J	0.36 J	0.3	10 U	0.18	0.17 J	0.17	0.52 J	0.46	0.18 J	0.17
pH			SU	7.73		6.86	7.93	8.2	7.5	7.06	8.3	7.1	6	7.35	7.3	6.47	6.24	7.92
Sulfate			mg/L	1100	1000	1100	55	29	86	39	210	190	51	56	430	510	190	150
Total Dissolved Solids			mg/L	2100	2000	2000	260	150	400	250	1500	1300	240	250	1100	1100	500	400
Appendix IV Parameters																		
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.0011 J	0.00074 J
Arsenic	0.01	0.01	mg/L	0.0018 J	0.0026 J	0.0028 J	0.0014 J	0.0015 J	0.005 U	0.005 U	0.0013 J	0.0016 J	0.013	0.015	0.00079 J	0.00083 J	0.0024 J	0.0028 J
Barium	2	2	mg/L	0.048	0.035	0.039	0.027	0.0086	0.039	0.019	0.32	0.31	0.027	0.028	0.052	0.054	0.043	0.039
Beryllium	0.004	0.004	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00042 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00024 J	0.001 U	0.00029 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.0021	0.002 U	0.002 U	0.002 U	0.002 U	0.0019 J	0.0018 J	0.002 U	0.002 U	0.002 U	0.002 U
Cobalt		0.006	mg/L	0.00027 J	0.00026 J	0.00028 J	0.0002 J	0.00034 J	0.00058 J	0.00031 J	0.001 U	0.00032 J	0.00084 J	0.00099 J	0.001 U	0.001 U	0.00053 J	0.00052 J
Fluoride	4	0.8	mg/L	0.77 J	0.74	0.73	0.052 J	0.048 J	0.36 J	0.3	10 U	0.18	0.17 J	0.17	0.52 J	0.46	0.18 J	0.17
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0014	0.00089 J	0.001 U	0.001 U	0.001 U	0.001 U
Lithium		0.04	mg/L	0.025	0.015	0.016	0.008 U	0.008 U	0.0017 J	0.008 U	0.0041 J	0.0031 J	0.008 U	0.008 U	0.0042 J	0.0052 J	0.008 U	0.008 U
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum		0.1	mg/L	0.024	0.014	0.015	0.0031 J	0.0018 J	0.005 J	0.0035 J	0.014	0.015	0.012	0.015	0.0083 J	0.0075 J	0.043	0.044
Radium 226 + 228	5		pCi/L	1.7	1.28	1.46	0.384 U	0.392 U	0.796	1 J+	3.52	5.55 J+	0.547 U	0.48 J+	1.69	1.45 J+	0.5	1.08 J+
Radium-226			pCi/L	0.773 J+	0.717	0.748	0.244 U	0.223 U	0.46 J+	0.299 J+	2.11	2.76 J+	0.257	0.238 J+	0.789	0.795 J+	0.385 J+	0.237 J+
Radium-228			pCi/L	0.928	0.562	0.708	0.384 U	0.392 U	0.392 U	0.706 J+	1.41	2.79 J+	0.547 U	0.347 U	0.897	0.658 J+	0.385 U	0.843 J+
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.005 U	0.001 J	0.0017 J	0.0014 J	0.0017 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0017 J	0.0012 J
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Field Parameters																		
Dissolved Oxygen			mg/L	0.24		0.29	0.12	3.59	0.48	0.21	0.44	0.1	0.53	0.8	0.26	0.86	0.61	1.41
Oxidation-Reduction Potential			millivolts	-140.7		-103.4	-171.4	-29.4	-30.3	85.1	-214.9	-103.5	-24.6	-168	-183.2	-199.5	107.8	-294.7
pH			SU	7.73		6.86	7.93	8.2	7.5	7.06	8.3	7.1	6	7.35	7.3	6.47	6.24	7.92
Specific Conductance			uS/cm	3311		2147	367	211	0.896	448	1934	2005	307	1620	1354	400	675	630
Temperature			deg C	15.39		14.9	11.4	11.3	19.97	17.6	17.26	16.6	21.3	20.4	20.89	20.1	21.2	18.53
Turbidity			NTU	2.78		3.58	3.96	3.45	0.45	0.83	1.6	0.88	9.93	3	2.43	5.17	2.03	1

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: Analytical Data for CCR Unit Monitoring Wells
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	MCL	IDEM RCG	Unit	GAMW54B		GAMW55				GAMW55B			GAMW56		GAMW56B	
				2018-09-10	2018-10-31	2018-09-10	2018-09-10	2018-10-29	2018-10-29	2018-09-11	2018-09-11	2018-10-29	2018-09-11	2018-10-26	2018-09-11	2018-10-29
				N	N	FD	N	FD	N	FD	N	N	N	N	N	N
Appendix III Parameters																
Boron		4	mg/L	5.6	6.5	1.9	1.9	1.8	1.8	7.1	7.4	8.2	0.26	0.28	1.2	1.2
Calcium			mg/L	210	220	260	250	270	260	250	250	260	130	110	140	140
Chloride			mg/L	100	95	58	59	69	70	220	220	190	3.1	2.4	50	36
Fluoride	4	0.8	mg/L	0.41 J	0.52	0.51 J	0.52 J	0.47	0.47	0.29 J	10 U	0.25	1.2 J	0.99	0.41 J	0.33
pH			SU	6.95	8.71		6.77		7.04		7.07	7.19	6.82	7.17	6.95	6.91
Sulfate			mg/L	750	730	590	600	630	620	820	820	910	57	63	170	130
Total Dissolved Solids			mg/L	1600	1400	1200	1300	1300	1300	1800	1900	1800	470	480	740	690
Appendix IV Parameters																
Antimony	0.006	0.006	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	0.01	0.01	mg/L	0.0025 J	0.0032 J	0.00083 J	0.005 U	0.005 U	0.005 U	0.0014 J	0.0011 J	0.005 U	0.019	0.022	0.005 U	0.005 U
Barium	2	2	mg/L	0.098	0.093	0.099	0.097	0.068	0.069	0.14	0.14	0.12	0.068	0.049	0.076	0.072
Beryllium	0.004	0.004	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium	0.005	0.005	mg/L	0.001 U	0.001 U	0.00035 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	0.1	0.1	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cobalt		0.006	mg/L	0.001 U	0.001 U	0.0065	0.0058	0.0044	0.0044	0.00034 J	0.00028 J	0.001 U	0.0017	0.0053	0.001 U	0.001 U
Fluoride	4	0.8	mg/L	0.41 J	0.52	0.51 J	0.52 J	0.47	0.47	0.29 J	10 U	0.25	1.2 J	0.99	0.41 J	0.33
Lead		0.015	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium		0.04	mg/L	0.0048 J	0.0036 J	0.0021 J	0.0017 J	0.008 U	0.008 U	0.0064 J	0.0064 J	0.0054 J	0.0034 J	0.0039 J	0.0051 J	0.0035 J
Mercury	0.002	0.002	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum		0.1	mg/L	0.018	0.019	0.03	0.028	0.026	0.026	0.0057 J	0.0055 J	0.0055 J	0.013	0.0094 J	0.004 J	0.003 J
Radium 226 + 228	5		pCi/L	2.03	2.7 J+	1.4	0.802	0.922 J+	1.24 J+	3.35	3.18	3.66 J+	0.728	0.698 J+	1.26	1.28 J+
Radium-226			pCi/L	1.18 J+	1.35 J+	0.574 J+	0.474 J+	0.363 J+	0.447 J+	1.72	1.75	1.86 J+	0.504	0.357 J+	0.763	0.578 J+
Radium-228			pCi/L	0.849	1.35 J+	0.824	0.403 U	0.559 J+	0.796 J+	1.63	1.43	1.79 J+	0.371 U	0.429 U	0.493	0.698 J+
Selenium	0.05	0.05	mg/L	0.005 U	0.005 U	0.0037 J	0.0031 J	0.0027 J	0.0027 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Thallium	0.002	0.002	mg/L	0.001 U	0.001 U	0.00021 J	0.001 U	0.00023 J	0.00022 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Field Parameters																
Dissolved Oxygen			mg/L	0.42	2.12		1.73		0.33		0.37	0.17	0.99	0.28	0.29	0.26
Oxidation-Reduction Potential			millivolts	-123.4	-315.7		21.6		-69.4		-129.5	-115.9	-97.4	-95.4	-102.8	-44.4
pH			SU	6.95	8.71		6.77		7.04		7.07	7.19	6.82	7.17	6.95	6.91
Specific Conductance			uS/cm	1816	1983		1493		1574		2109	2201	749	835	928	1036
Temperature			deg C	17.6	17.29		21.1		19.4		19.2	18.5	17	15.7	13.9	13.8
Turbidity			NTU	4.2	1.64		1.74		0.66		4.38	1.74	2.91	2.99	2.96	1.45

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picoCuries per liter
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.
"J+" = Indicates the result was estimated below the RL but above the MDL and may be biased high; the estimated value is provided.
"J-" = Indicates the result was estimated below the RL but above the MDL and may be biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Prepared by: DFS
Checked by: KMC
Reviewed by: MAH

Table 3: General Groundwater Response Actions
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

General Response Action	Comments	Corrective Measure Area	
		Below CCR Unit	Downgradient of CCR Unit
Limited Action	Access Restrictions Institutional Controls Use Restrictions Environmental Monitoring Monitored Natural Attenuation	X	X
Containment	Physical	X	
Removal	Extraction	X	X
Treatment	In-Situ Ex-Situ	X	X
On-Site Disposal	Surface Water Discharge Groundwater Discharge POTW Discharge	X	X
Off-Site Disposal	Permitted Disposal Facility	X	X

Notes
X- General Response Action selected for further screening at the indicated Corrective Measure Area

Prepared by: DFS
Checked by: KMC
Reviewed by: MAH

Table 4: Initial Screening of Corrective Measure Alternatives / Process Options for Groundwate
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

General Response Action	Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation	
					Below CCR Unit	Downgradient of CCR Unit
Limited Action	Institutional Controls	Permitting and Notices	Administrative controls to restrict groundwater use.	Potentially implementable.	Yes	Yes
		Access Restrictions	Physical restrictions or structures that prevent access by unauthorized persons.	Potentially implementable.	Yes	Yes
	Monitoring	Groundwater Monitoring	Periodic sampling and analyses of groundwater as a means of detecting unacceptable changes in constituent concentrations.	Potentially implementable.	Yes	Yes
	Use Restriction	Deed Restrictions	Administrative controls to provide future land use restrictions.	Potentially implementable.	Yes	Yes
	Monitored Natural Attenuation	Monitored Natural Attenuation	Long-term monitoring of natural attenuation, including advection/dispersion/adsorption and biotic and abiotic degradation/transformation, of the inorganic constituents dissolved in groundwater; advection/dispersion/adsorption of inorganics.	Potentially implementable.	Yes	Yes
Containment	Physical Containment	Capping	Low-permeable cap covering the source area.	Potentially implementable, minimizes stormwater infiltration reducing the potential for plume migration.	Yes	NA
		Vertical Barriers	Vertical barriers including slurry walls and sheet piling placed around the area of contamination to contain groundwater.	Potentially implementable, reduces potential for plume migration.	Yes	NA
Removal	Extraction	Extraction Wells	Use of extraction wells to extract contaminated groundwater and control groundwater movement within capture zone.	Potentially implementable, results in physical removal of dissolved constituents of concern and reduces potential for plume migration.	Yes	Yes
		Extraction Trench	Removal of groundwater by pumping from extraction trenches.	Potentially implementable, results in physical removal of dissolved constituents of concern and reduces potential for plume migration.	Yes	Yes
In Situ Treatment	Stabilization/ Solidification	Solidification	Blending soil with grout to contain and immobilize contaminated groundwater.	Potentially implementable for the corrective measure area below the CCR Unit. Reduces potential for plume migration.	Yes	No
	Permeable Reactive Barrier	Vertical Reactive Barrier	Construction of vertical reactive barrier (e.g., carbon wall) to treat groundwater as it flows through the treatment zone.	Not effective on all Site COCs, limited effectiveness on Sites with high groundwater velocity.	No	No
In Situ Treatment	Chemical Addition/ Treatment	Chemical Precipitation	Increasing inorganic precipitation through chemical injection, either by changing site geochemical conditions (i.e., pH, Eh, or ionic strength) or the addition of a co-precipitate that reacts with or acts as an adsorbent for the COC.	Not effective on all Site COCs.	No	No
		Chemical Reduction	Injection of a reducing agent such as nanoscale or microscale zero valent iron into groundwater. Reduction reactions chemically convert constituents to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.	Not effective on all Site COCs.	No	No
	Biological Treatment	Bioremediation	Use of microorganisms to oxidize/reduce metal contaminants directly or by the production of chemical oxidizing/reducing agents.	Not effective on all Site COCs.	No	No

Table 4: Initial Screening of Corrective Measure Alternatives / Process Options for Groundwate
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

General Response Action	Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation	
					Below CCR Unit	Downgradient of CCR Unit
Ex Situ Treatment	On-Site Treatment Facility	On-Site, Various Physical/chemical Process Options	Extracted groundwater is pumped to the on-Site treatment facility (physical/chemical treatment).	Potentially implementable to treat extracted contaminated groundwater. Treatment processes that could remediate the Site COCs include chemical/physical precipitation, activated carbon, and reverse osmosis.	Yes	Yes
Disposal	On-Site Discharge	On-Site Discharge to Surface Water	Treated groundwater discharged to local water body pursuant to updated NPDES permit.	Potentially implementable. Treated landfill leachate is currently discharged to a local water body pursuant to a NPDES permit.	Yes	Yes
		On-Site Discharge to Groundwater	Treated groundwater discharged to groundwater within the Station Area.	Potentially implementable.	Yes	Yes
		POTW Discharge	Discharge of treated groundwater to POTW under a discharge authorization.	No access to POTW.	No	No
	Off-Site Treatment	Off-Site Disposal/Treatment of Collected Groundwater	Transport and treatment of extracted groundwater at off-Site treatment facility.	Not retained due to higher safety concerns and much higher disposal costs.	No	No

Notes
COC- constituent of concern
NPDES- National Pollutant Discharge Elimination System
POTW- publicly owned treatment works
NA- not applicable

Prepared by: DFS
Checked by: KMC
Reviewed by: MAH

Table 5: Summary of Corrective Measure Alternatives
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Alternative	Key Components
Excavation with monitored natural attenuation	Removal and disposal of CCR source material from CCR Unit Permitting Implementation of deed restrictions Environmental monitoring
Excavation with capping and monitored natural attenuation	Removal and disposal of CCR source material from CCR Unit Permitting Implementation of deed restrictions Installation of low-permeability cap Long-term maintenance Environmental monitoring
Excavation with vertical barrier and monitored natural attenuation	Removal and disposal of CCR source material from CCR Unit Permitting Implementation of deed restrictions Installation of vertical barrier wall Environmental monitoring
Excavation with in situ stabilization/solidification and monitored natural attenuation	Removal and disposal of CCR source material from CCR Unit Permitting Implementation of deed restrictions *In situ* stabilization/solidification of saturated soil below the CCR Unit Environmental monitoring Long-term maintenance
Excavation with pump-and-treat and monitored natural attenuation	Removal and disposal of CCR source material from CCR Unit Permitting Implementation of deed restrictions Installation of monitoring wells or extraction trench inside or outside the slurry wall *Ex situ* treatment of pumped groundwater with an on-Site treatment facility Disposal of treated groundwater to on-Site surface water or groundwater NPDES permit or installation of injection wells Environmental monitoring Long-term maintenance
Excavation with capping, pump-and-treat, and monitored natural attenuation.	Removal and disposal of CCR source material from CCR Unit Permitting Implementation of deed restrictions Installation of a low-permeability cap Installation of monitoring wells or extraction trench outside the vertical barrier wall *Ex situ* treatment of pumped groundwater with an on-Site treatment facility Disposal of treated groundwater to on-Site surface water or groundwater NPDES permit or installation of injection wells Environmental monitoring Long-term maintenance

Table 5: Summary of Corrective Measure Alternatives
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Alternative	Key Components
Excavation with vertical barrier, pump-and-treat, and monitored natural attenuation.	Removal and disposal of CCR source material from CCR Unit Permitting Implementation of deed restrictions Installation of a vertical barrier wall Installation of monitoring wells or extraction trench outside the vertical barrier wall *Ex situ* treatment of pumped groundwater with an on-Site treatment facility Disposal of treated groundwater to on-Site surface water or groundwater NPDES permit or installation of injection wells Environmental monitoring Long-term maintenance
Excavation with in-situ stabilization/solidification, pump-and-treat, and monitored natural attenuation	Removal and disposal of CCR source material from CCR Unit Permitting Implementation of deed restrictions *In situ* stabilization/solidification of saturated soil below the CCR Unit Installation of monitoring wells or extraction trench outside the slurry wall *Ex situ* treatment of pumped groundwater with an on-Site treatment facility Disposal of treated groundwater to on-Site surface water or groundwater NPDES permit or installation of injection wells Environmental monitoring Long-term maintenance

Prepared by: DFS
Checked by: KMC
Reviewed by: MAH

Table 6: Evaluation of Corrective Measure Alternatives
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

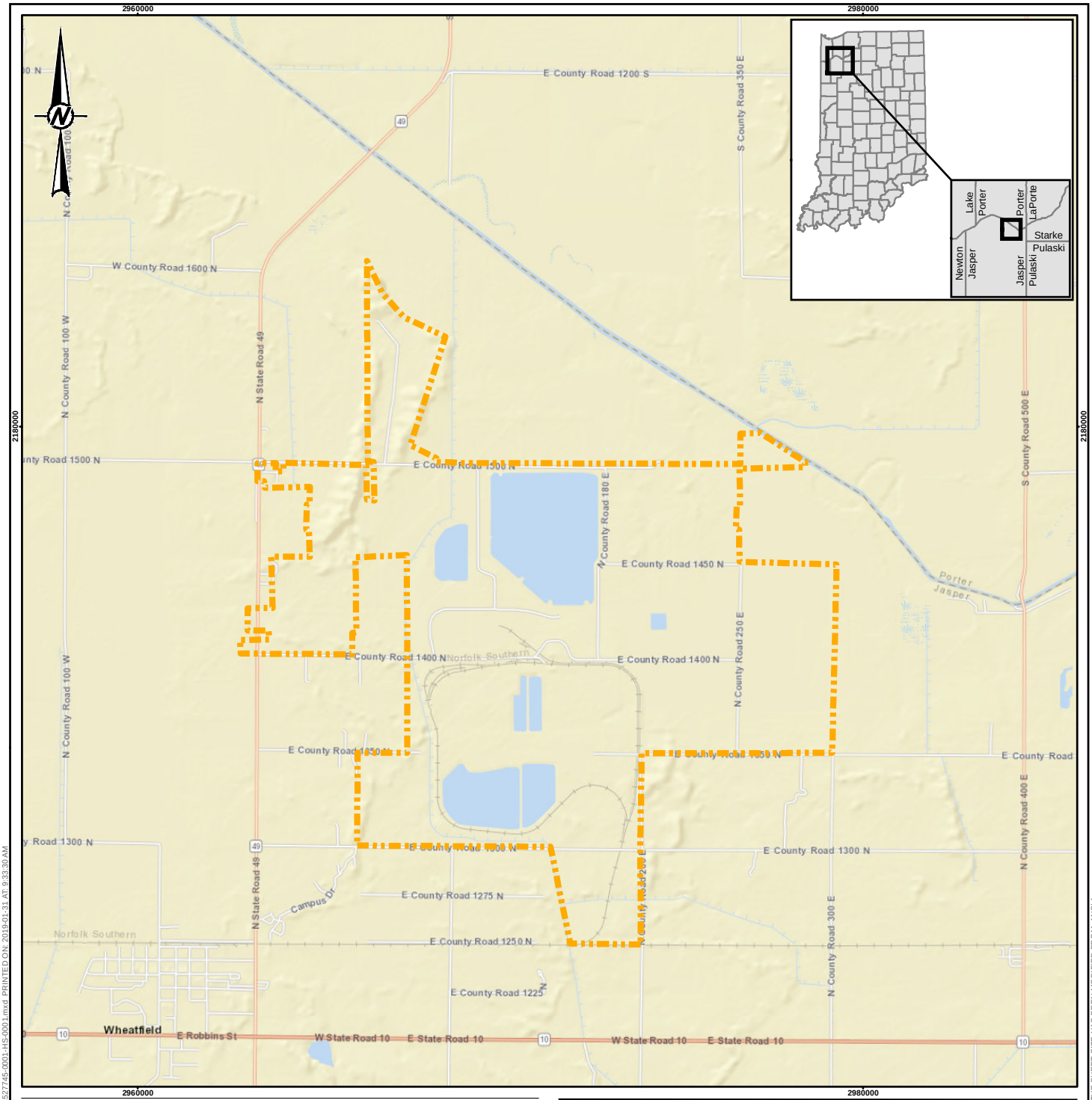
	Corrective Measure Alternative				
Evaluation Criteria	**Excavation with monitored natural attenuation**	**Excavation with capping and monitored natural attenuation**	**Excavation with vertical barrier and monitored natural attenuation**	**Excavation with in situ stabilization/solidification and monitored natural attenuation**	**Excavation with pump-and-treat and monitored natural attenuation**
Performance	Initial review of site conditions indicates plume stability and confirmation of attenuation and immobilization, therefore, monitored natural attenuation could be effective in reducing the COC concentrations and mobility. Relative unknown short-term effectiveness depending on success of excavation to remove entire source.	A low-permeable cap could be an effective means of reducing mobility of COCs and potential for plume migration. Relative unknown short-term effectiveness depending on success of excavation to remove entire source.	Vertical barriers are an effective means of containing the source area, relatively effective both short-term and long-term.	ISS is an effective means of immobilizing metals in saturated soil and preventing further release to groundwater; relatively effective both short-term and long-term.	Groundwater extraction of contaminated groundwater could be potentially effective in reducing volume and mobility of dissolved COCs in groundwater. Relatively effective both short-term and long-term.
Reliability	Reliable due to source removal.	Reliable due to source removal.	If vertical barrier can be keyed into impermeable layer should be relatively reliable.	Stabilization should be relatively reliable.	Moderate, some O&M required and potential treatment replacement.
Ease of Implementation	Readily implementable and commonly used technologies.	Readily implementable and commonly used technologies.	Technology is common; some installation challenges expected based slurry walls currently located on Site.	Direct mixing is straightforward; some uncertainty in full extent/contact unless it can be verified; potential unseen factors, etc.	Technology is common, some installation and drilling challenges expected, added wall may be required.
Potential Impacts	If performed properly, will reduce long-term cross media impacts, some safety concerns related to excavation.	If performed properly, will reduce long-term cross media impacts, some safety concerns related to excavation.	Vertical barriers control cross media impacts, outside of the wall, some safety concerns related to excavation and installation.	Stabilization controls cross media impacts, some safety concerns related to excavation and auguring/mixing of soils.	If performed properly, will reduce long-term cross media impacts, some safety concerns related to excavation and drilling.
Time Requirements	Relatively long, no active remediation.	Relatively long, no active remediation.	Moderate, should be shorter than MNA alone.	Moderate, should be shorter than MNA alone.	Moderate, should be shorter than MNA alone.
Institutional Requirements	Low permitting requirements	permitting permitting requirements	Low permitting requirements	Low permitting requirements	May require NPDES permit modifications, overall low permitting requirements
Relative Costs	Low Capital Low O&M	Moderate Capital Low O&M	High Capital Low O&M	High Capital Low O&M	High Capital Moderate O&M

Table 6: Evaluation of Corrective Measure Alternatives
CCR Unit Schahfer MSRB, MCWB, and DA
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

	Corrective Measure Alternative		
Evaluation Criteria	**Excavation with capping, pump-and-treat, and monitored natural attenuation**	**Excavation with vertical barrier, pump-and-treat, and monitored natural attenuation**	**Excavation with in-situ stabilization/solidification, pump-and-treat, and monitored natural attenuation**
Performance	A low-permeable cap could be an effective means of reducing mobility of COCs and potential for plume migration and groundwater extraction of contaminated groundwater could be potentially effective in reducing volume and mobility of dissolved COCs in groundwater. Relatively effective both short-term and long-term.	Vertical barriers are an effective means of containing the source area and groundwater extraction of contaminated groundwater could be potentially effective in reducing volume and mobility of dissolved COCs in groundwater. Relatively effective both short-term and long-term.	ISS is an effective means of immobilizing metals in saturated soil and preventing further release to groundwater and groundwater extraction of the contaminated groundwater could be potentially effective in reducing the volume and mobility of dissolved COCs in groundwater. Relatively effective both short-term and long-term.
Reliability	Moderate, some O&M required and potential treatment replacement.	Moderate, some O&M required and potential treatment replacement.	Moderate, some O&M required and potential treatment replacement.
Ease of Implementation	Technology is common, some installation and drilling challenges expected, added wall may be required.	Technology is common, some installation and drilling challenges expected, added wall may be required.	Technology is common, some uncertainty in full extent/contact of soil mixing, unless it can be verified; some drilling challenges expected; added wells may be required; potential unforeseen factors.
Potential Impacts	If performed properly, will reduce long-term cross media impacts, some safety concerns related to excavation.	Vertical barriers and collection and treatment have good control of cross media impacts, some safety concerns related to excavation, installation, and drilling.	Stabilization and collection and treatment have good control of cross media impacts, some safety concerns related to excavation, drilling, and auguring/mixing of soils.
Time Requirements	Moderate, shorter than MNA or pump-and-treat alone.	Moderate, shorter than MNA or pump-and-treat alone.	Moderate, shorter than MNA or pump-and-treat alone.
Institutional Requirements	May require NPDES permit modifications, overall low permitting requirements	May require NPDES permit modifications, overall low permitting requirements	May require NPDES permit modifications, overall low permitting requirements
Relative Costs	High Capital Moderate O&M	High Capital Moderate O&M	High Capital Moderate O&M

Prepared by: DFS
Checked by: KMC
Reviewed by: MAH

Figures



LEGEND

Approximate Property Line

0 0.75 1.5

1 " = 0.75 miles Miles

REFERENCE(S)

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

SITE LOCATION MAP

CONSULTANT

GOLDER

YYYY-MM-DD	1/31/2019
DESIGNED	DFS
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

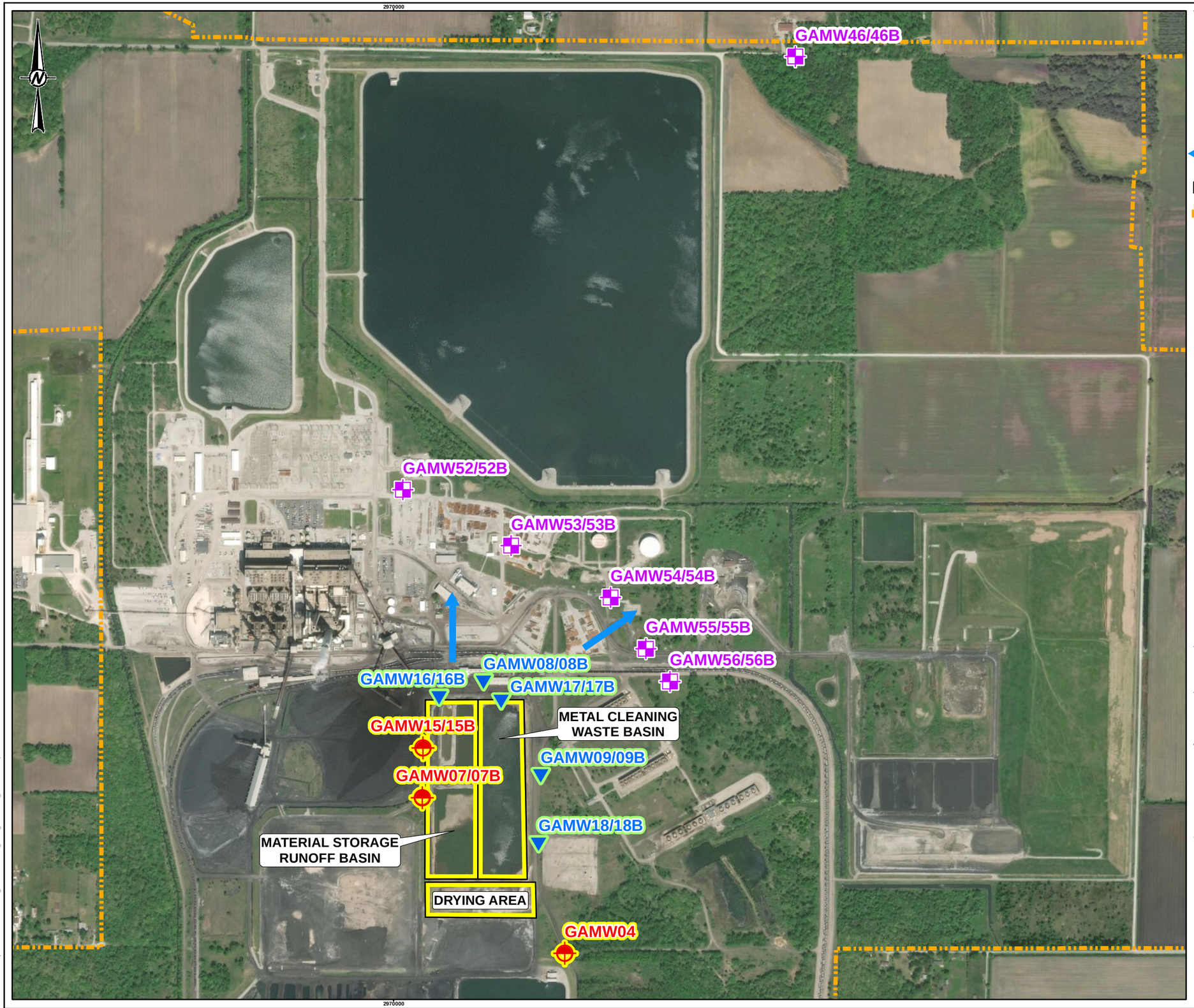
PROJECT NO.	CONTROL	REV.	FIGURE
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

1 in

0

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LEGEND

- Assessment Monitoring Well
- Background Monitoring Well
- Downgradient Monitoring Well
- Generalized Groundwater Flow Direction
- CCR Units
- Approximate Property Line

0 850 1,700

1 " = 850 feet Feet

NOTE(S)

1. THIS FIGURE DEPICTS THE GENERALIZED GROUNDWATER FLOW DIRECTION WITHIN THE UPPER PORTION OF THE SURFICIAL AQUIFER.

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

MONITORING WELL LOCATIONS
DRYING AREA, MSRB, AND MCWB

CONSULTANT

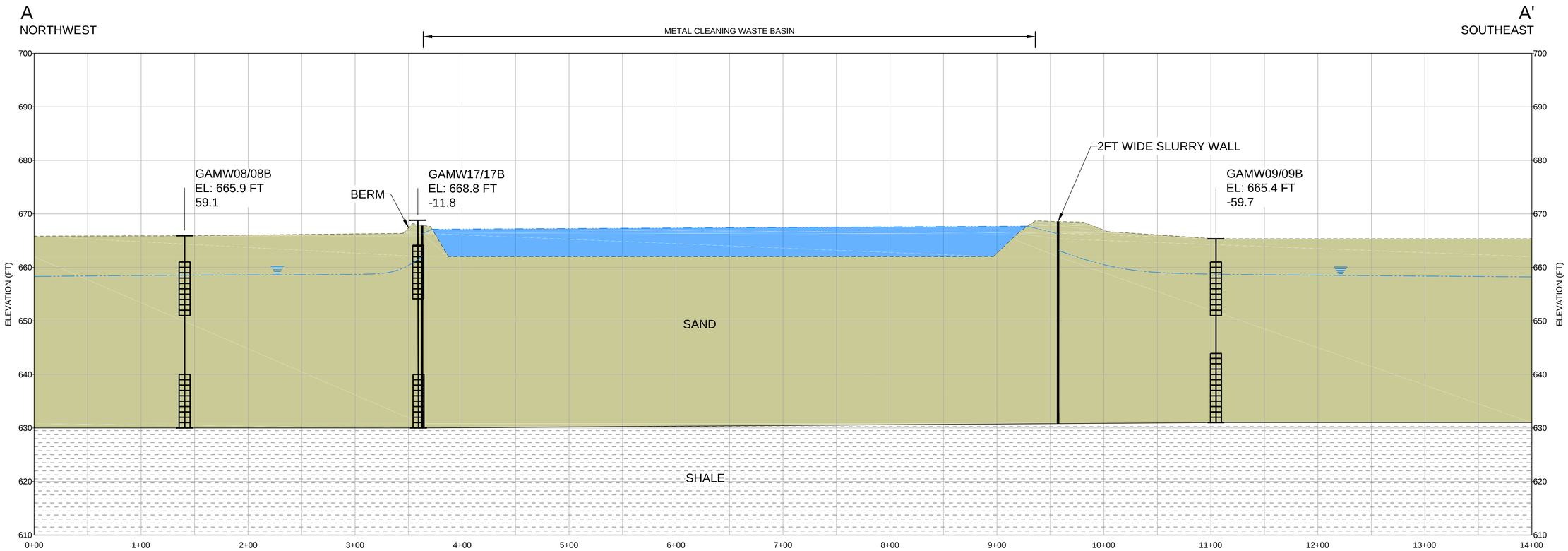
GOLDER

YYYY-MM-DD	1/31/2019
DESIGNED	DFS
PREPARED	SHL
REVIEWED	MAH
APPROVED	MAH

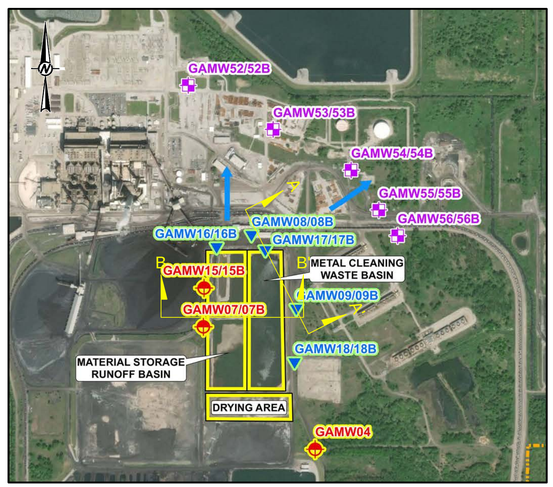
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



A-A'



VERTICAL SCALE: 0 10 20 — 1" = 10' FEET

HORIZONTAL SCALE: 0 50 100 — 1" = 50' FEET

LEGEND

GAMW-08/08B	=	WELL I.D.
EL: 665.9 59.1	= =	GROUND SURFACE ELEVATION OFFSET DISTANCE C/L = CENTERLINE
	=	GROUNDWATER ELEVATION
	=	WELL SCREEN
	=	END OF BORING LOCATION
		IMPOUNDMENT WATER
		SAND
		SHALE

NOTE(S)

1. GEOLOGIC CONTACTS ILLUSTRATED BETWEEN AND BELOW BORINGS ARE INFERRED AND SHOULD NOT BE INTERPRETED AS EXACT INDICATORS OF GEOLOGIC CONDITIONS AT, BETWEEN, OR BELOW BORINGS.

CLIENT
NORTHERN INDIANA PUBLIC SERVICE COMPANY

CONSULTANT
GOLDER

YYYY-MM-DD	2019-02-28
DESIGNED	RWC
PREPARED	RWC
REVIEWED	
APPROVED	

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
ROLLIN M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
GEOLOGIC INTERPRETATION
CROSS SECTION A-A'

PROJECT NO.	CONTROL	REV.	FIGURE
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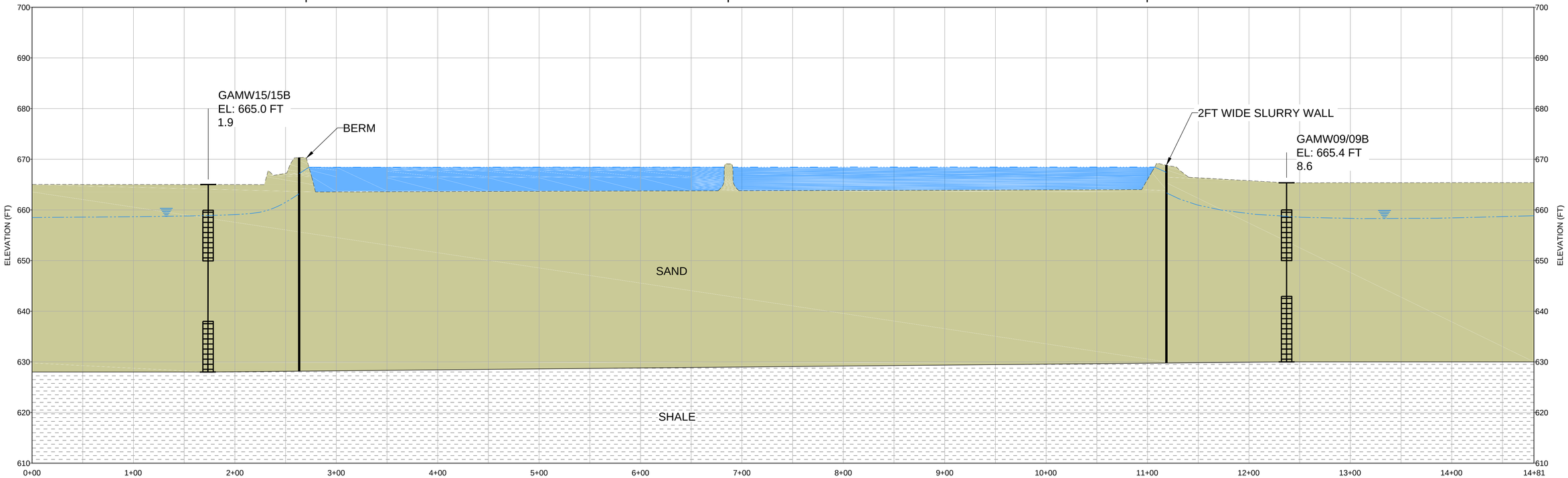
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B
WEST

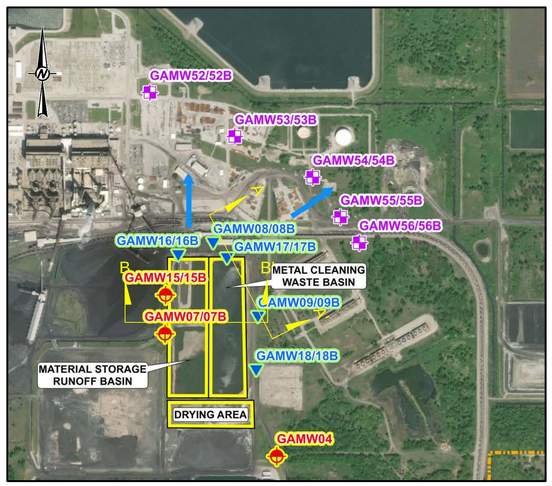
B'
EAST

MATERIAL STORAGE RUNOFF BASIN

METAL CLEANING WASTE BASIN



B-B'



VERTICAL SCALE: 0 10 20 — 1" = 10' FEET

HORIZONTAL SCALE: 0 50 100 — 1" = 50' FEET

LEGEND

GAMW-15/15B	=	WELL I.D.
EL: 665.14	=	GROUND SURFACE ELEVATION
1.9	=	OFFSET DISTANCE C/L = CENTERLINE
	=	GROUNDWATER ELEVATION
	=	WELL SCREEN
	=	END OF BORING LOCATION
		IMPOUNDMENT WATER
		SAND
		SHALE

NOTE(S)

1. GEOLOGIC CONTACTS ILLUSTRATED BETWEEN AND BELOW BORINGS ARE INFERRED AND SHOULD NOT BE INTERPRETED AS EXACT INDICATORS OF GEOLOGIC CONDITIONS AT, BETWEEN, OR BELOW BORINGS.

CLIENT
NORTHERN INDIANA PUBLIC SERVICE COMPANY

CONSULTANT
GOLDER

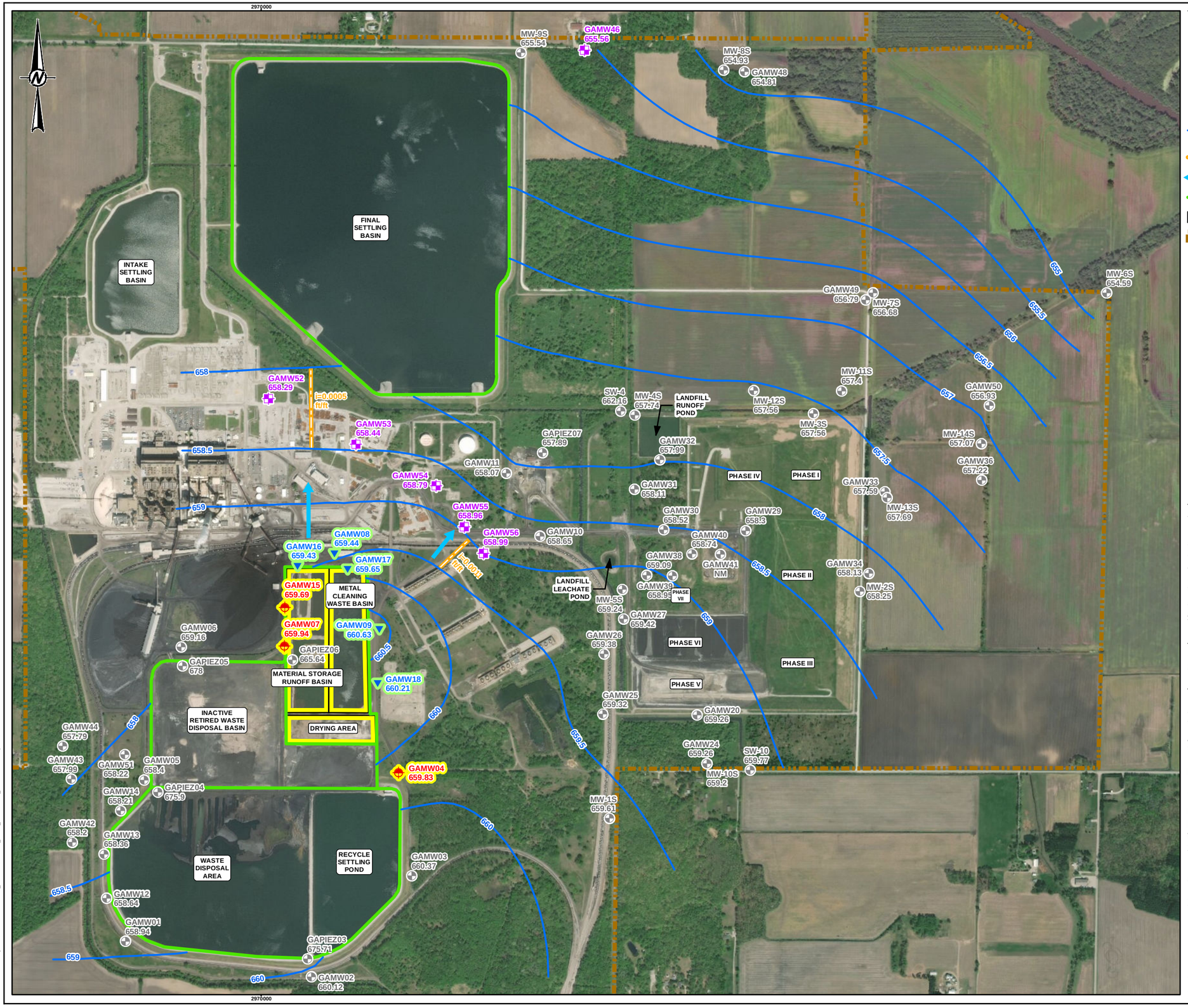
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DESIGNED	RWC
PREPARED	RWC
REVIEWED	
APPROVED	

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
ROLLIN M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
GEOLOGIC INTERPRETATION
CROSS SECTION B-B'

PROJECT NO.	CONTROL	REV.	FIGURE
1648171	03	0	4

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D
0 1 in



LEGEND

- Assessment Monitoring Well
- Background Monitoring Well
- Downgradient Monitoring Well
- Non-CCR Well
- August 2018 Groundwater Elevation Contour (0.5 ft interval)
- Hydraulic Gradient
- Generalized Groundwater Flow Direction
- Slurry Wall
- CCR Units
- Approximate Property Line

0 1,000 2,000

1 " = 1,050 feet Feet

FIGURE NARRATIVE

THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION SCREENED WITHIN THE UPPER PORTION OF THE SURFICIAL AQUIFER, AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY GOLDER ON AUGUST 27-28, 2018.

THE DIRECTION OF HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

GOLDER INFERRED THE ELEVATION CONTOURS BASED ON THE DATA ILLUSTRATED. THE ACTUAL ELEVATION OF THE POTENTIOMETRIC SURFACE IS LIKELY MORE HETEROGENEOUS THAN SHOWN AND ACTUAL CONDITIONS WILL VARY. OTHER INTERPRETATIONS ARE POSSIBLE. THE DEPTH TO GROUNDWATER IS KNOWN TO VARY WITH TIME.

NOTE(S)

1. WATER LEVEL MEASUREMENTS COLLECTED BETWEEN AUGUST 27-28TH.
2. NM INDICATES WATER LEVEL WAS NOT MEASURED IN AUGUST 2018

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCES: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

AUGUST 2018 GROUNDWATER ELEVATION CONTOUR MAP

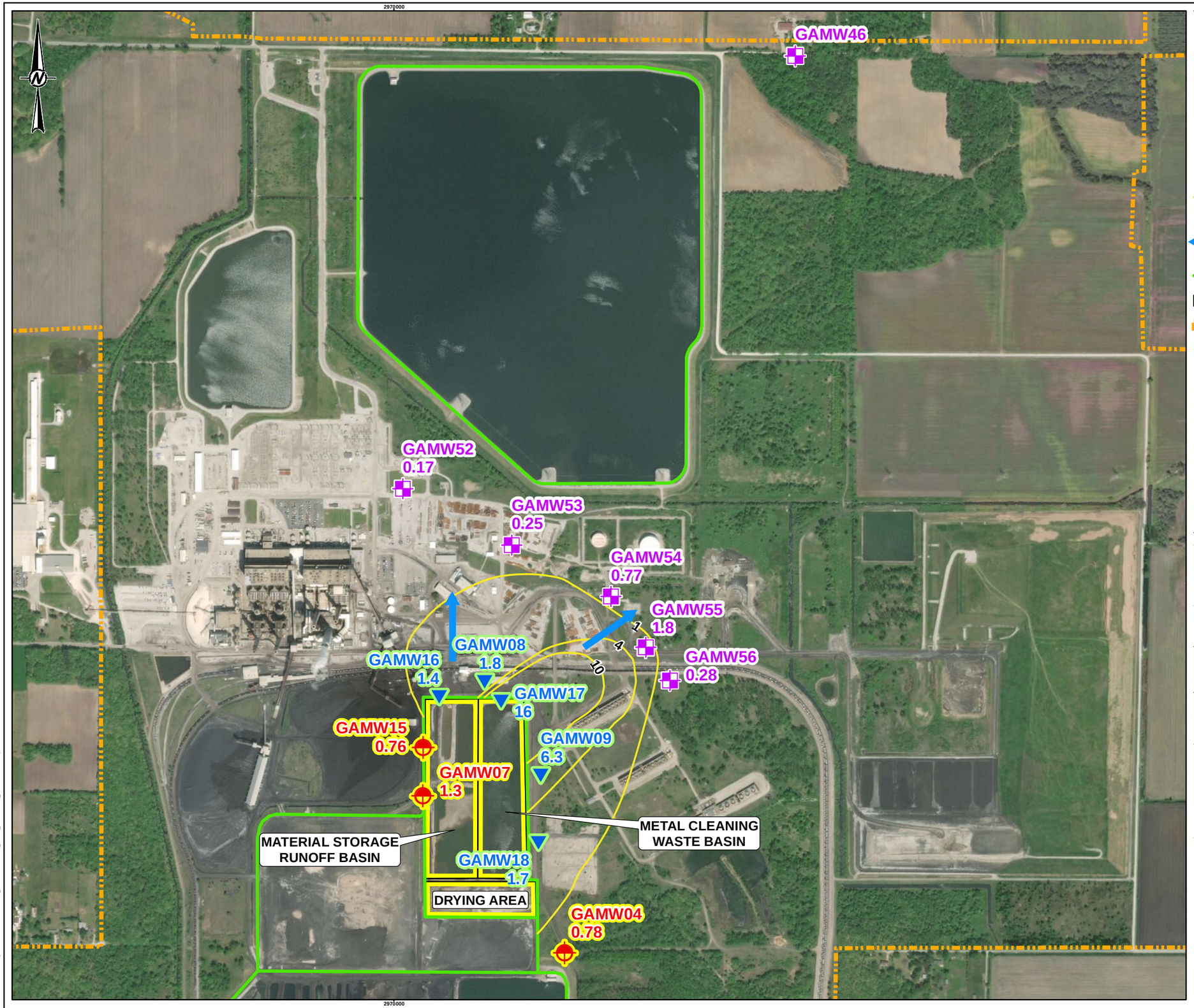
CONSULTANT

GOLDER

YYYY-MM-DD	4/19/2019
DESIGNED	JSP
PREPARED	SHL
REVIEWED	DFS
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
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0 1in



LEGEND

- 0.17 October 2018 Boron Concentration (mg/L)
- Assessment Monitoring Well
- Background Monitoring Well
- Downgradient Monitoring Well
- October 2018 Shallow Boron Contour (mg/L)
- Generalized Groundwater Flow Direction
- Slurry Wall
- CCR Units
- Approximate Property Line

0 850 1,700

1 " = 850 feet Feet

FIGURE NARRATIVE

THIS FIGURE SHOWS THE INTERPRETED BORON ISOCONCENTRATION CONTOURS BASED ON GROUNDWATER ANALYTICAL DATA FROM THE OCTOBER 2018 SAMPLING EVENT FOR SHALLOW WELLS SCREENED IN THE SURFICIAL AQUIFER. THE ISOCONCENTRATION CONTOURS ARE INTENDED TO DEPICT THE INFERRED DISTRIBUTION OF BORON IN GROUNDWATER ON THE BASIS OF THE DATA ILLUSTRATED. THE DISTRIBUTION IS LIKELY MORE HETEROGENEOUS THAN SHOWN, AND THE ACTUAL CONDITIONS WILL VARY. OTHER INTERPRETATIONS ARE POSSIBLE. BORON DISTRIBUTION IN GROUNDWATER IS KNOWN TO VARY WITH TIME.

NOTE(S)

1. THIS FIGURE DEPICTS THE GENERALIZED GROUNDWATER FLOW DIRECTION WITHIN THE UPPER PORTION OF THE SURFICIAL AQUIFER.
2. ALL VALUES SHOWN ARE IN MILLIGRAMS PER LITER (MG/L)

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

ASSESSMENT OF CORRECTIVE MEASURES
BORON ISOCONCENTRATION CONTOUR MAP
OCTOBER 2018 (SHALLOW)

CONSULTANT

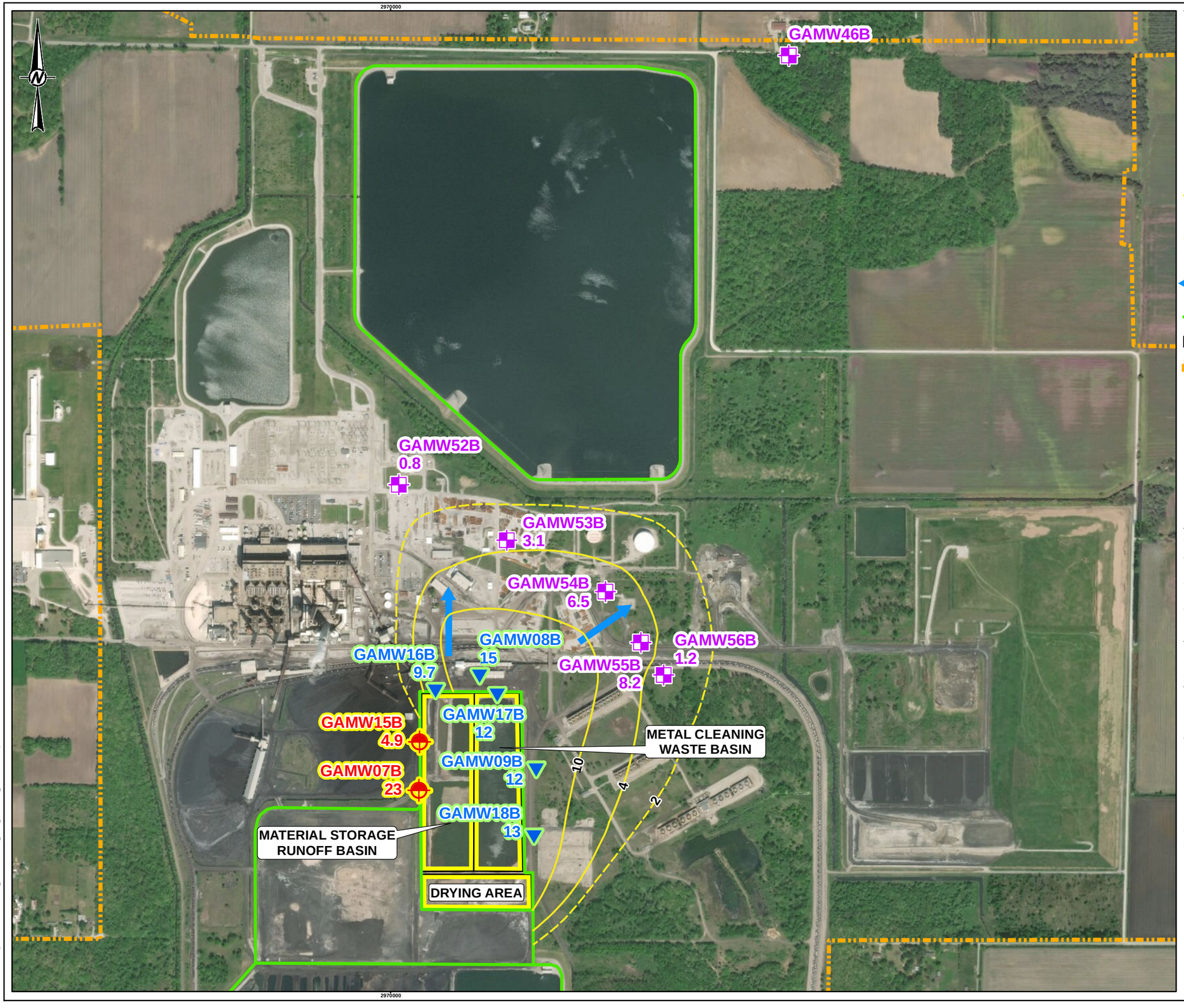
GOLDER

YYYY-MM-DD	4/18/2019
DESIGNED	DFS
PREPARED	SHL
REVIEWED	MAH
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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LEGEND

- 3.1 October 2018 Boron Concentration (mg/L)
- Assessment Monitoring Well
- Background Monitoring Well
- Downgradient Monitoring Well
- October 2018 Deep Boron Contour (mg/L)
- Inferred October 2018 Deep Boron Contour (mg/L)
- Generalized Groundwater Flow Direction
- Slurry Wall
- CCR Units
- Approximate Property Line

0 850 1,700

1 " = 850 feet Feet

FIGURE NARRATIVE

THIS FIGURE SHOWS THE INTERPRETED BORON ISOCONCENTRATION CONTOURS BASED ON GROUNDWATER ANALYTICAL DATA FROM THE OCTOBER 2018 SAMPLING EVENT FOR DEEP WELLS SCREENED IN THE SURFICIAL AQUIFER. THE ISOCONCENTRATION CONTOURS ARE INTENDED TO DEPICT THE INFERRED DISTRIBUTION OF BORON IN GROUNDWATER ON THE BASIS OF THE DATA ILLUSTRATED. THE DISTRIBUTION IS LIKELY MORE HETEROGENEOUS THAN SHOWN, AND THE ACTUAL CONDITIONS WILL VARY. OTHER INTERPRETATIONS ARE POSSIBLE. BORON DISTRIBUTION IN GROUNDWATER IS KNOWN TO VARY WITH TIME.

THE IMPACTS DETECTED IN GAMW-07B AND GAMW-15B ARE NOT CONTOURED IN THIS MAP. GOLDER'S INTERPRETATION IS THAT THESE CONCENTRATIONS ARE DUE TO UPGRADIENT IMPACT.

NOTE(S)

1. THIS FIGURE DEPICTS THE GENERALIZED GROUNDWATER FLOW DIRECTION WITHIN THE UPPER PORTION OF THE SURFICIAL AQUIFER.
2. ALL VALUES SHOWN ARE IN MILLIGRAMS PER LITER (MG/L)

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCES: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

ASSESSMENT OF CORRECTIVE MEASURES
BORON ISOCONCENTRATION CONTOUR MAP
OCTOBER 2018 (DEEP)

CONSULTANT

GOLDER

YYYY-MM-DD	4/19/2019
DESIGNED	DFS
PREPARED	SHL
REVIEWED	DFS
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

APPENDIX A

Volume Calculations

Volume of impacted material below the CCR Unit

Assumptions:

Entire remaining volume of water within the slurry walls after excavation is impacting.
Area is estimated by the combined area of the three impoundments (Figure 6).
Depth is estimated by the approximate saturated thickness outside the slurry walls (Figure 3).

Area	36.2	acre	(A)	(Wood 2019)
Saturated depth	32	feet	(D)	(Golder 2017)

Estimated volume of impacted material was calculated using the following formula:

$Volume = A*D = V_1$ 1 acre= 43560 ft^2

V_1	1158	acre-ft
V_1	5.0E+07	ft^3

Volume of impacted material downgradient of the CCR Unit

Assumptions:

The volume is estimated by the volume with boron concentrations greater than 4 mg/L.
Plume areas are calculated based on the 4 mg/L contours displayed on Figure 6 and Figure 7.

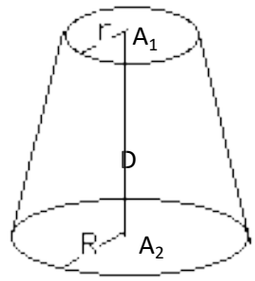
Shallow plume area	21.75	acre		
	9.474E+05	ft^2	(A1)	
Deep plume area	87.40	acre		
	3.807E+06	ft^2	(A2)	
Saturated depth	32	feet	(D)	(Golder 2017)
Assumed effective porosity	0.3		(n)	(Golder 2017)

The plume area were approximated as circles, and the volume of impacted material was estimated as a frustrum using the following formula:

$Volume = \pi*D/3*(R^2 + Rr + r^2) = V_2$

$r = (A_1/\pi)^{1/2}$, $R = (A_2/\pi)^{1/2}$

r	549.2	ft
R	1101	ft
V_2	7.10E+07	ft^3
V_2	1629	acre-ft



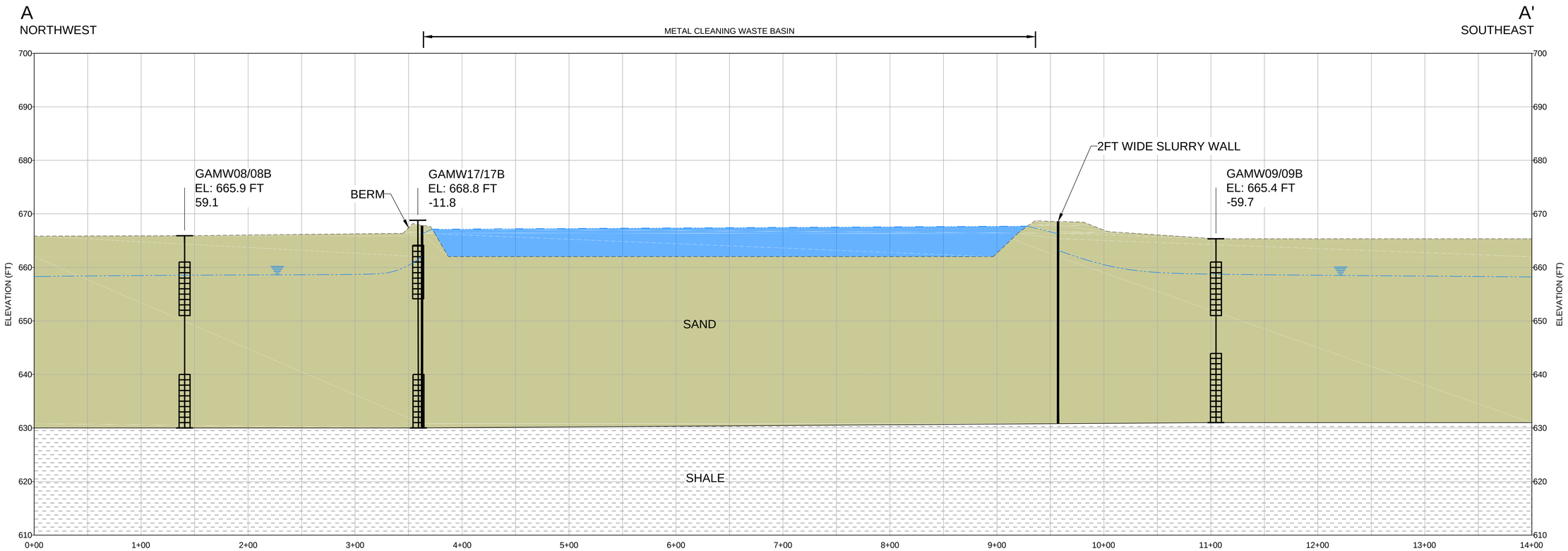
Estimated volume of impacted groundwater was calculated using the following forumula:

$Volume = V_2*n = V_{water}$

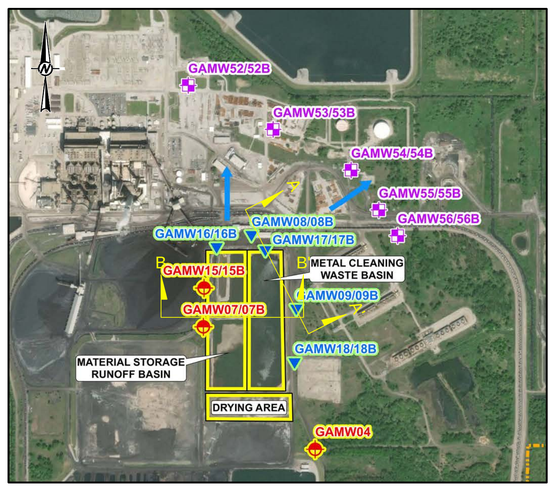
V_{water}	2.13E+07	ft^3
V_{water}	1.59E+08	gallons

Prepared by: DFS
Checked by: BPC
Reviewed by: JBG

Golder Associates, Groundwater Monitoring Program Implementation Manual, October 2017
Wood, 2019. Multi-Cell Unit Surface Impoundments (CCR Final Rule) Draft Closure Application. March 8, 2019.



A-A'



VERTICAL SCALE: 0 10 20 — 1" = 10' FEET

HORIZONTAL SCALE: 0 50 100 — 1" = 50' FEET

LEGEND

GAMW-08/08B	=	WELL I.D.
EL: 665.9 59.1	= =	GROUND SURFACE ELEVATION OFFSET DISTANCE C/L = CENTERLINE
	=	GROUNDWATER ELEVATION
	=	WELL SCREEN
	=	END OF BORING LOCATION
		IMPOUNDMENT WATER
		SAND
		SHALE

NOTE(S)

1. GEOLOGIC CONTACTS ILLUSTRATED BETWEEN AND BELOW BORINGS ARE INFERRED AND SHOULD NOT BE INTERPRETED AS EXACT INDICATORS OF GEOLOGIC CONDITIONS AT, BETWEEN, OR BELOW BORINGS.

CLIENT
NORTHERN INDIANA PUBLIC SERVICE COMPANY

CONSULTANT
GOLDER

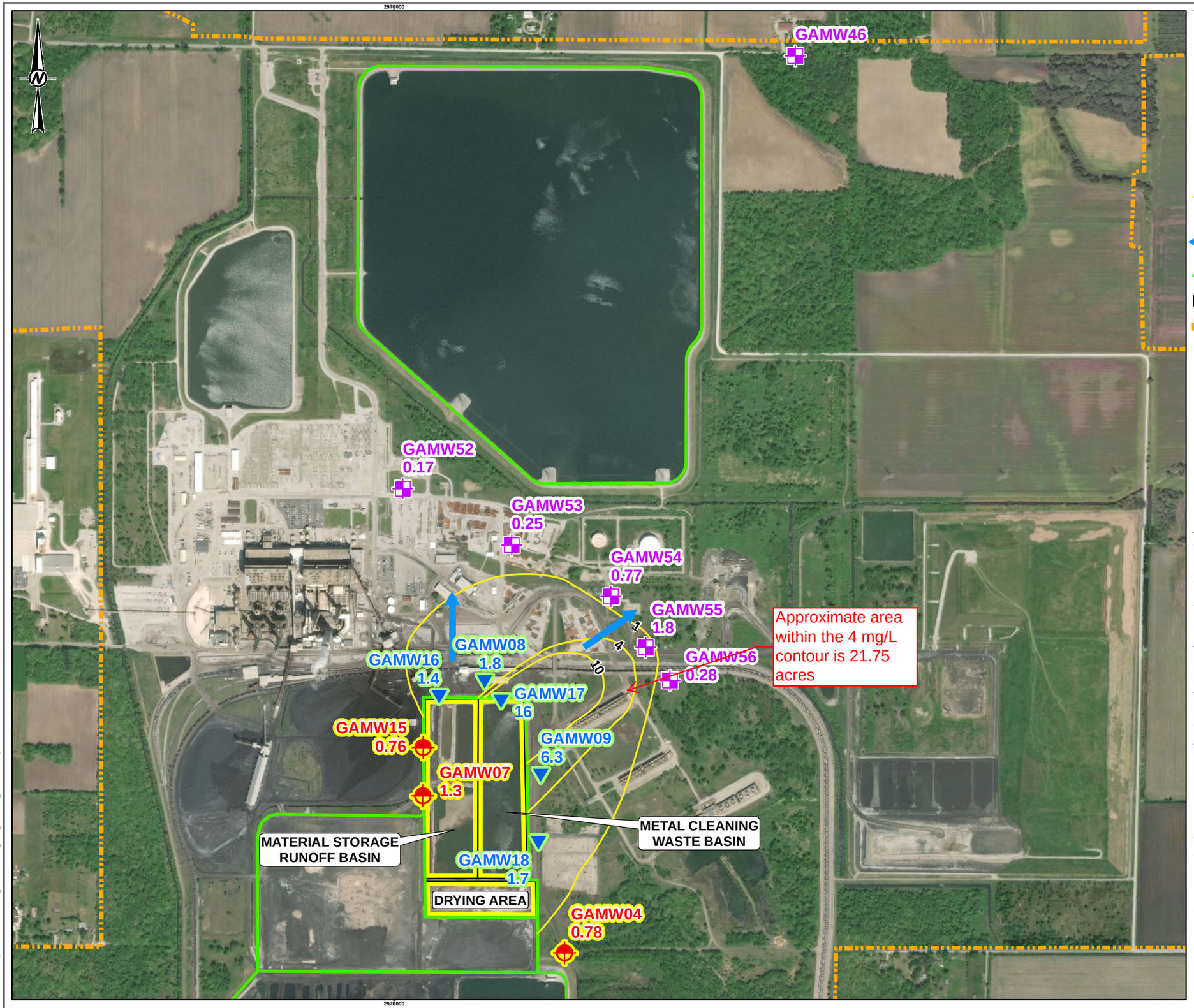
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DESIGNED	RWC
PREPARED	RWC
REVIEWED	
APPROVED	

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
ROLLIN M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
GEOLOGIC INTERPRETATION
CROSS SECTION A-A'

PROJECT NO.	CONTROL	REV.	FIGURE
1648171	03	0	3

Path: \\manchester\cadd\NIPSCO\Schahfer, Wheatfield, IN\99_PROJECTS\1648171_Ngsco_Schahfer\03_RMSGS CCR-Phase3\02_PRODUCTION\DWG\ | File Name: 1648171_03_001.dwg | Last Edited By: rclark Date: 2019-03-04 Time:1:58:59 PM | Printed By: rclark Date: 2019-03-04 Time:2:24:48 PM
0 1in
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



LEGEND

- 0.17 October 2018 Boron Concentration (mg/L)
- Assessment Monitoring Well
- Background Monitoring Well
- Downgradient Monitoring Well
- October 2018 Shallow Boron Contour (mg/L)
- Generalized Groundwater Flow Direction
- Slurry Wall
- CCR Units
- Approximate Property Line

0 850 1,700

1 " = 850 feet Feet

FIGURE NARRATIVE

THIS FIGURE SHOWS THE INTERPRETED BORON ISOCONCENTRATION CONTOURS BASED ON GROUNDWATER ANALYTICAL DATA FROM THE OCTOBER 2018 SAMPLING EVENT FOR SHALLOW WELLS SCREENED IN THE SURFICIAL AQUIFER. THE ISOCONCENTRATION CONTOURS ARE INTENDED TO DEPICT THE INFERRED DISTRIBUTION OF BORON IN GROUNDWATER ON THE BASIS OF THE DATA ILLUSTRATED. THE DISTRIBUTION IS LIKELY MORE HETEROGENEOUS THAN SHOWN, AND THE ACTUAL CONDITIONS WILL VARY. OTHER INTERPRETATIONS ARE POSSIBLE. BORON DISTRIBUTION IN GROUNDWATER IS KNOWN TO VARY WITH TIME.

NOTE(S)

1. THIS FIGURE DEPICTS THE GENERALIZED GROUNDWATER FLOW DIRECTION WITHIN THE UPPER PORTION OF THE SURFICIAL AQUIFER.
2. ALL VALUES SHOWN ARE IN MILLIGRAMS PER LITER (MG/L)

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

ASSESSMENT OF CORRECTIVE MEASURES
BORON ISOCONCENTRATION CONTOUR MAP
OCTOBER 2018 (SHALLOW)

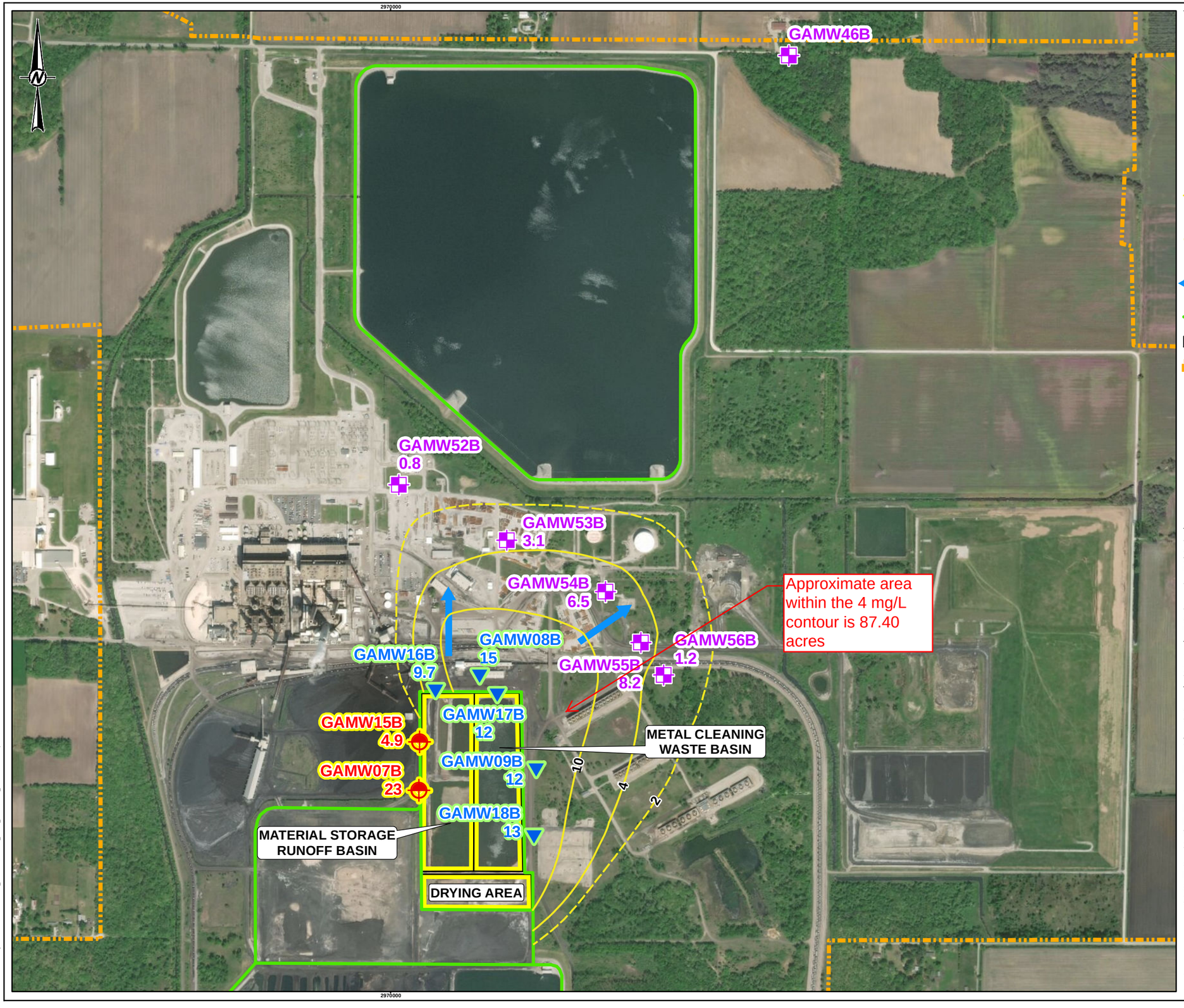
CONSULTANT

GOLDER

YYYY-MM-DD	4/18/2019
DESIGNED	DFS
PREPARED	SHL
REVIEWED	MAH
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
164817101	A	0	6

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
1 in
0



LEGEND

- 3.1 October 2018 Boron Concentration (mg/L)
- Assessment Monitoring Well
- Background Monitoring Well
- Downgradient Monitoring Well
- October 2018 Deep Boron Contour (mg/L)
- Inferred October 2018 Deep Boron Contour (mg/L)
- Generalized Groundwater Flow Direction
- Slurry Wall
- CCR Units
- Approximate Property Line

0 850 1,700

1 " = 850 feet Feet

FIGURE NARRATIVE

THIS FIGURE SHOWS THE INTERPRETED BORON ISOCONCENTRATION CONTOURS BASED ON GROUNDWATER ANALYTICAL DATA FROM THE OCTOBER 2018 SAMPLING EVENT FOR DEEP WELLS SCREENED IN THE SURFICIAL AQUIFER. THE ISOCONCENTRATION CONTOURS ARE INTENDED TO DEPICT THE INFERRED DISTRIBUTION OF BORON IN GROUNDWATER ON THE BASIS OF THE DATA ILLUSTRATED. THE DISTRIBUTION IS LIKELY MORE HETEROGENEOUS THAN SHOWN, AND THE ACTUAL CONDITIONS WILL VARY. OTHER INTERPRETATIONS ARE POSSIBLE. BORON DISTRIBUTION IN GROUNDWATER IS KNOWN TO VARY WITH TIME.

THE IMPACTS DETECTED IN GAMW-07B AND GAMW-15B ARE NOT CONTOURED IN THIS MAP. GOLDER'S INTERPRETATION IS THAT THESE CONCENTRATIONS ARE DUE TO UPGRADIENT IMPACT.

NOTE(S)

1. THIS FIGURE DEPICTS THE GENERALIZED GROUNDWATER FLOW DIRECTION WITHIN THE UPPER PORTION OF THE SURFICIAL AQUIFER.
2. ALL VALUES SHOWN ARE IN MILLIGRAMS PER LITER (MG/L)

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCES: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

ASSESSMENT OF CORRECTIVE MEASURES
BORON ISOCONCENTRATION CONTOUR MAP
OCTOBER 2018 (DEEP)

CONSULTANT

GOLDER

YYYY-MM-DD	4/19/2019
DESIGNED	DFS
PREPARED	SHL
REVIEWED	DFS
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
164817101	A	0	7

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

APPENDIX B

Slug Test Data and Calculations

Appendix A
HYDRAULIC CONDUCTIVITY TESTING RESULTS

Well	Date	Screened Interval	Type	Test Duration	Test Number	Hvorslev Method		Bouwer and Rice Method		van der Kamp Method		Hvorslev/Bouwer and Rice Arithmetic Mean	
						cm/sec	ft/day	cm/sec	ft/day	cm/sec	ft/day	cm/sec	ft/day
GAMW03	7/7/2016	5-15	Transducer (Rising)	<2 min	1	7.44E-03	2.11E+01	4.99E-03	1.42E+01	n/a	n/a	6.22E-03	1.77E+01
					2	7.45E-03	2.11E+01	5.22E-03	1.48E+01	n/a	n/a	6.34E-03	1.80E+01
GAMW13	7/7/2016	5-15	Transducer (Rising)	<2 min	1	5.75E-02	1.63E+02	3.91E-02	1.11E+02	n/a	n/a	4.83E-02	1.37E+02
					2	6.50E-02	1.84E+02	4.81E-02	1.36E+02	n/a	n/a	5.66E-02	1.60E+02
GAMW15	7/7/2016	5-15	Transducer (Rising)	<2 min	1	2.59E-02	7.34E+01	1.63E-02	4.63E+01	n/a	n/a	2.11E-02	5.99E+01
					2	1.11E-02	3.15E+01	1.08E-02	3.05E+01	n/a	n/a	1.10E-02	3.10E+01
GAMW19	7/7/2016	6-16	Transducer (Rising)	<2 min	1	3.70E-02	1.05E+02	2.25E-02	6.38E+01	n/a	n/a	2.98E-02	8.44E+01
					2	1.01E-01	2.87E+02	6.85E-02	1.94E+02	n/a	n/a	8.48E-02	2.41E+02
Average Shallow (515 ftbgs)						**3.90E-02**	**1.11E+02**	**2.69E-02**	**7.63E+01**	**n/a**	**n/a**	**3.30E-02**	**9.35E+01**
GAMW03B	7/8/2016	27-37	Transducer (Falling)	<2 min	1	6.78E-03	1.92E+01	5.81E-03	1.65E+01	n/a	n/a	6.30E-03	1.79E+01
					2	4.30E-03	1.22E+01	4.79E-03	1.36E+01	n/a	n/a	4.55E-03	1.29E+01
			Transducer (Rising)	<2 min	1	5.65E-03	1.60E+01	6.42E-03	1.82E+01	n/a	n/a	6.04E-03	1.71E+01
					2	1.47E-02	4.16E+01	1.25E-02	3.55E+01	1.49E-02	4.22E+01	1.36E-02	3.86E+01
GAMW13B	7/7/2016	25-35	Transducer (Falling)	<2 min	1	8.48E-03	2.40E+01	9.27E-03	2.63E+01	n/a	n/a	8.88E-03	2.52E+01
					2	8.09E-03	2.29E+01	9.27E-03	2.63E+01	n/a	n/a	8.68E-03	2.46E+01
			Transducer (Rising)	<2 min	1	1.11E-02	3.15E+01	1.16E-02	3.30E+01	2.73E-02	7.74E+01	1.14E-02	3.23E+01
					2	1.06E-02	3.00E+01	1.08E-02	3.06E+01	1.06E-02	3.01E+01	1.07E-02	3.03E+01
GAMW15B	7/7/2016	27.7-37.7	Transducer (Falling)	<2 min	1	4.50E-03	1.28E+01	3.45E-03	9.79E+00	n/a	n/a	3.98E-03	1.13E+01
					2	1.03E-02	2.91E+01	8.75E-03	2.48E+01	9.53E-03	2.70E+01	9.53E-03	2.70E+01
			Transducer (Rising)	<2 min	1	1.17E-02	3.32E+01	1.06E-02	3.02E+01	1.24E-02	3.50E+01	1.12E-02	3.17E+01
					2	1.06E-02	3.02E+01	9.79E-03	2.77E+01	1.69E-02	4.80E+01	1.02E-02	2.90E+01
GAMW19B	7/7/2016	23-33	Transducer (Falling)	<2 min	1	1.37E-02	3.88E+01	1.44E-02	4.09E+01	n/a	n/a	1.41E-02	3.99E+01
					2	6.82E-03	1.93E+01	6.31E-03	1.79E+01	n/a	n/a	6.57E-03	1.86E+01
			Transducer (Rising)	<2 min	1	1.84E-02	5.21E+01	1.83E-02	5.18E+01	1.29E-02	3.67E+01	1.84E-02	5.20E+01
					2	1.21E-02	3.43E+01	1.03E-02	2.91E+01	1.21E-02	3.43E+01	1.12E-02	3.17E+01
Average Deep (2535 ftbgs)						**9.86E-03**	**2.80E+01**	**9.52E-03**	**2.70E+01**	**1.46E-02**	**4.13E+01**	**9.69E-03**	**2.75E+01**

Notes:
ft/day = feet per day
cm/sec = centimeters per second
n/a = not analyzed

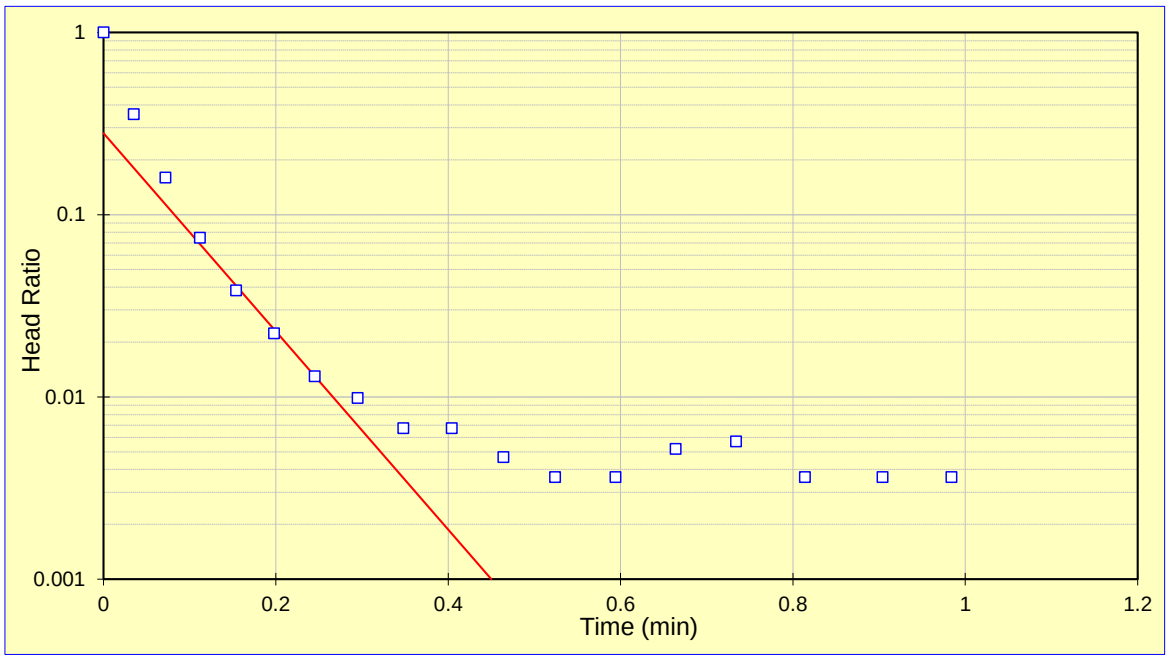
Prepared by: DFS
Checked by: KMC
Reviewed by: MAH

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-03 (TEST 1)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left|\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right| 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	7.44E-03	cm/sec
t_1 =	0	K=	2.11E+01	ft/day
t_2 =	0.45			
h_1/h_0 =	0.28			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/25/2016

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-03 (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

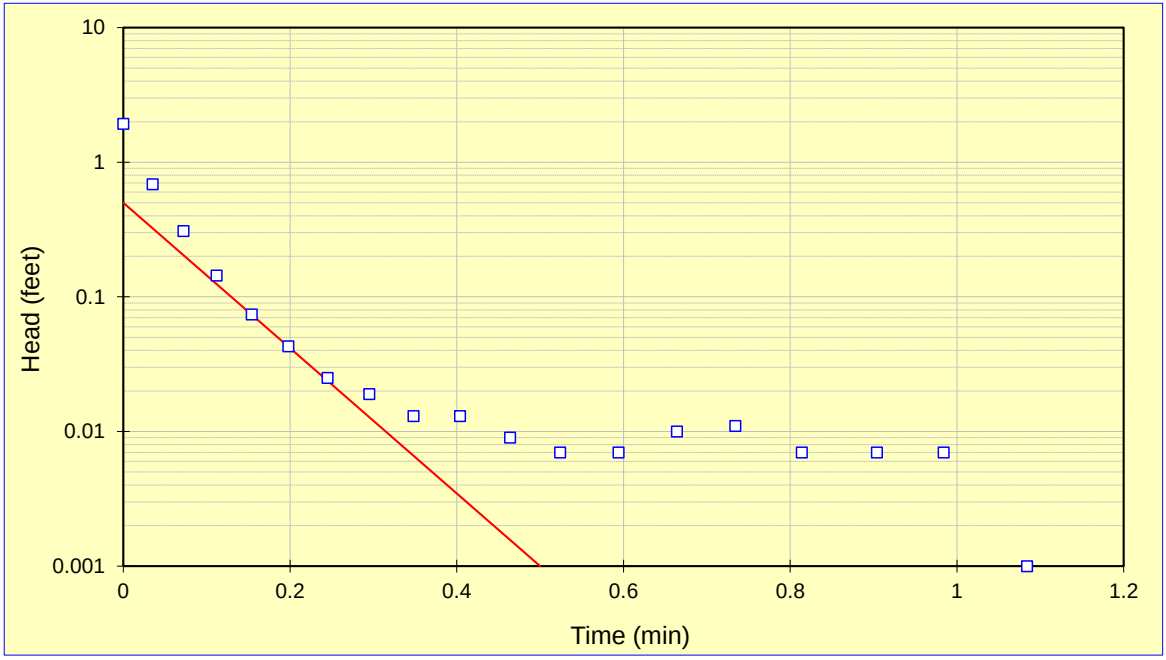
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.28
y_0 =	0.50
y_t =	0.001
t =	0.5

RESULTS

K=	4.99E-03	cm/sec
K=	1.42E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

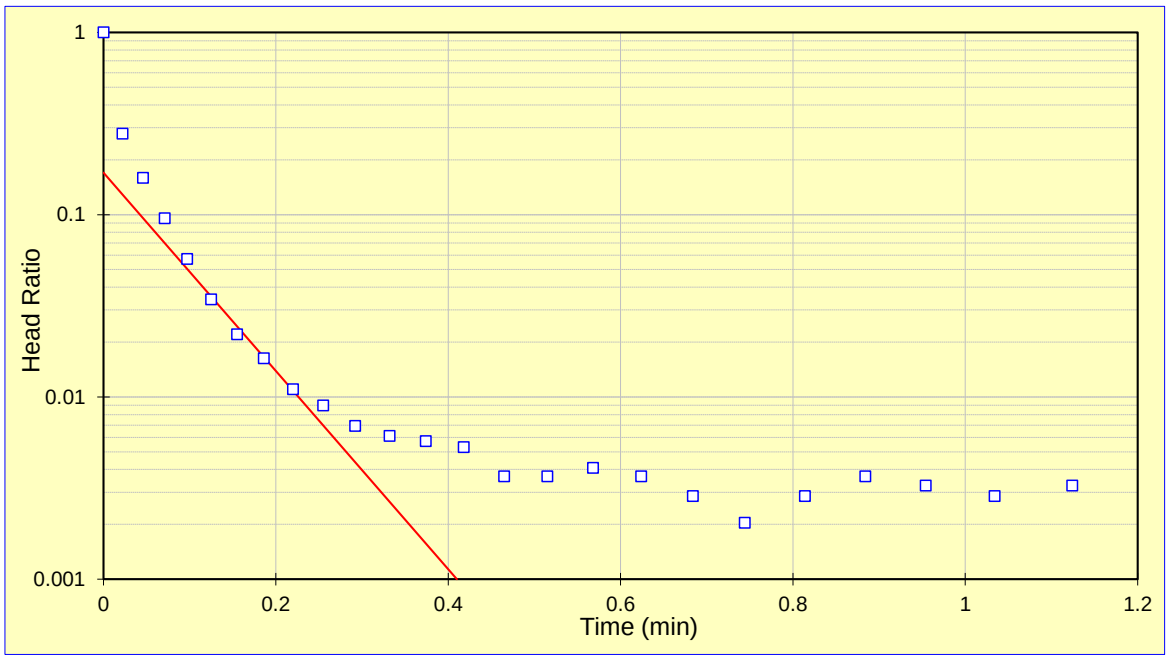
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-03 (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	7.45E-03	cm/sec
t_1 =	0	K=	2.11E+01	ft/day
t_2 =	0.41			
h_1/h_0 =	0.17			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-03 (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

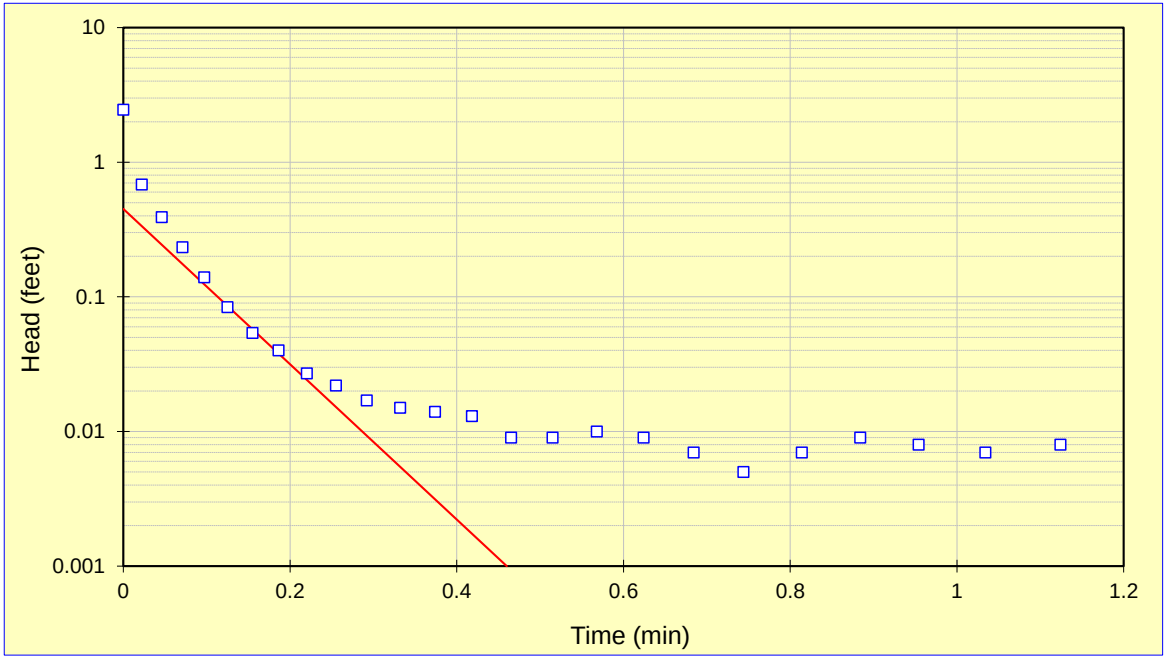
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.23
y_0 =	0.45
y_t =	0.001
t =	0.5

RESULTS

K=	5.22E-03	cm/sec
K=	1.48E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

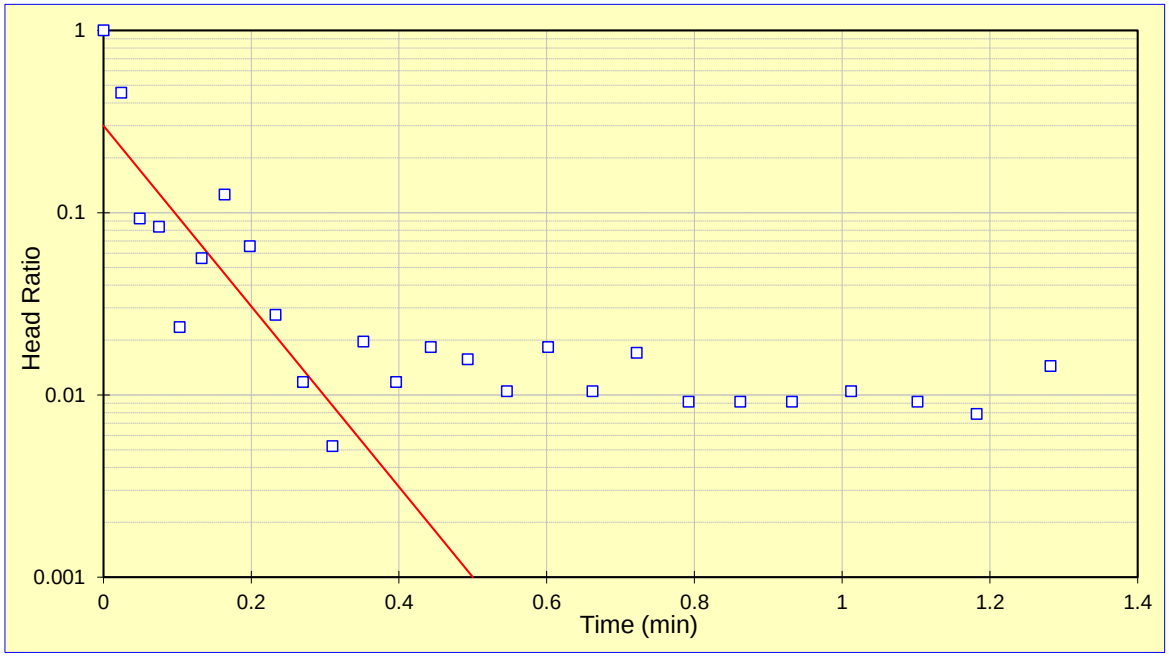
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Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-03B (TEST 1)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	6.78E-03	cm/sec
t_1 =	0	K=	1.92E+01	ft/day
t_2 =	0.5			
h_1/h_0 =	0.30			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/08/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-03B (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

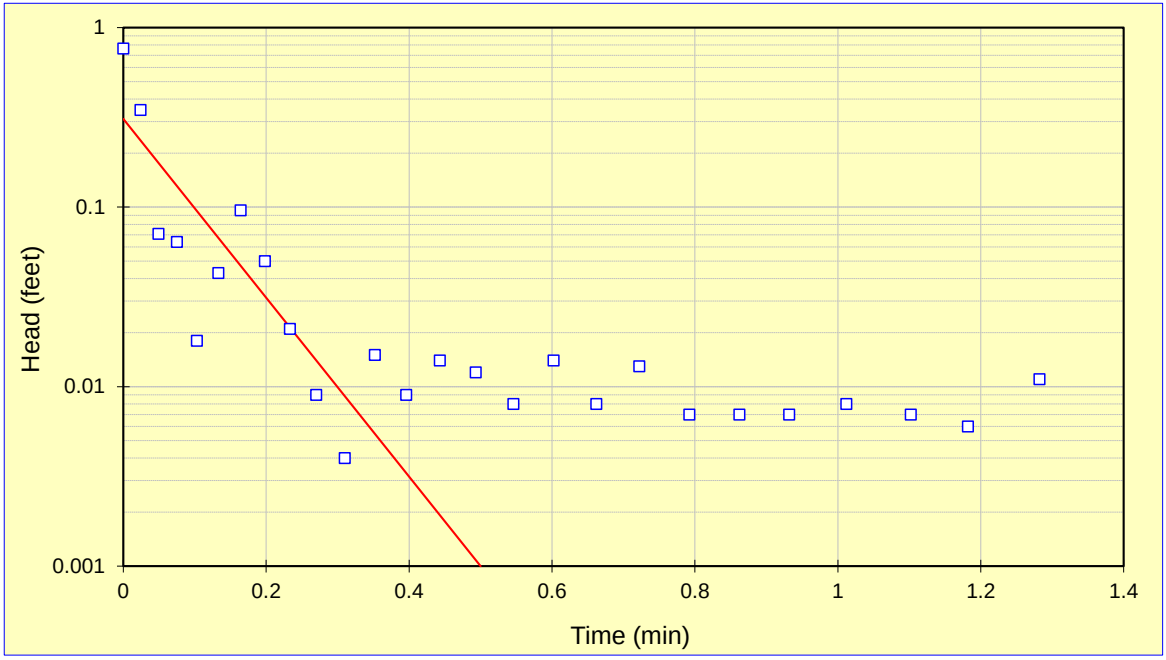
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.87
y_0 =	0.31
y_t =	0.001
t =	0.5

RESULTS

K=	5.81E-03	cm/sec
K=	1.65E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/08/16

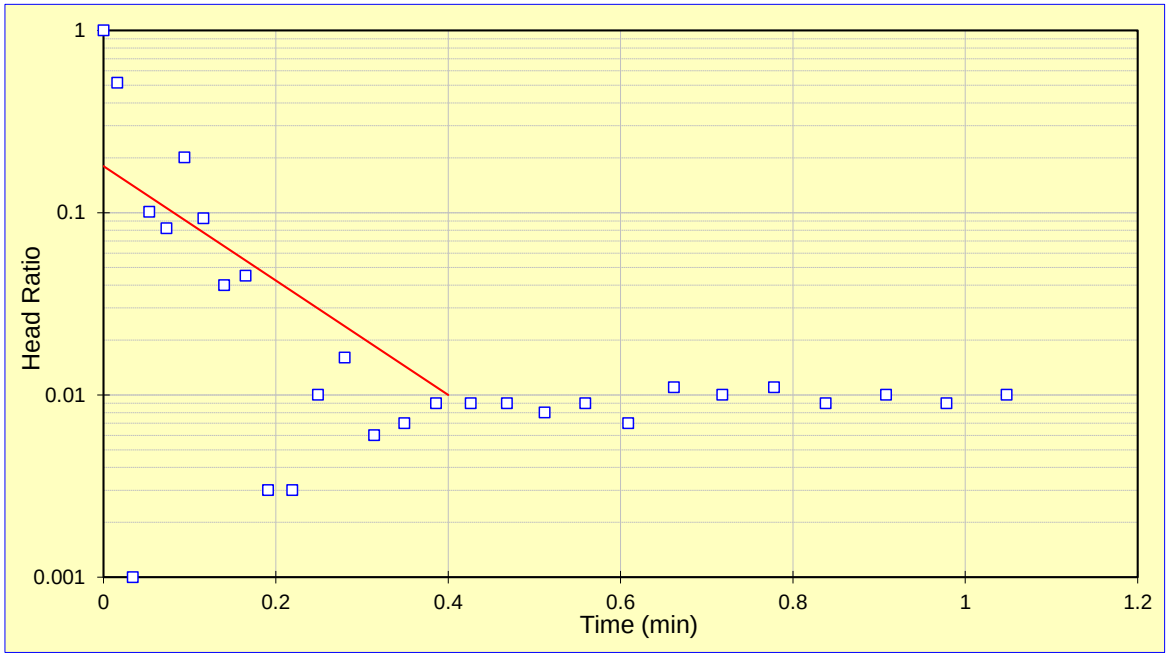
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Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-03B (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	4.30E-03	cm/sec
t_1 =	0	K=	1.22E+01	ft/day
t_2 =	0.4			
h_1/h_0 =	0.18			
h_2/h_0 =	0.01			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/08/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-03B (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

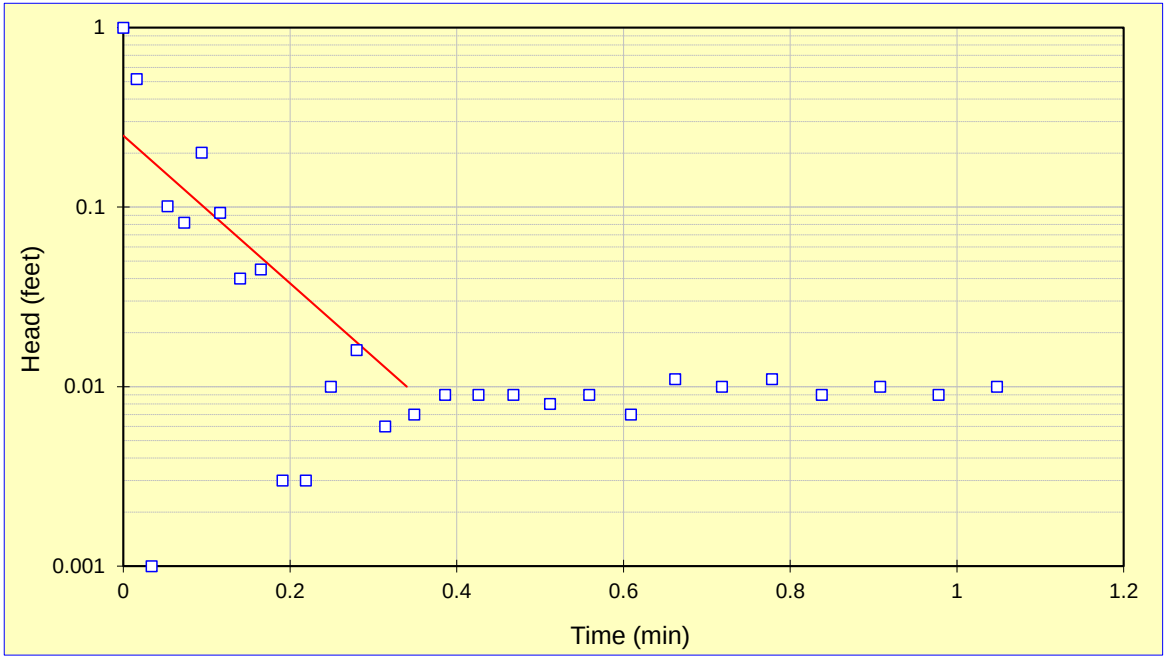
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.87
y_0 =	0.25
y_t =	0.010
t =	0.3

RESULTS

K=	4.79E-03	cm/sec
K=	1.36E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/08/16

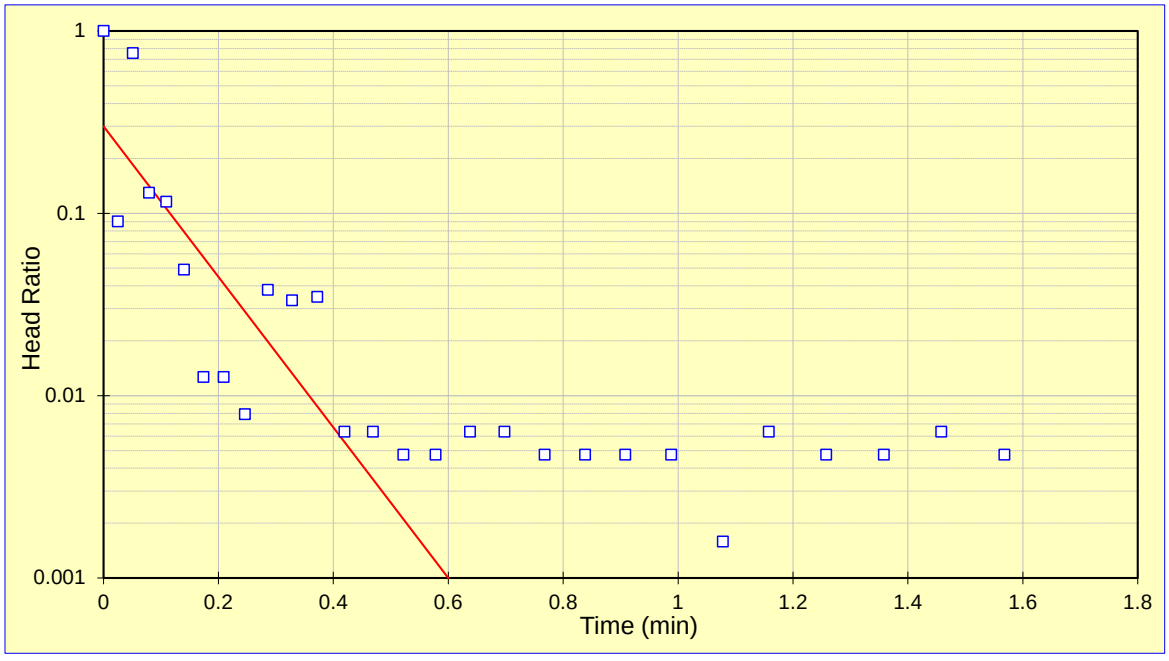
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-03B (TEST 1)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	5.65E-03	cm/sec
t_1 =	0	K=	1.60E+01	ft/day
t_2 =	0.6			
h_1/h_0 =	0.30			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/08/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-03B (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

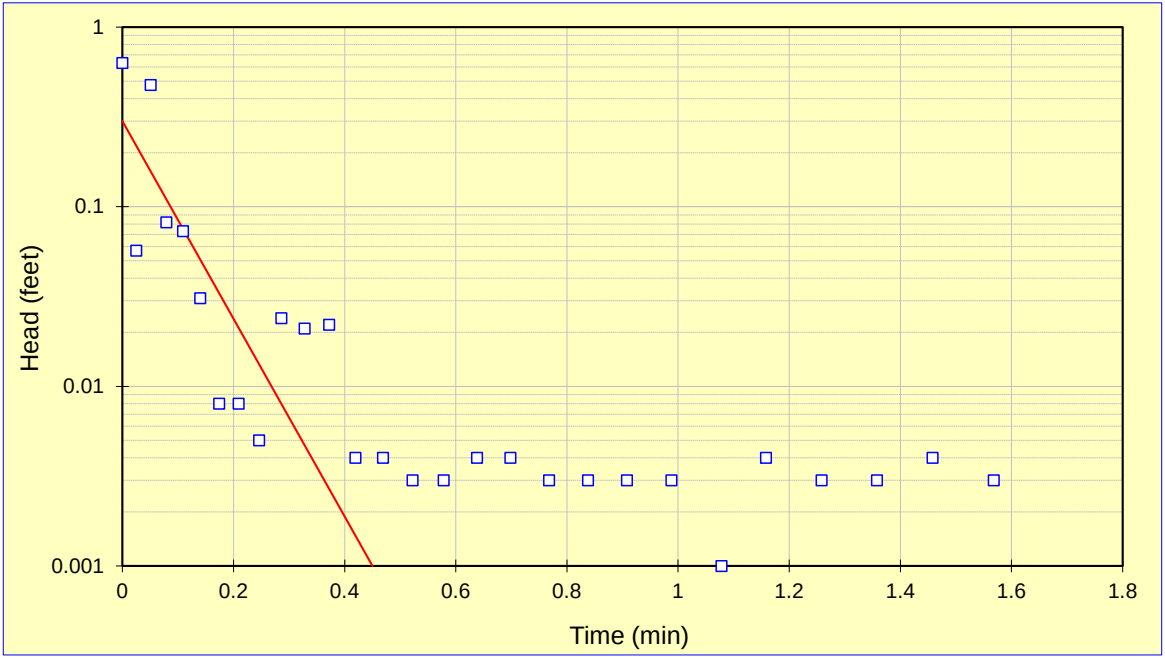
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.87
y_0 =	0.30
y_t =	0.001
t =	0.5

RESULTS

K=	6.42E-03	cm/sec
K=	1.82E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/08/16

Analysis By: DFS
Checked By: JRS
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van der KAMP RISING HEAD SLUG TEST ANALYSIS
UNDERDAMPED SLUG TEST GAMW-03B (TEST 2)

$$T = b + a\ln T$$

where:

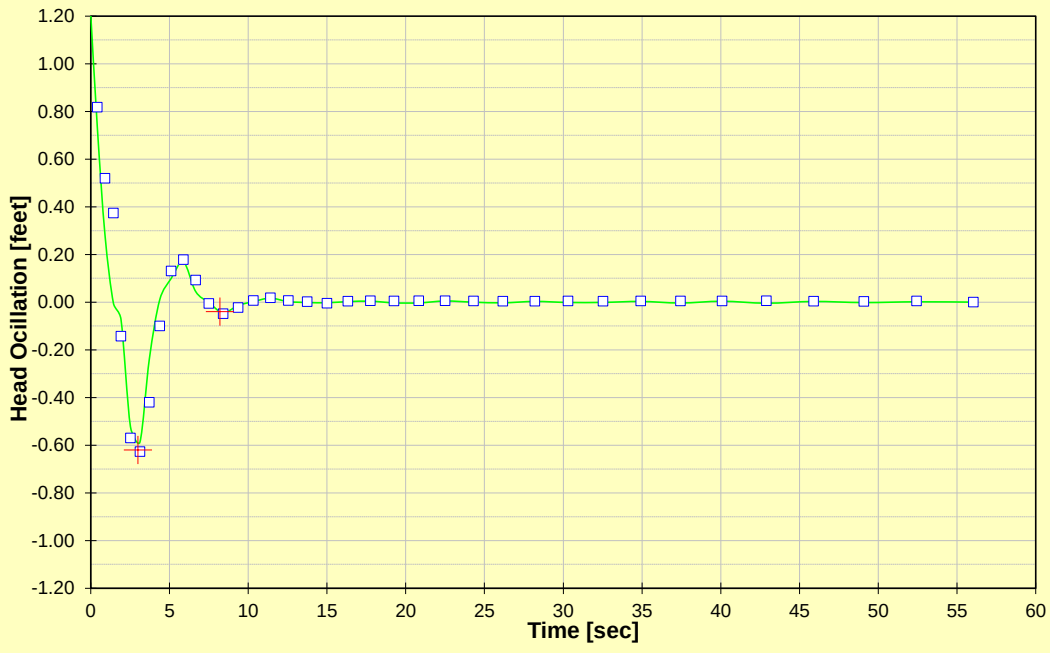
$$b = -a\ln\left[0.79 r_s^2 S (g/L)^{1/2}\right]$$
$$a = r_c^2 \left(g / L^{1/2}\right) / 8d$$
$$d = \gamma / \left(g / L\right)^{1/2}$$
$$L = g / \left(\omega^2 + \gamma^2\right)$$

INPUT PARAMETERS

r_c =	0.08	ft	$(g/L)^{1/2}$ =	1.31826	ft^2
r_s =	0.08	ft	d =	0.3998	ft^{-1}
L_c =	19.62	ft	a =	0.00286	ft^3
L_s =	10.00	ft	t_1 =	3.00	sec
ω =	1.2083	ft^{-1}	t_2 =	8.20	sec
γ =	0.5271	ft^{-1}	$h(t_1)$ =	0.62	ft
L =	18.52	ft^3/sec^2	$h(t_2)$ =	0.04	ft
g =	32.19	ft/sec^2	S =	1.00E-02	dim

RESULTS

$b = T_0$ =	2.73E-02	ft^2/sec	α < 0.1?	YES
T =	1.53E-02	ft^2/sec	d < 0.7?	YES
T =	1.32E+03	ft^2/day	L_1 =	18.52
K =	4.22E+01	ft/day	L_2 =	24.62
K =	1.49E-02	cm/sec	L_1:L_2 Diff <20% ?	NO



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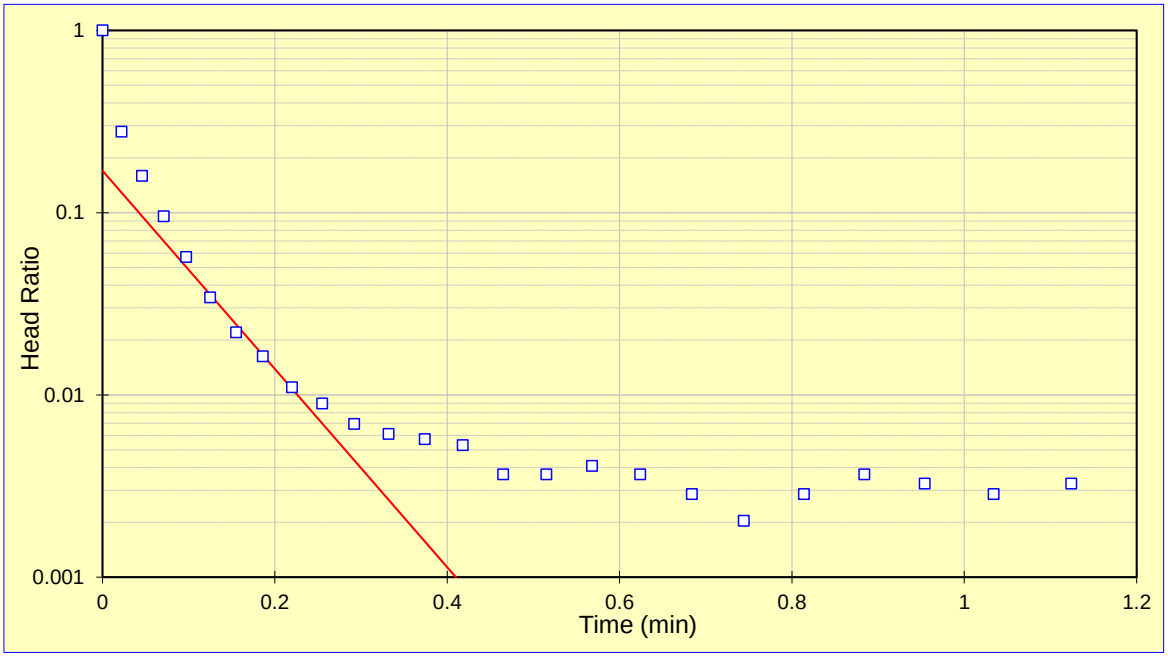
Analysis By: DFS
Checked By: JRS
Analysis Date: 8/8/2016

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-03 (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	7.45E-03	cm/sec
t_1 =	0	K=	2.11E+01	ft/day
t_2 =	0.41			
h_1/h_0 =	0.17			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
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Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-03 (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

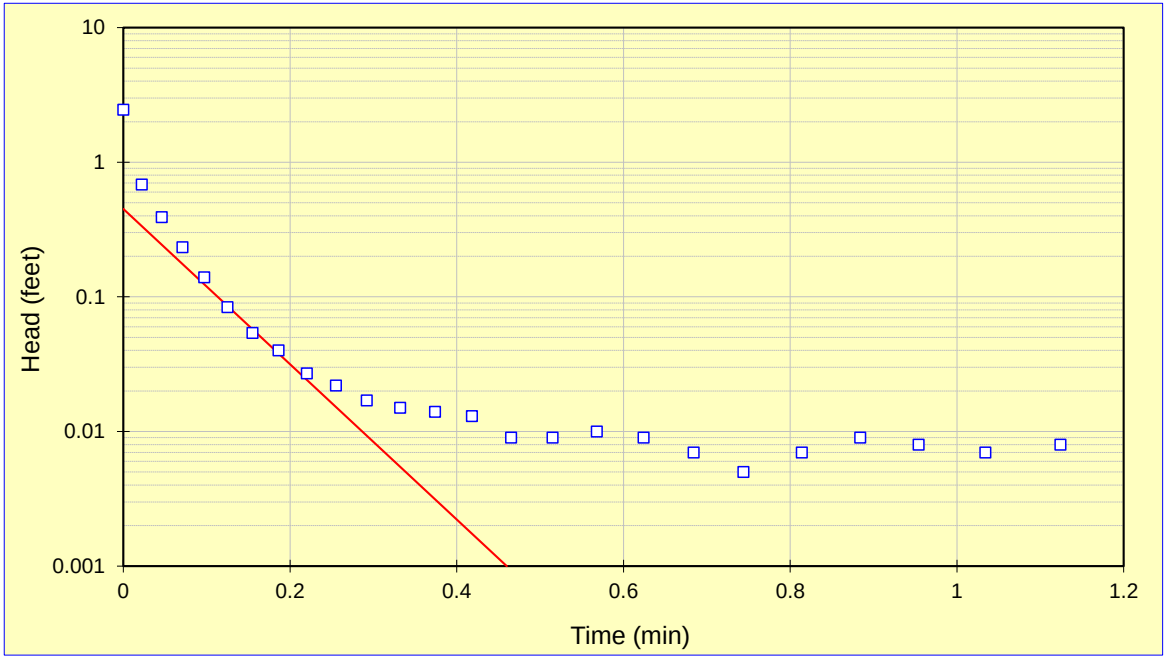
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.23
y_0 =	0.45
y_t =	0.001
t =	0.5

RESULTS

K=	5.22E-03	cm/sec
K=	1.48E+01	ft/day



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Checked By: JRS
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HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-13B (TEST 1)

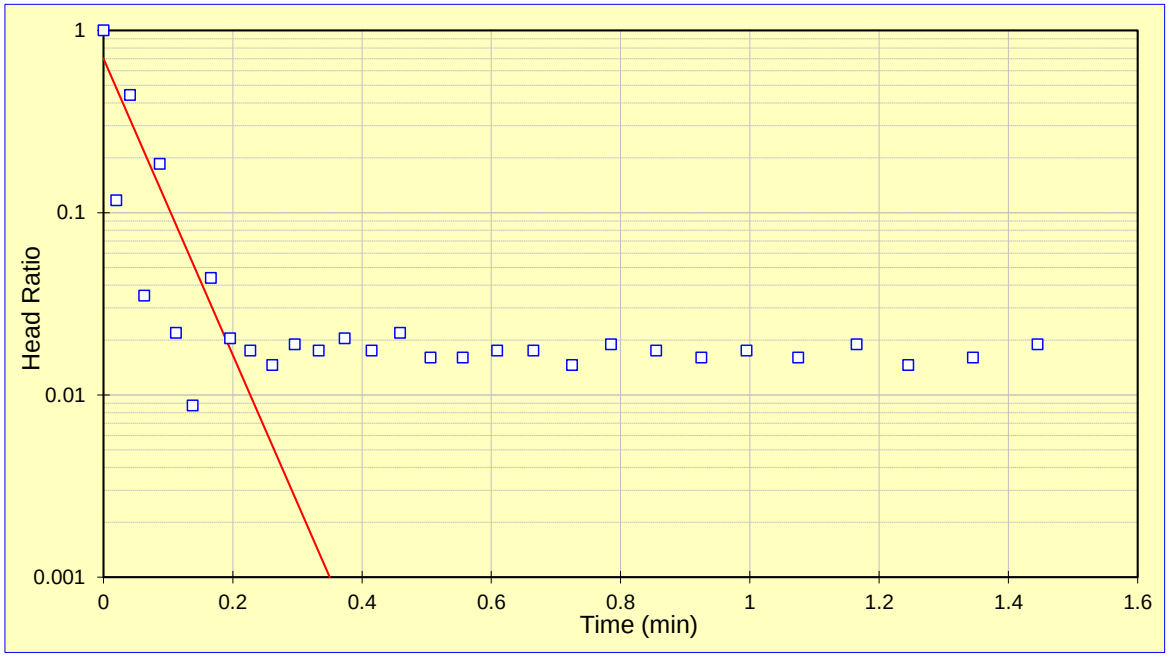
$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS	
r_c =	0.08
R_e =	0.34
L_e =	10
t_1 =	0
t_2 =	0.35
h_1/h_0 =	0.70
h_2/h_0 =	0.00

RESULTS

K=	1.11E-02	cm/sec
K=	3.15E+01	ft/day



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Analysis By: DFS
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BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-13B (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

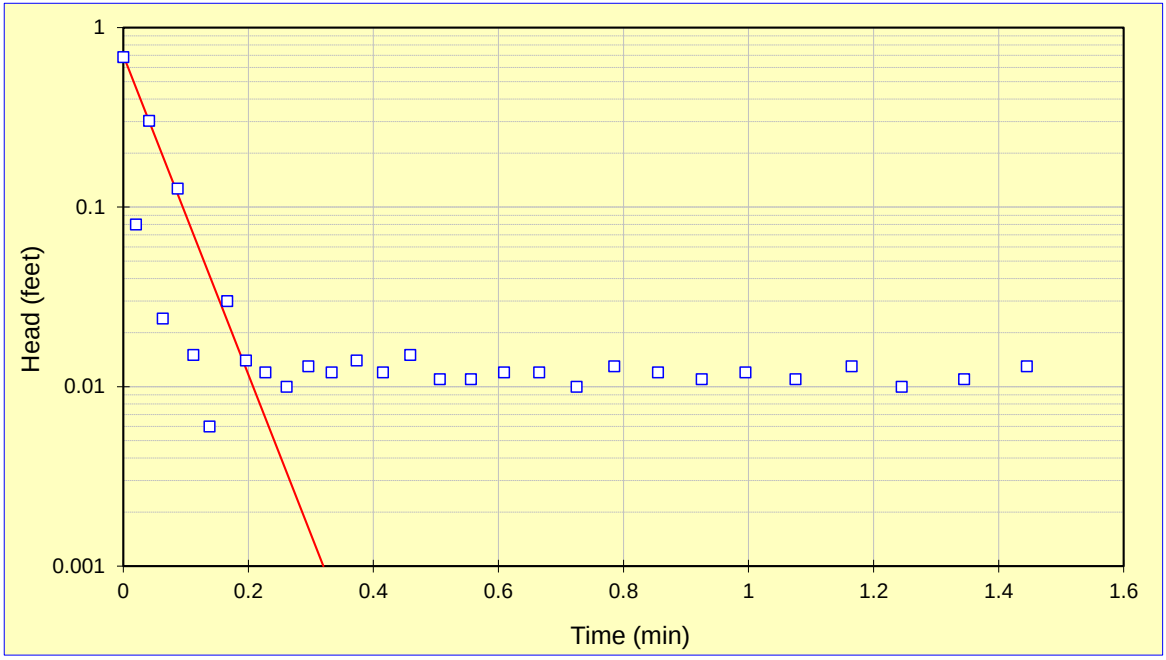
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	3.22
y_0 =	0.70
y_t =	0.001
t =	0.3

RESULTS

K=	1.16E-02	cm/sec
K=	3.30E+01	ft/day



Project Name: NIPSCO Schahfer
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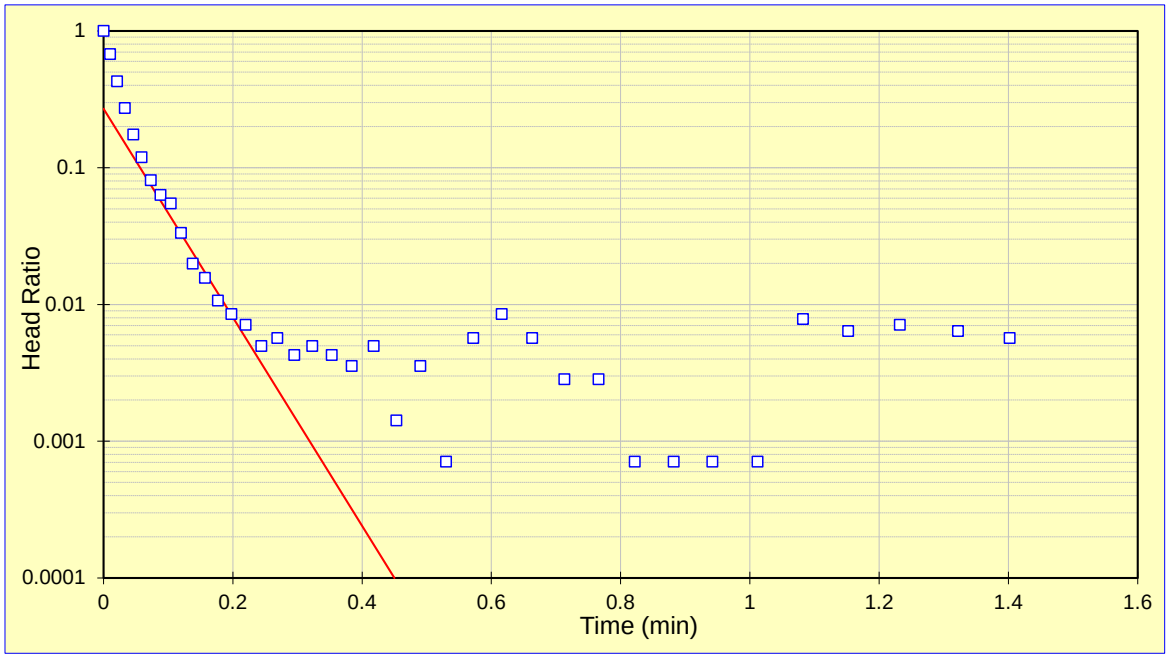
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-13 (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.20			
R_e =	0.34			
L_e =	9.037	K=	6.50E-02	cm/sec
t_1 =	0	K=	1.84E+02	ft/day
t_2 =	0.45			
h_1/h_0 =	0.27			
h_2/h_0 =	0.00			



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BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-13 (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

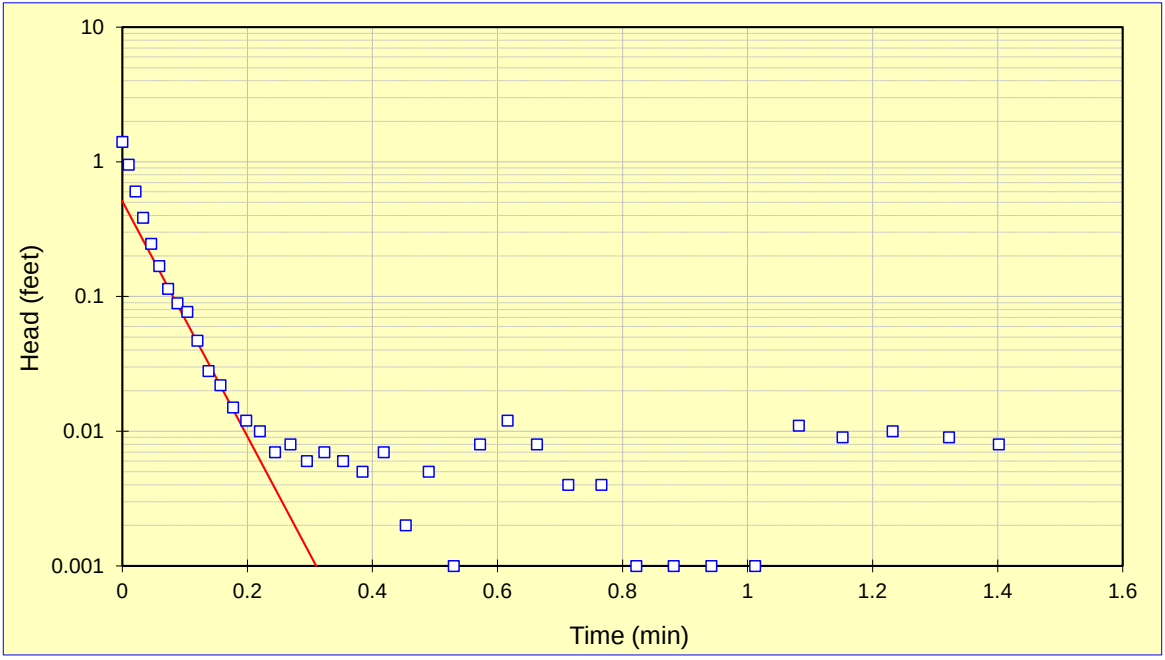
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.20
r_w =	0.34
L_e =	9.037
$\ln(R_e/r_w)$=	2.11
y_0 =	0.51
y_t =	0.001
t =	0.3

RESULTS

K=	4.81E-02	cm/sec
K=	1.36E+02	ft/day



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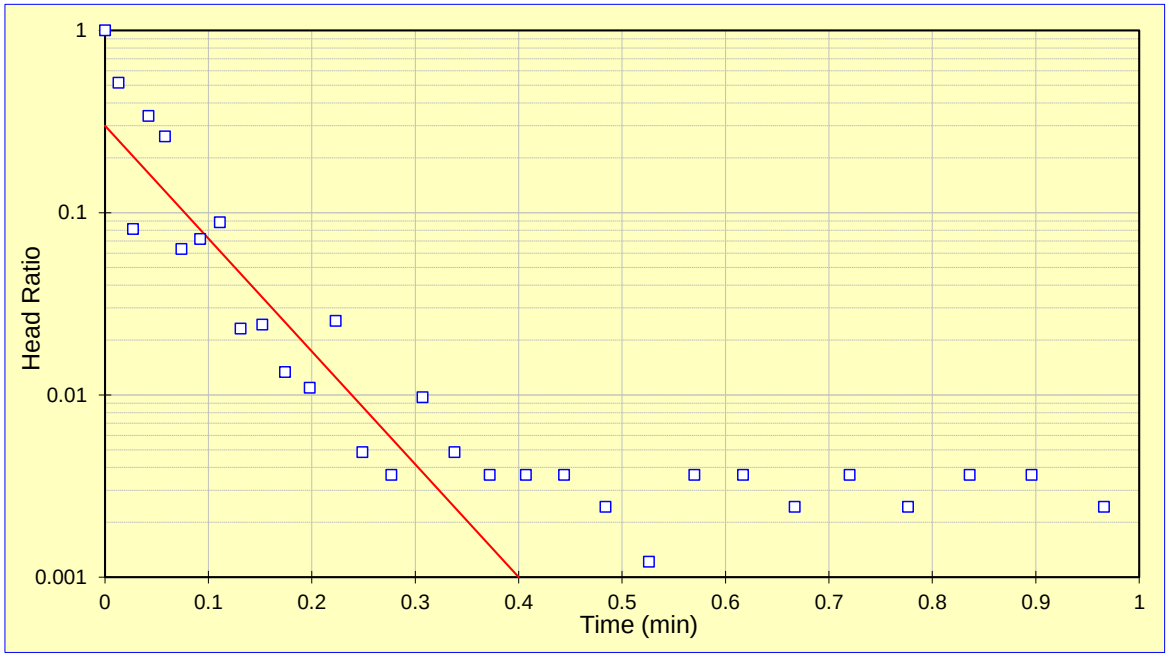
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-13B (TEST 1)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left|\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right| 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	8.48E-03	cm/sec
t_1 =	0	K=	2.40E+01	ft/day
t_2 =	0.4			
h_1/h_0 =	0.30			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
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Analysis By: DFS
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BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-13B (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

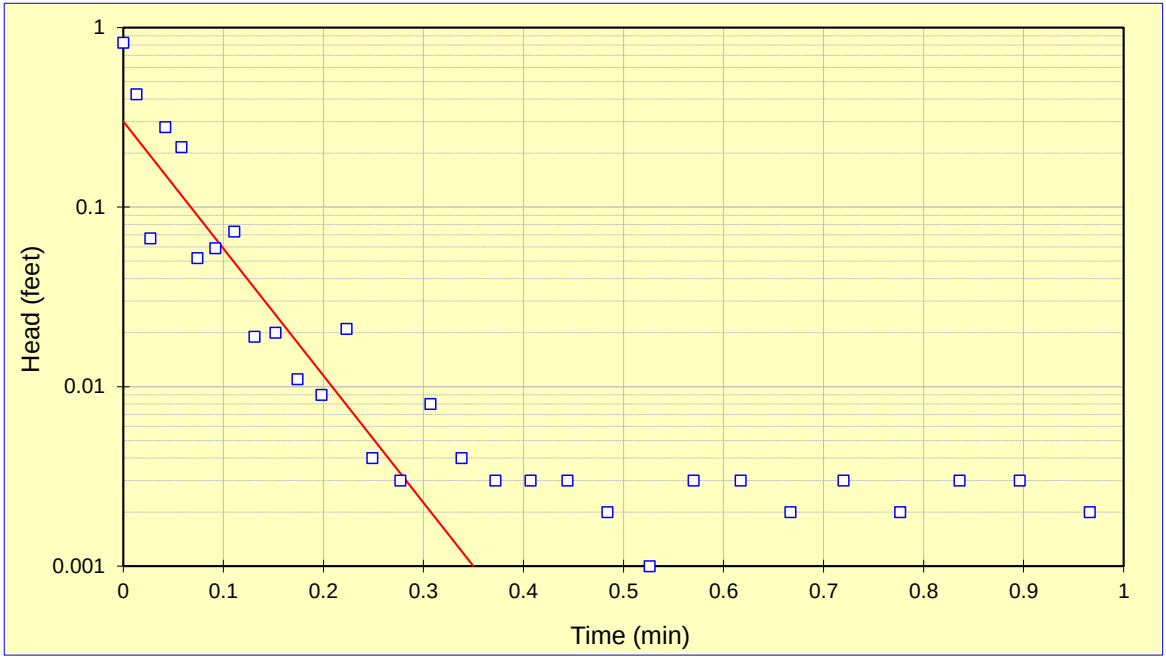
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	3.22
y_0 =	0.30
y_t =	0.001
t =	0.4

RESULTS

K=	9.27E-03	cm/sec
K=	2.63E+01	ft/day



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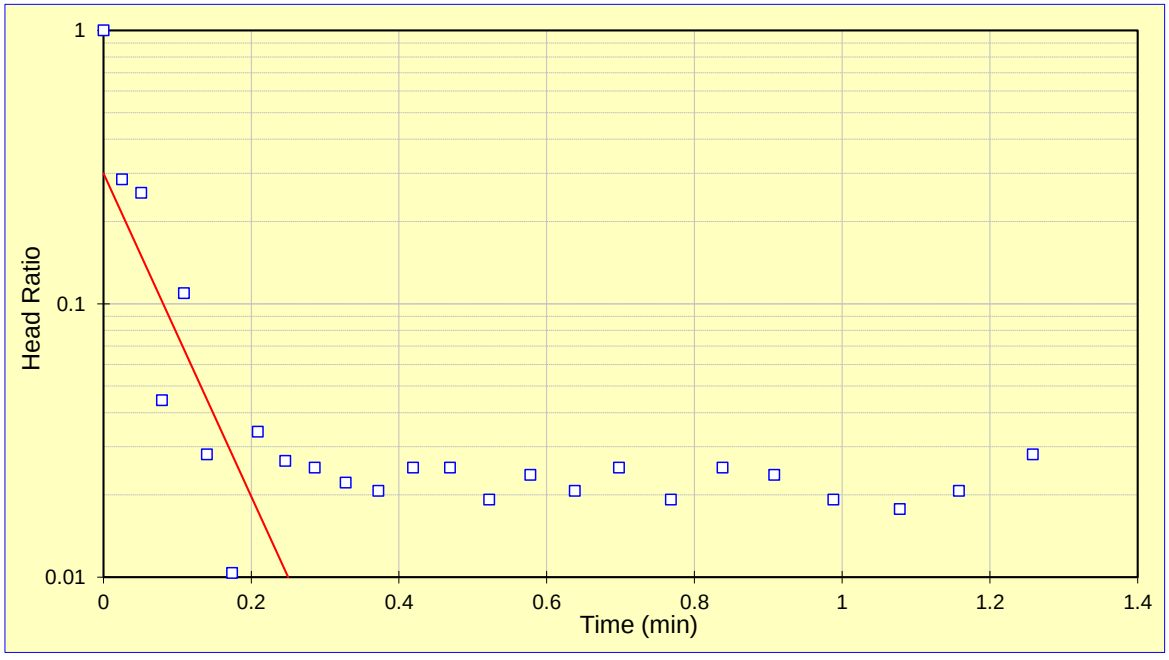
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-13B (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	8.09E-03	cm/sec
t_1 =	0	K=	2.29E+01	ft/day
t_2 =	0.25			
h_1/h_0 =	0.30			
h_2/h_0 =	0.01			



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BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-13B (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

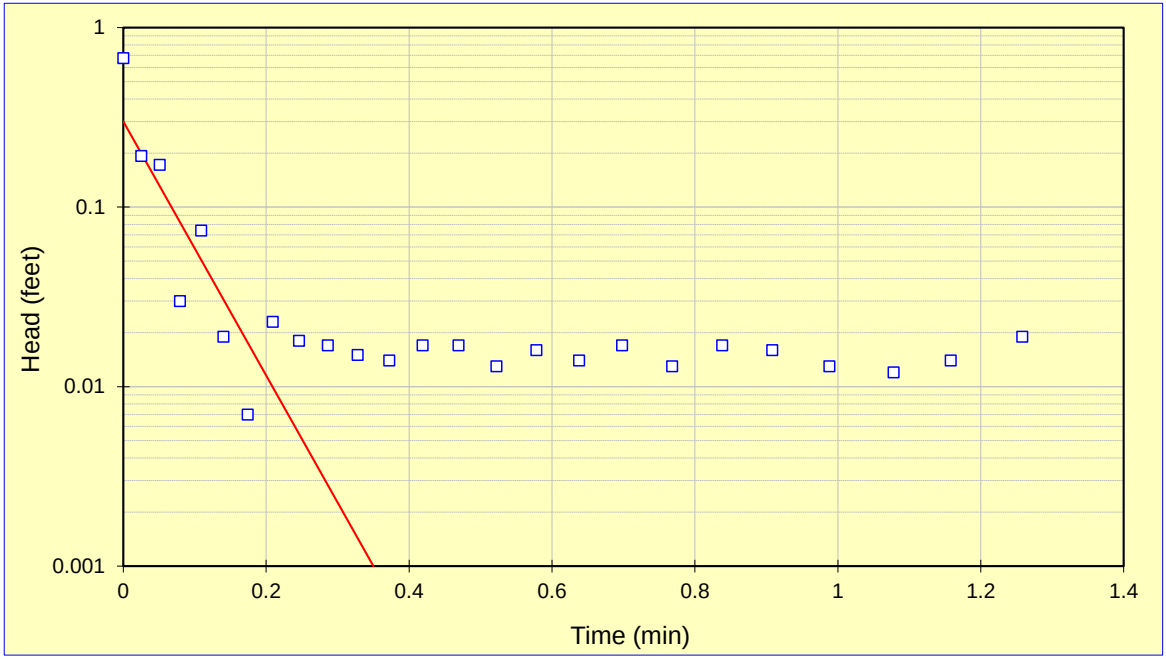
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	3.22
y_0 =	0.30
y_t =	0.001
t =	0.4

RESULTS

K=	9.27E-03	cm/sec
K=	2.63E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

van der KAMP RISING HEAD SLUG TEST ANALYSIS
UNDERDAMPED SLUG TEST GAMW-13B (TEST 1)

$$T = b + a \ln T$$

where:

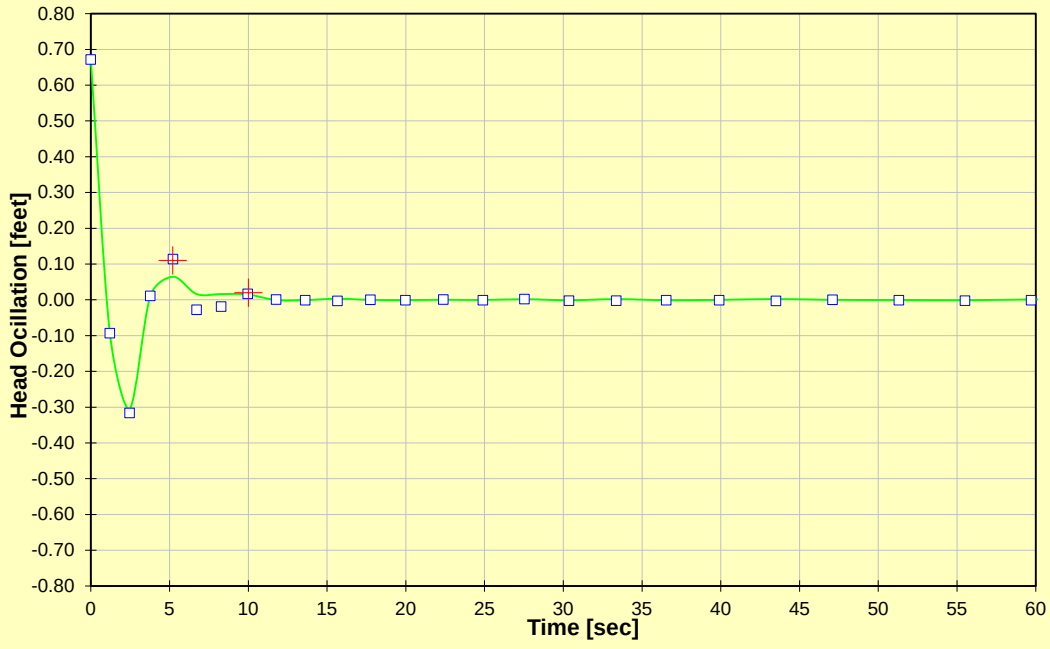
$$b = -a \ln\left[0.79 r_s^2 S (g/L)^{1/2}\right]$$
$$a = r_c^2 \left(g/L^{1/2}\right)/8d$$
$$d = \gamma / (g/L)^{1/2}$$
$$L = g/\left(\omega^2 + \gamma^2\right)$$

INPUT PARAMETERS

r_c =	0.08	ft	$(g/L)^{1/2}$ =	1.35632	ft^2
r_s =	0.08	ft	d =	0.2619	ft^{-1}
L_c =	19.45	ft	a =	0.00450	ft^3
L_s =	9.98	ft	t_1 =	5.20	sec
w =	1.3090	ft^{-1}	t_2 =	10.00	sec
g =	0.3552	ft^{-1}	$h(t_1)$ =	0.11	ft
L =	17.50	ft^3/sec^2	$h(t_2)$ =	0.02	ft
g =	32.19	ft/sec^2	S =	1.00E-02	dim

RESULTS

$b = T_0$ =	4.27E-02	ft^2/sec	$a < 0.1$?	YES
T =	2.64E-02	ft^2/sec	$d < 0.7$?	YES
T =	2.28E+03	ft^2/day	L_1 =	17.50
K =	7.74E+01	ft/day	L_2 =	24.44
K =	2.73E-02	cm/sec	L_1:L_2 Diff <20% ?	NO



Project Name: NIPSCO RMSGS
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/31/2017

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-13B (TEST 1)

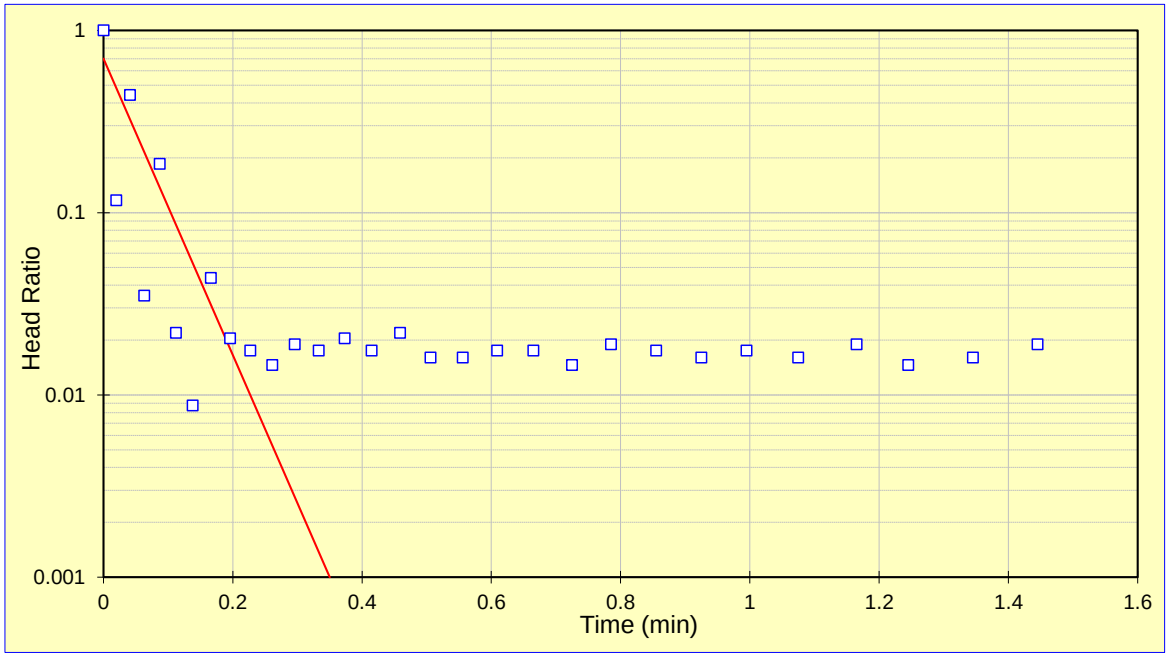
$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS	
r_c =	0.08
R_e =	0.34
L_e =	10
t_1 =	0
t_2 =	0.35
h_1/h_0 =	0.70
h_2/h_0 =	0.00

RESULTS

K=	1.11E-02	cm/sec
K=	3.15E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
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BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-13B (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

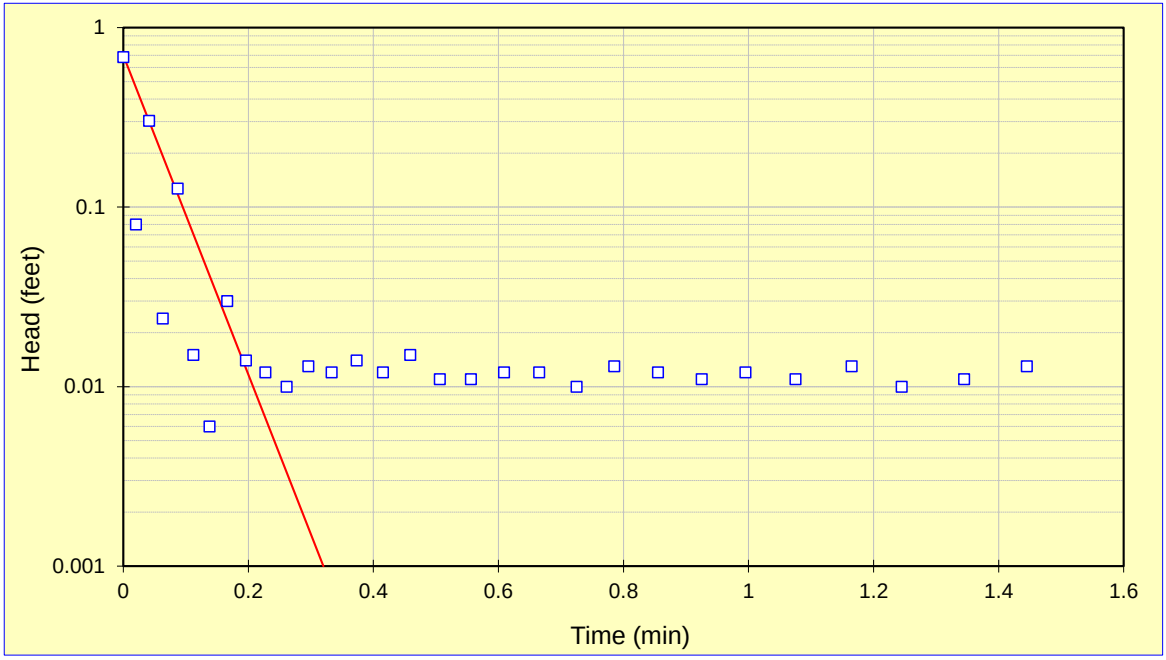
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	3.22
y_0 =	0.70
y_t =	0.001
t =	0.3

RESULTS

K=	1.16E-02	cm/sec
K=	3.30E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

van der KAMP RISING HEAD SLUG TEST ANALYSIS
UNDERDAMPED SLUG TEST GAMW-13B (TEST 2)

$$T = b + a \ln T$$

where:

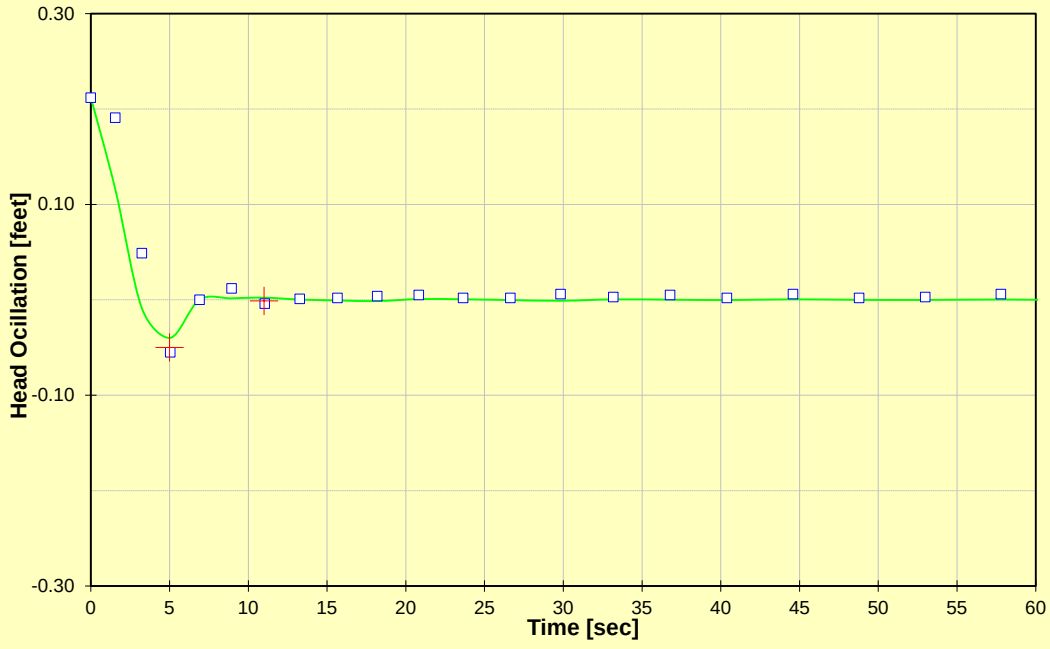
$$b = -a \ln\left[0.79 r_s^2 S (g/L)^{1/2}\right]$$
$$a = r_c^2 \left(g/L^{1/2}\right)/8d$$
$$d = \gamma / (g/L)^{1/2}$$
$$L = g/\left(\omega^2 + \gamma^2\right)$$

INPUT PARAMETERS

r_c =	0.08	ft	$(g/L)^{1/2}$ =	1.23358	ft^2
r_s =	0.08	ft	d =	0.5285	ft^{-1}
L_c =	19.14	ft	a =	0.00203	ft^3
L_s =	9.98	ft	t_1 =	5.00	sec
w =	1.0472	ft^{-1}	t_2 =	11.00	sec
g =	0.6520	ft^{-1}	$h(t_1)$ =	0.05	ft
L =	21.15	ft^3/sec^2	$h(t_2)$ =	0.00	ft
g =	32.19	ft/sec^2	S =	1.00E-02	dim

RESULTS

$b = T_0$ =	1.95E-02	ft^2/sec	a < 0.1?	YES
T =	1.02E-02	ft^2/sec	d < 0.7?	YES
T =	8.77E+02	ft^2/day	L_1 =	21.15
K =	3.01E+01	ft/day	L_2 =	24.13
K =	1.06E-02	cm/sec	L_1:L_2 Diff <20% ?	YES



Project Name: NIPSCO RMSGS
Project No.: 164-8171
Test Date: 07/07/16

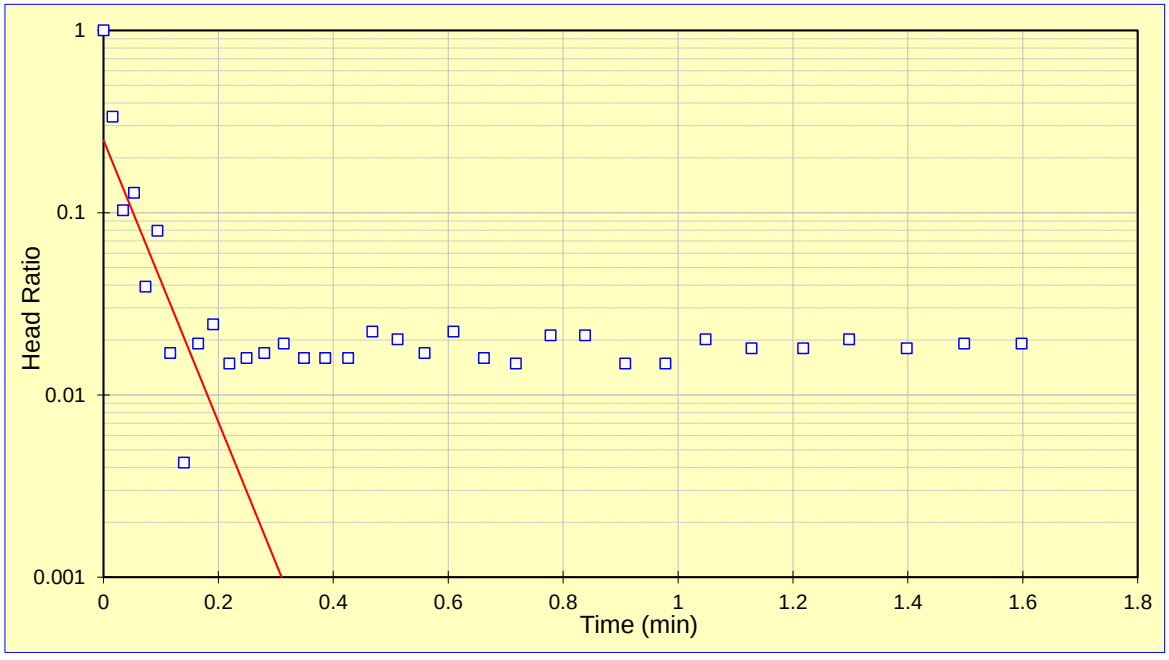
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/31/2017

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-13B (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln \frac{L_e}{R_e} \left| \frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)} \right| 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	1.06E-02	cm/sec
t_1 =	0	K=	3.00E+01	ft/day
t_2 =	0.31			
h_1/h_0 =	0.25			
h_2/h_0 =	0.00			



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Checked By: JRS
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BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-13B (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

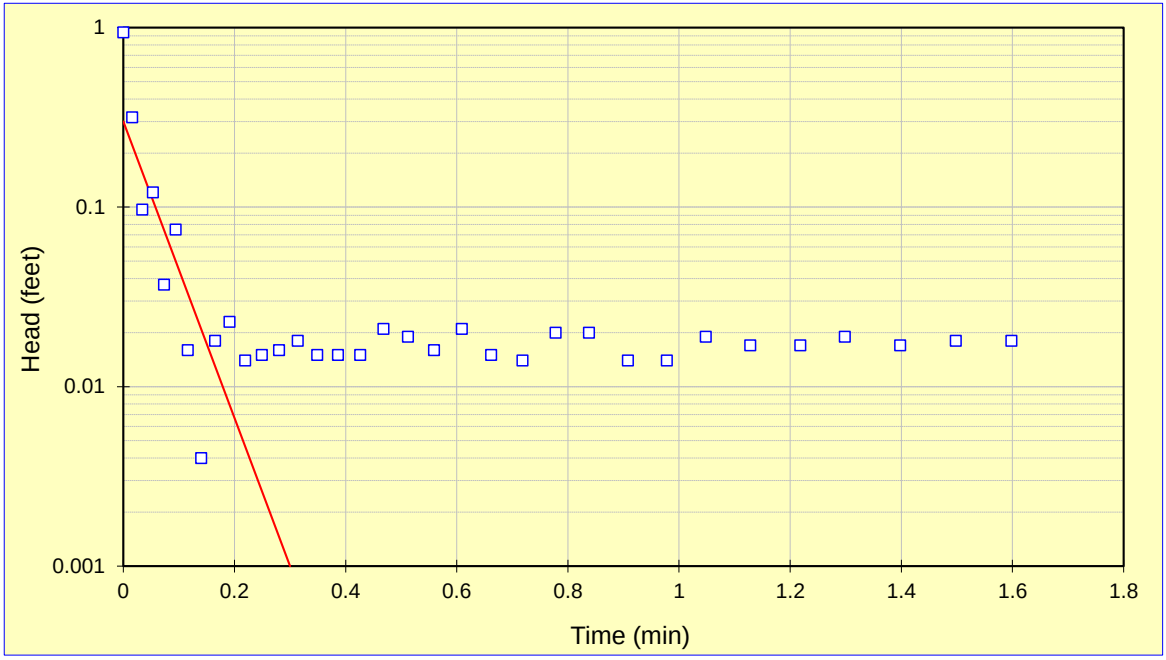
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	3.22
y_0 =	0.30
y_t =	0.001
t =	0.3

RESULTS

K=	1.08E-02	cm/sec
K=	3.06E+01	ft/day



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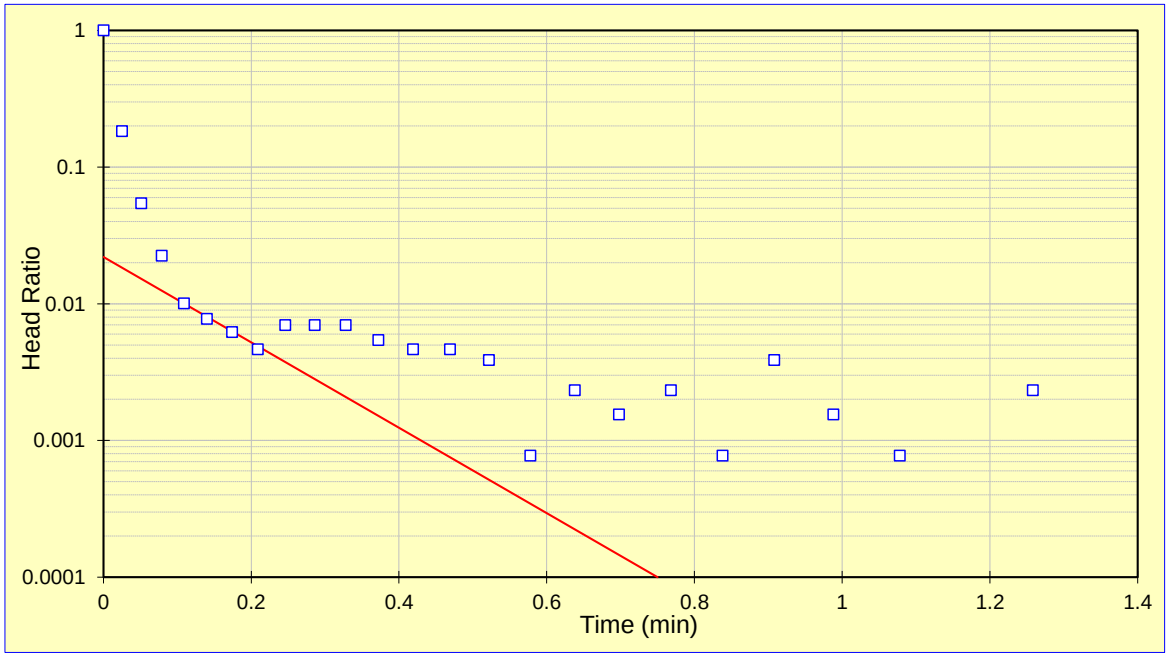
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-15 (TEST 1)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.20			
R_e =	0.34			
L_e =	9.417	K=	2.59E-02	cm/sec
t_1 =	0	K=	7.34E+01	ft/day
t_2 =	0.75			
h_1/h_0 =	0.02			
h_2/h_0 =	0.00			



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BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-15 (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

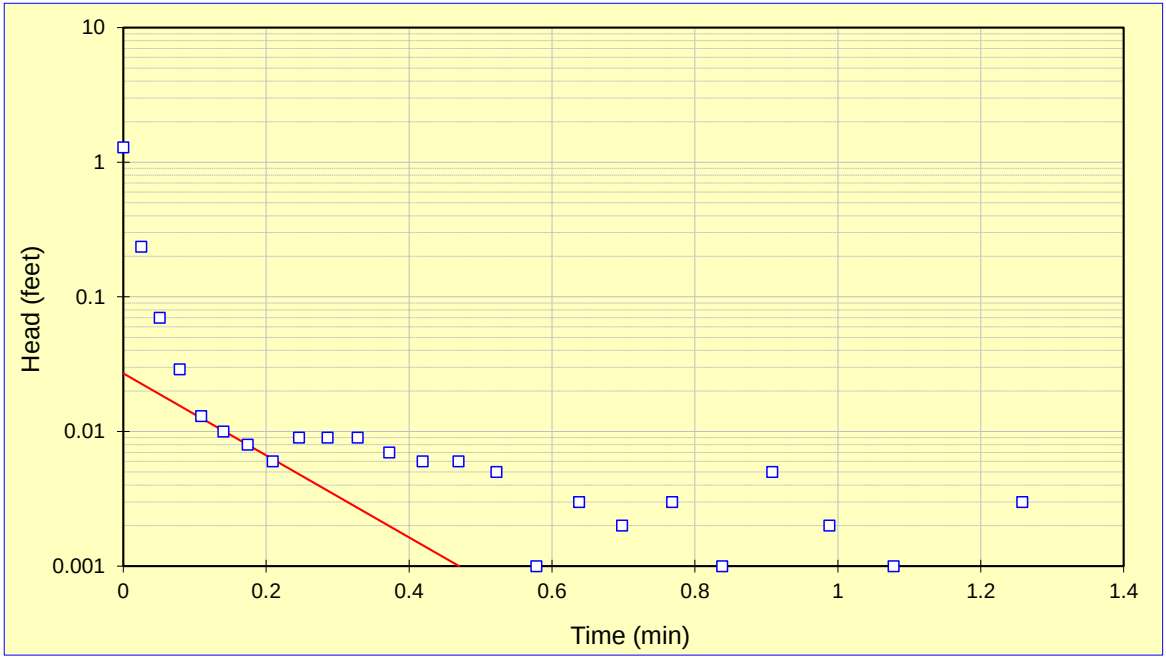
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.20
r_w =	0.34
L_e =	9.417
$\ln(R_e/r_w)$=	2.14
y_0 =	0.03
y_t =	0.001
t =	0.5

RESULTS

K=	1.63E-02	cm/sec
K=	4.63E+01	ft/day



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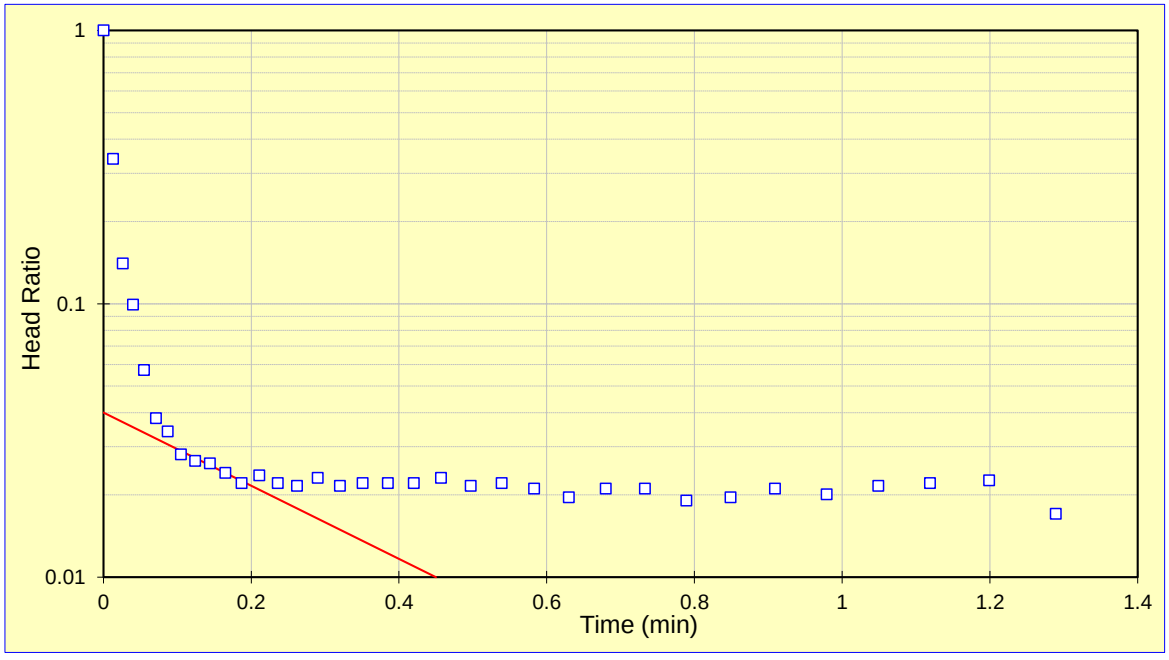
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-15 (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.20			
R_e =	0.34			
L_e =	9.348	K=	1.11E-02	cm/sec
t_1 =	0	K=	3.16E+01	ft/day
t_2 =	0.45			
h_1/h_0 =	0.04			
h_2/h_0 =	0.01			



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BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-15 (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

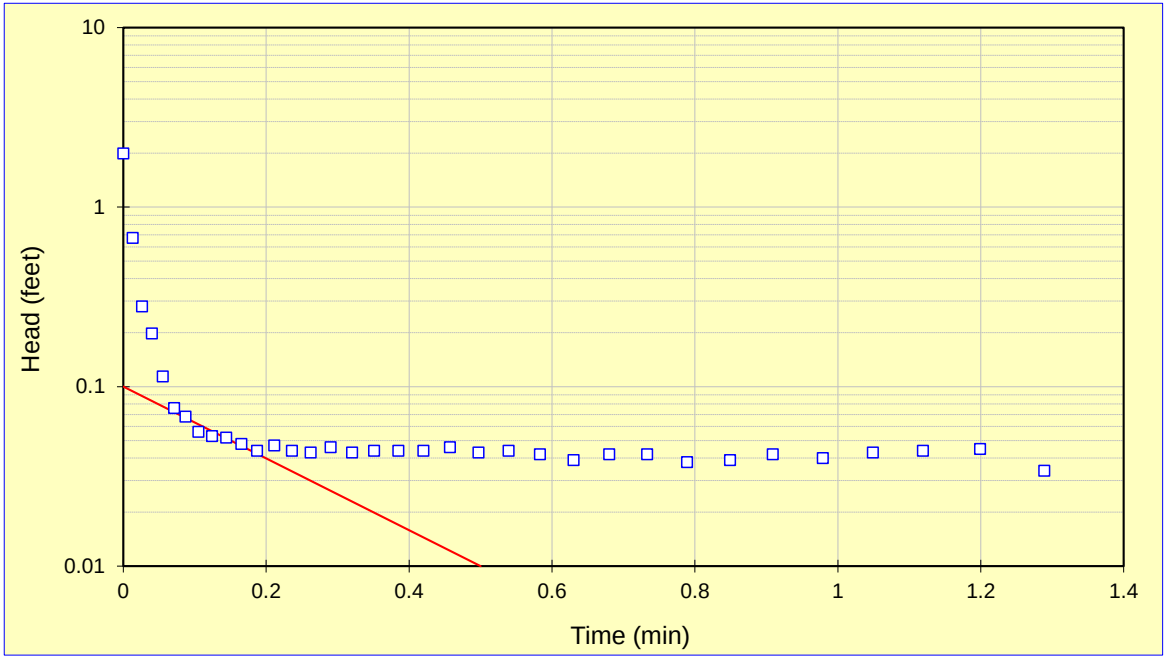
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.20
r_w =	0.34
L_e =	9.348
$\ln(R_e/r_w)$=	2.13
y_0 =	0.10
y_t =	0.010
t =	0.5

RESULTS

K=	1.08E-02	cm/sec
K=	3.05E+01	ft/day



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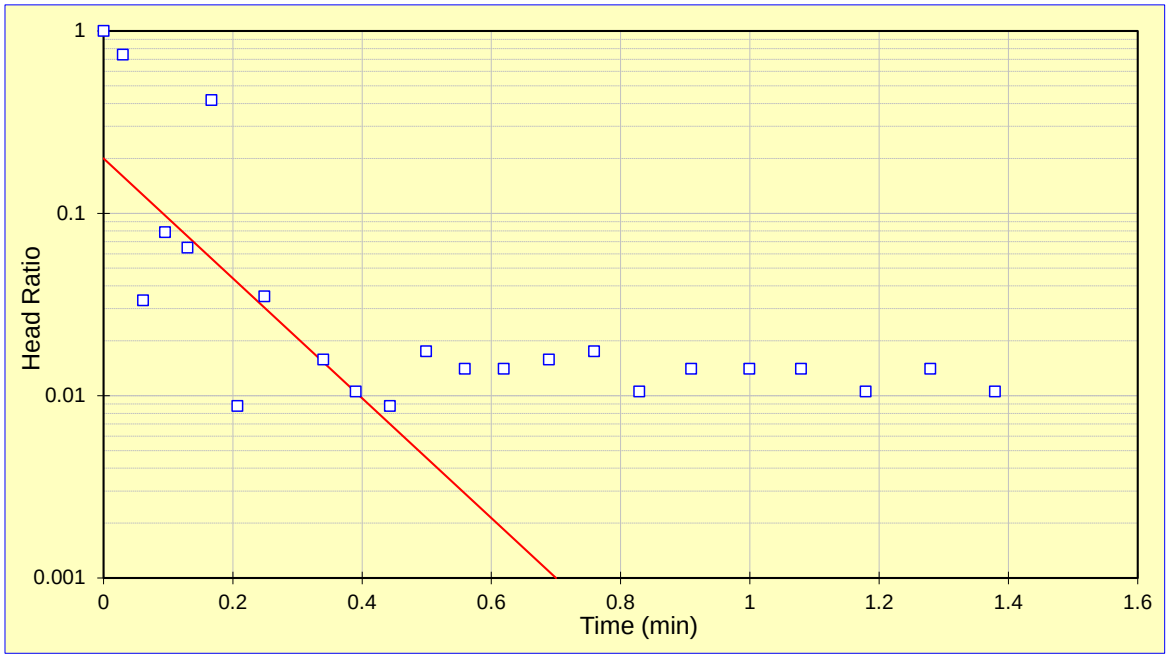
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-15B (TEST 1)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	4.50E-03	cm/sec
t_1 =	0	K=	1.28E+01	ft/day
t_2 =	0.7			
h_1/h_0 =	0.20			
h_2/h_0 =	0.00			



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BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-15B (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

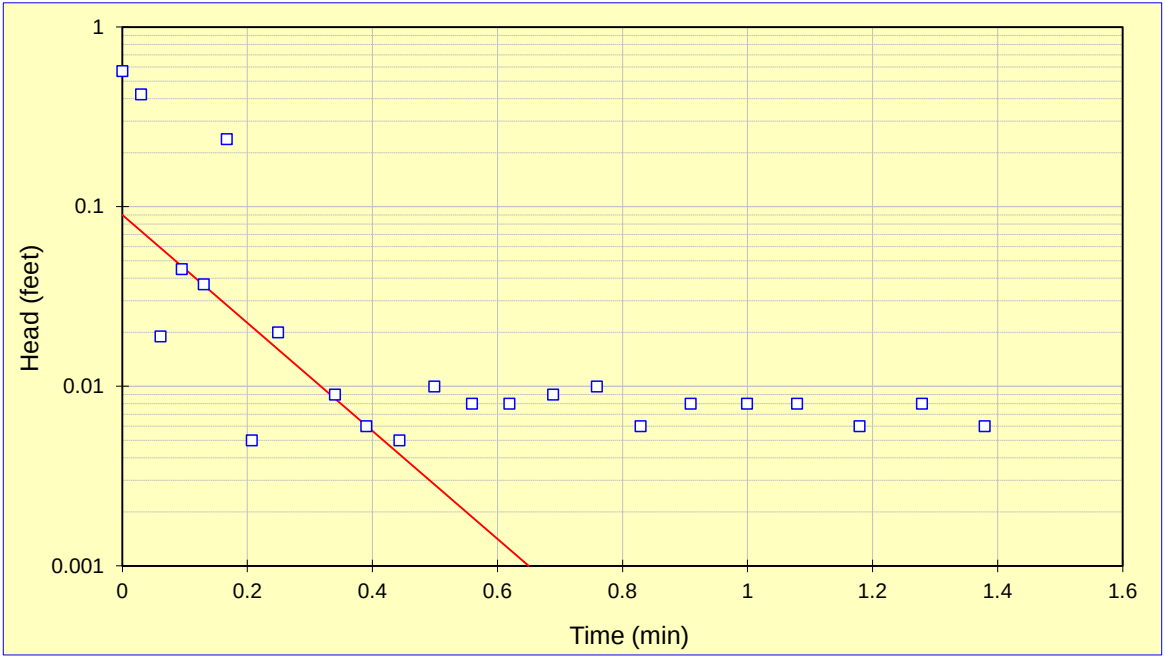
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.83
y_0 =	0.09
y_t =	0.001
t =	0.7

RESULTS

K=	3.45E-03	cm/sec
K=	9.79E+00	ft/day



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van der KAMP FALLING HEAD SLUG TEST ANALYSIS
UNDERDAMPED SLUG TEST GAMW-15B (TEST 2)

$$T = b + a \ln T$$

where:

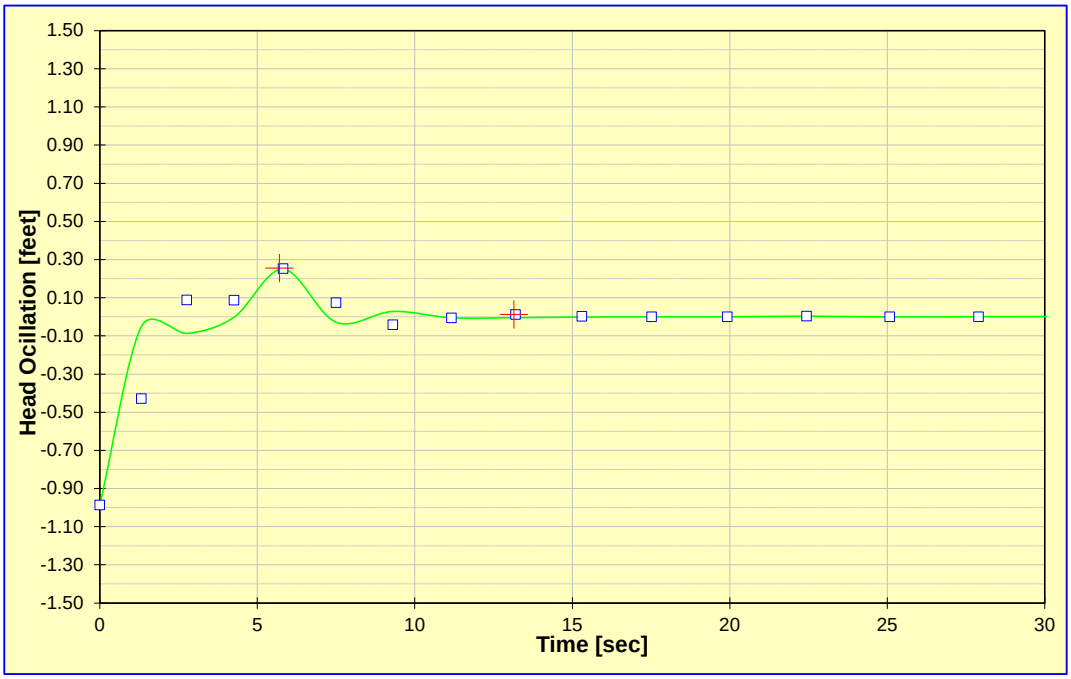
$$b = -a \ln\left[0.79 r_s^2 S (g/L)^{1/2}\right]$$
$$a = r_c^2 \left(g/L^{1/2}\right)/8d$$
$$d = \gamma/(g/L)^{1/2}$$
$$L = g/\left(\omega^2 + \gamma^2\right)$$

INPUT PARAMETERS

r_c =	0.08	ft	$(g/L)^{1/2}$ =	0.93787	ft^2
r_s =	0.08	ft	d =	0.4374	ft^{-1}
L_c =	19.23	ft	a =	0.00186	ft^3
L_s =	10.00	ft	t_1 =	5.70	sec
w =	0.8434	ft^{-1}	t_2 =	13.15	sec
g =	0.4102	ft^{-1}	$h(t_1)$ =	0.26	ft
L =	36.60	ft^3/sec^2	$h(t_2)$ =	0.01	ft
g =	32.19	ft/sec^2	S =	1.00E-02	dim

RESULTS

$b = T_0$ =	1.84E-02	ft^2/sec	$a < 0.1$?	YES
T =	9.76E-03	ft^2/sec	$d < 0.7$?	YES
T =	8.44E+02	ft^2/day	L_1 =	36.60
K =	2.70E+01	ft/day	L_2 =	24.23
K =	9.53E-03	cm/sec	L_1:L_2 Diff <20% ?	NO



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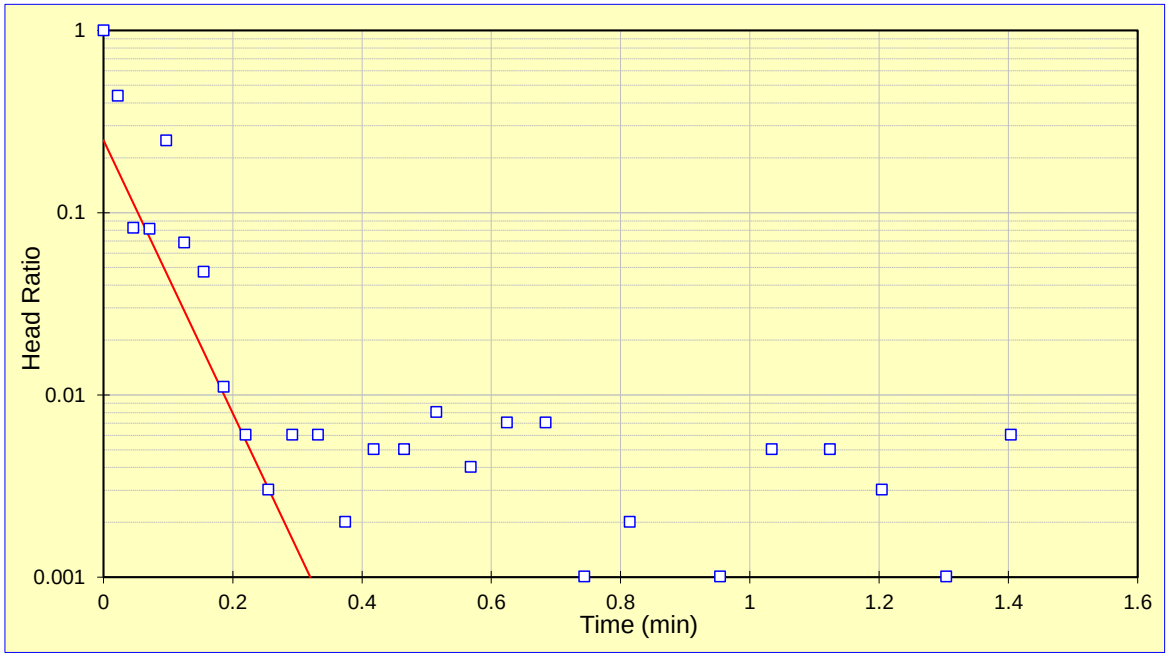
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/31/2017

HVORSLEV SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-15B (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left|\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right| 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	1.03E-02	cm/sec
t_1 =	0	K=	2.91E+01	ft/day
t_2 =	0.32			
h_1/h_0 =	0.25			
h_2/h_0 =	0.00			



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Checked By: JRS
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BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-15B (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

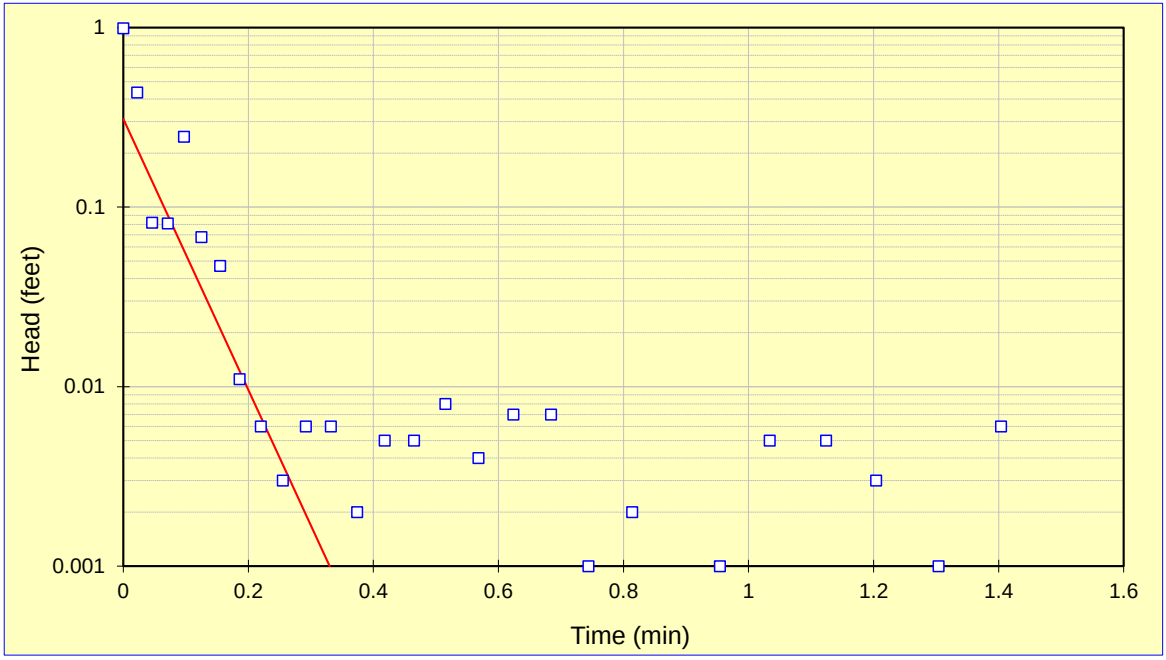
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.85
y_0 =	0.31
y_t =	0.001
t =	0.3

RESULTS

K=	8.75E-03	cm/sec
K=	2.48E+01	ft/day



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van der KAMP RISING HEAD SLUG TEST ANALYSIS
UNDERDAMPED SLUG TEST GAMW-15B (TEST 1)

$$T = b + a \ln T$$

where:

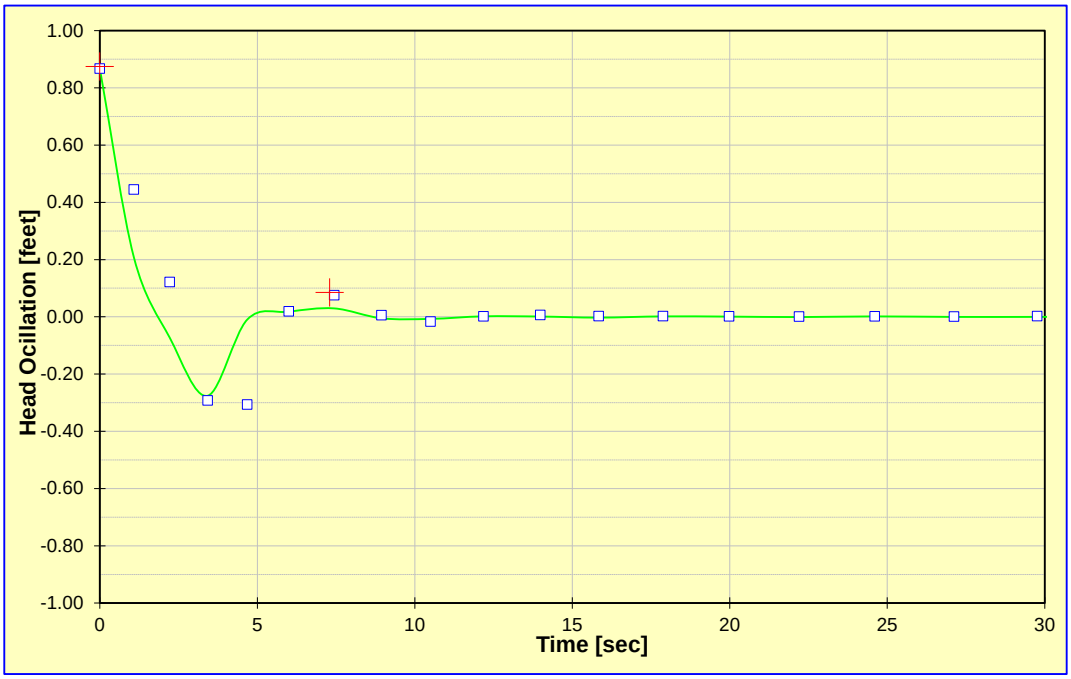
$$b = -a \ln\left[0.79 r_s^2 S (g/L)^{1/2}\right]$$
$$a = r_c^2 \left(g/L^{1/2}\right)/8d$$
$$d = \gamma/(g/L)^{1/2}$$
$$L = g/\left(\omega^2 + \gamma^2\right)$$

INPUT PARAMETERS

r_c =	0.08	ft	$(g/L)^{1/2}$ =	0.91806	ft^2
r_s =	0.08	ft	d =	0.3479	ft^{-1}
L_c =	19.23	ft	a =	0.00229	ft^3
L_s =	10.00	ft	t_1 =	0.00	sec
w =	0.8607	ft^{-1}	t_2 =	7.30	sec
g =	0.3194	ft^{-1}	$h(t_1)$ =	0.88	ft
L =	38.19	ft^3/sec^2	$h(t_2)$ =	0.09	ft
g =	32.19	ft/sec^2	S =	1.00E-02	dim

RESULTS

$b = T_0$ =	2.27E-02	ft^2/sec	a < 0.1?	YES
T =	1.27E-02	ft^2/sec	d < 0.7?	YES
T =	1.09E+03	ft^2/day	L_1 =	38.19
K =	3.50E+01	ft/day	L_2 =	24.23
K =	1.24E-02	cm/sec	L_1:L_2 Diff <20% ?	NO



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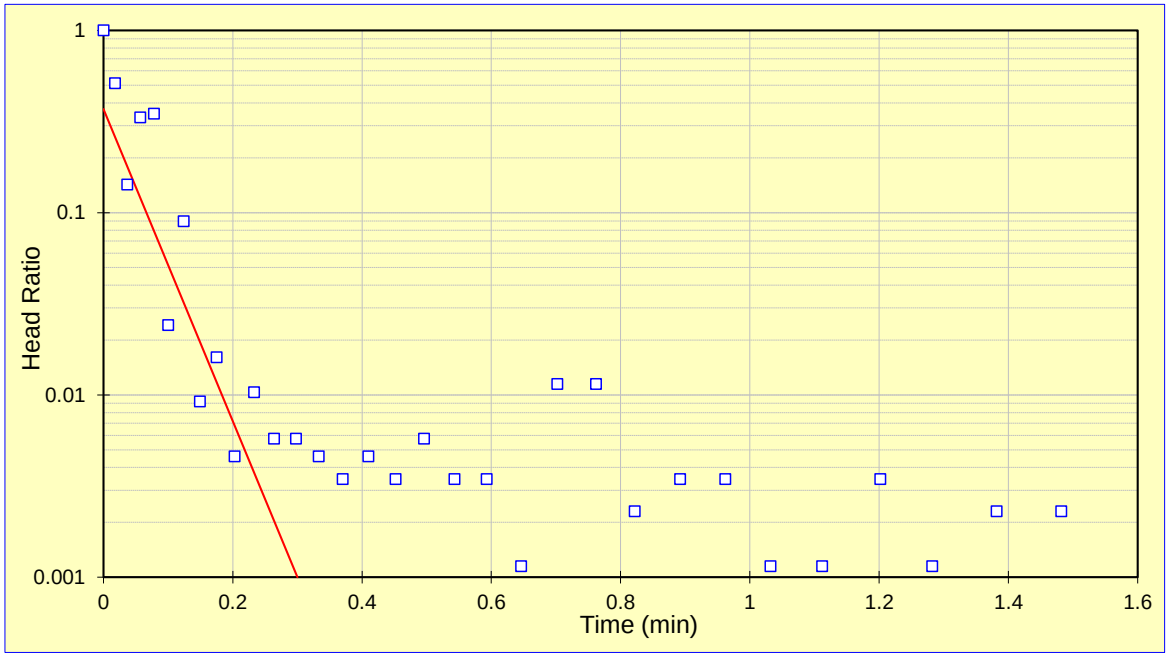
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/31/2017

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-15B (TEST 1)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	1.17E-02	cm/sec
t_1 =	0	K=	3.32E+01	ft/day
t_2 =	0.3			
h_1/h_0 =	0.37			
h_2/h_0 =	0.00			



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BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-15B (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

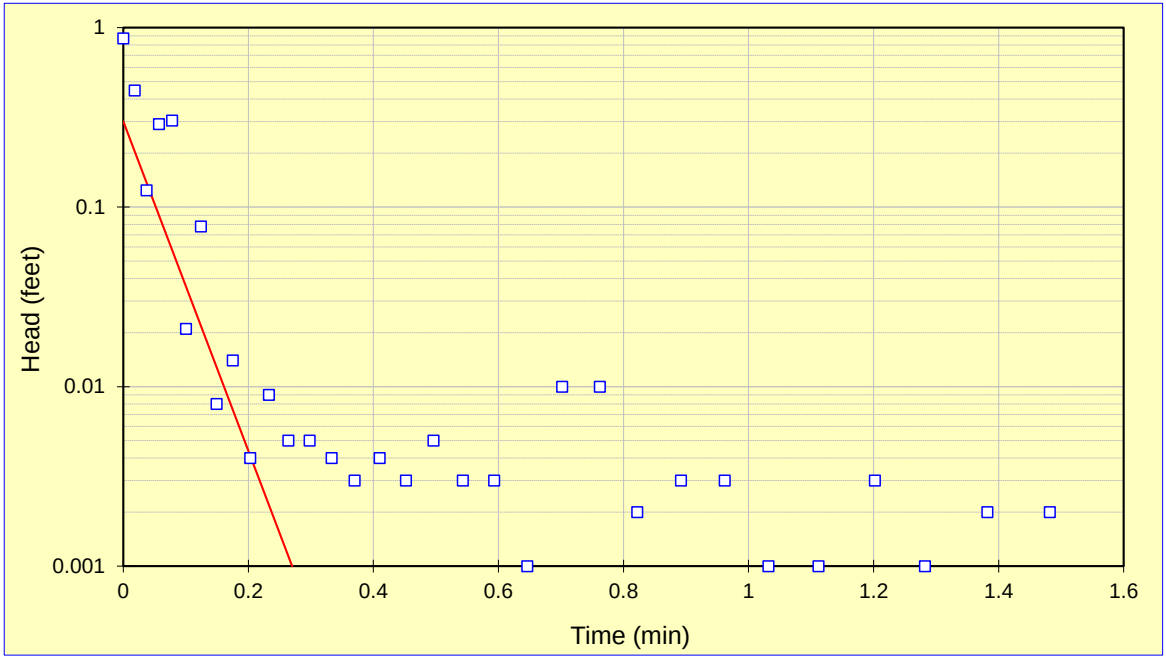
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.85
y_0 =	0.30
y_t =	0.001
t =	0.3

RESULTS

K=	1.06E-02	cm/sec
K=	3.02E+01	ft/day



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Checked By: JRS
Analysis Date: 7/27/2016

van der KAMP RISING HEAD SLUG TEST ANALYSIS
UNDERDAMPED SLUG TEST GAMW-15B (TEST 2)

$$T = b + a \ln T$$

where:

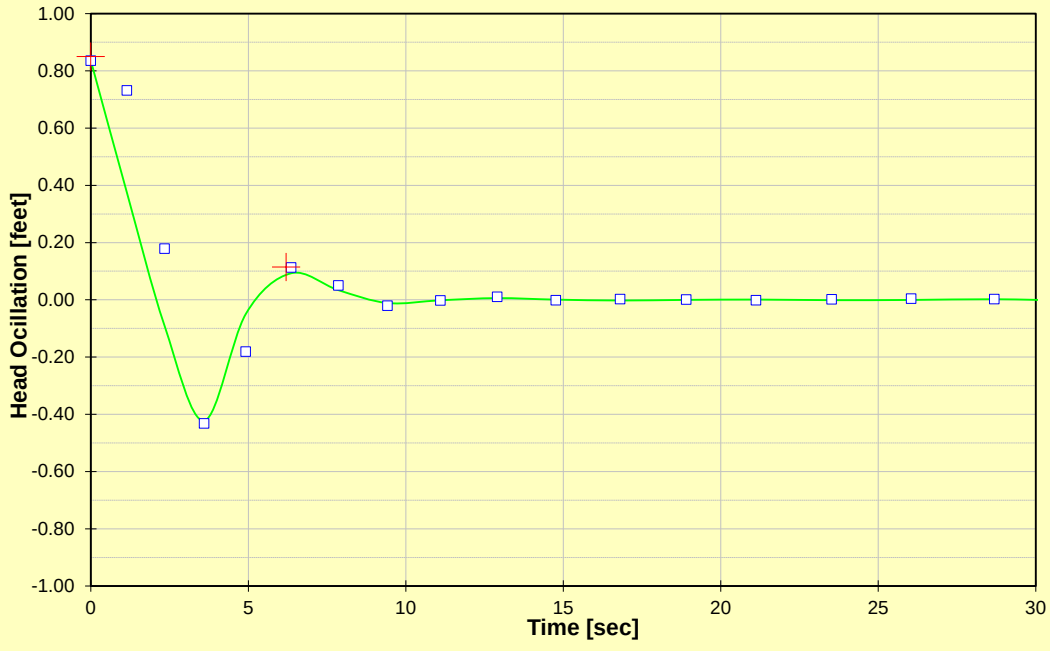
$$b = -a \ln\left[0.79 r_s^2 S (g/L)^{1/2}\right]$$
$$a = r_c^2 \left(g/L^{1/2}\right)/8d$$
$$d = \gamma / (g/L)^{1/2}$$
$$L = g/\left(\omega^2 + \gamma^2\right)$$

INPUT PARAMETERS

r_c =	0.08	ft	$(g/L)^{1/2}$ =	1.06353	ft^2
r_s =	0.08	ft	d =	0.3034	ft^{-1}
L_c =	19.22	ft	a =	0.00304	ft^3
L_s =	10.00	ft	t_1 =	0.00	sec
w =	1.0134	ft^{-1}	t_2 =	6.20	sec
g =	0.3226	ft^{-1}	$h(t_1)$ =	0.85	ft
L =	28.46	ft^3/sec^2	$h(t_2)$ =	0.12	ft
g =	32.19	ft/sec^2	S =	1.00E-02	dim

RESULTS

$b = T_0$ =	2.97E-02	ft^2/sec	$a < 0.1$?	YES
T =	1.73E-02	ft^2/sec	$d < 0.7$?	YES
T =	1.50E+03	ft^2/day	L_1 =	28.46
K =	4.80E+01	ft/day	L_2 =	24.22
K =	1.69E-02	cm/sec	L_1:L_2 Diff <20% ?	YES



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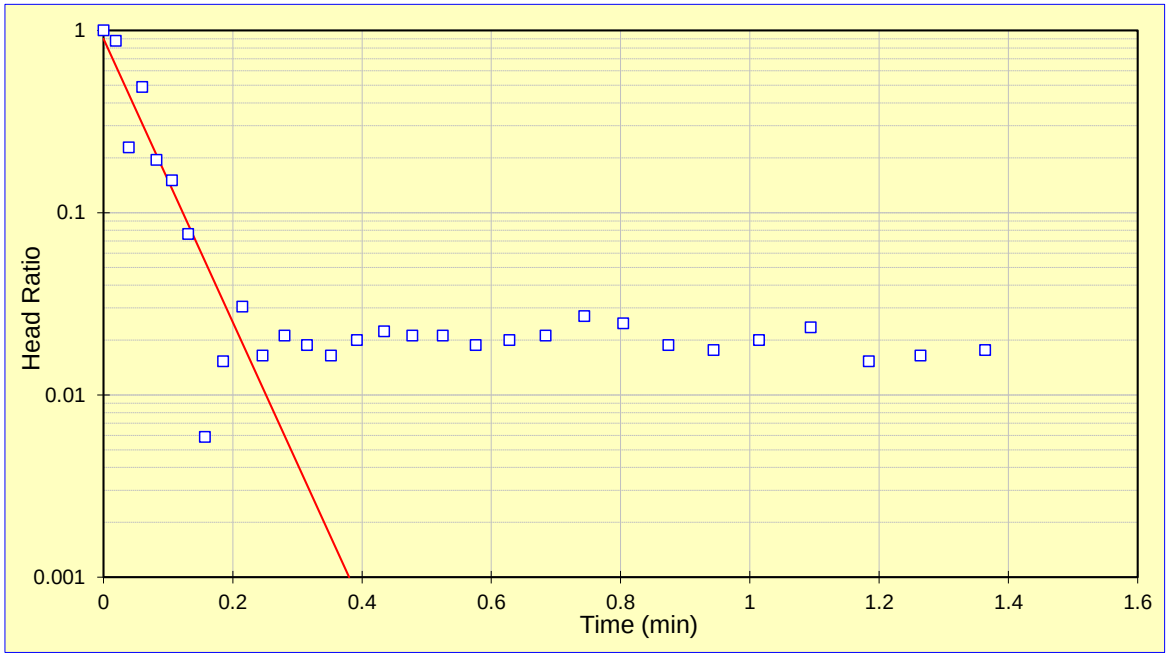
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/31/2017

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-15B (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	1.06E-02	cm/sec
t_1 =	0	K=	3.02E+01	ft/day
t_2 =	0.38			
h_1/h_0 =	0.90			
h_2/h_0 =	0.00			



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BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-15B (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

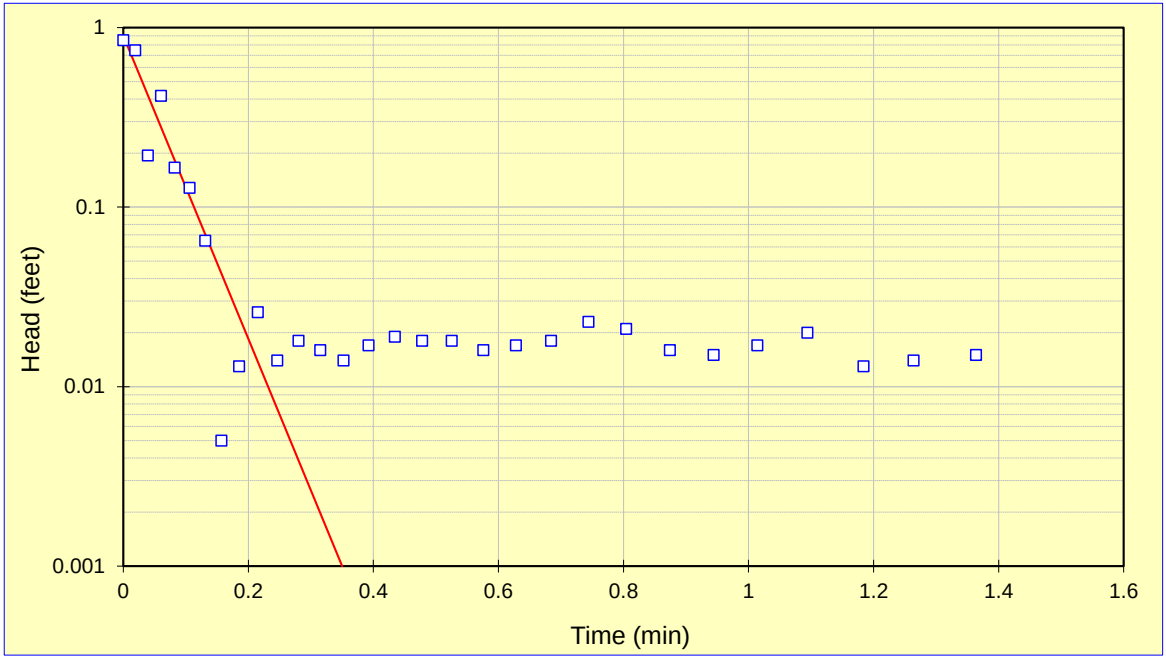
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	2.85
y_0 =	0.90
y_t =	0.001
t =	0.4

RESULTS

K=	9.79E-03	cm/sec
K=	2.77E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/08/16

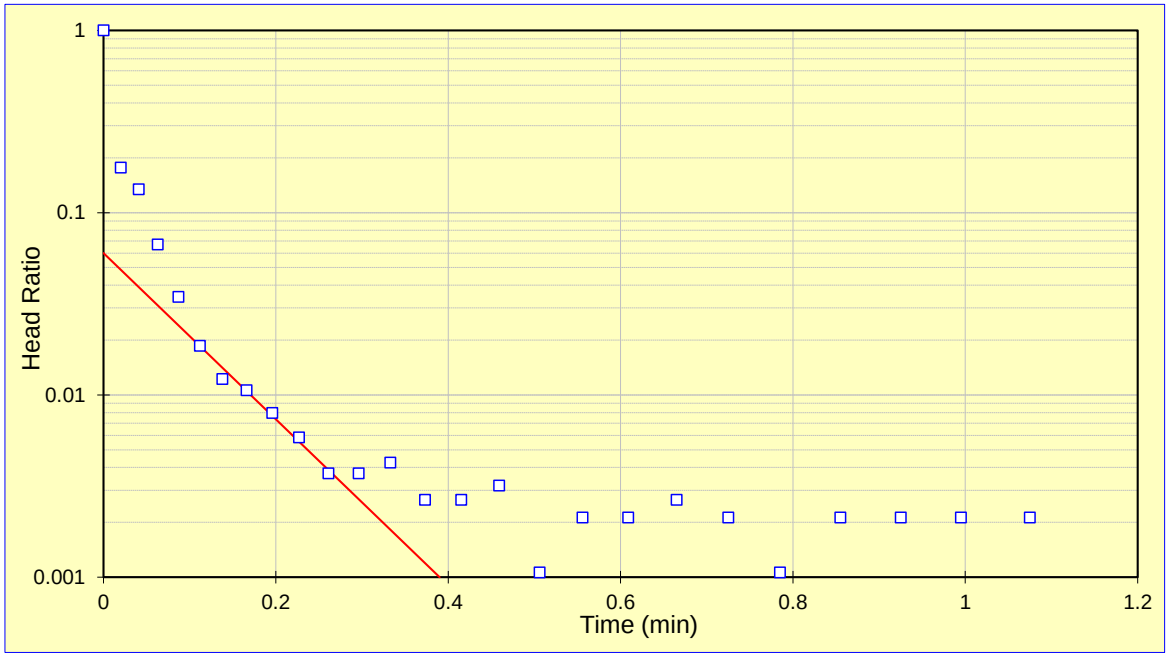
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-19 (TEST 1)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left|\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right| 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.20			
R_e =	0.34			
L_e =	9.705	K=	3.70E-02	cm/sec
t_1 =	0	K=	1.05E+02	ft/day
t_2 =	0.39			
h_1/h_0 =	0.06			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-19 (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

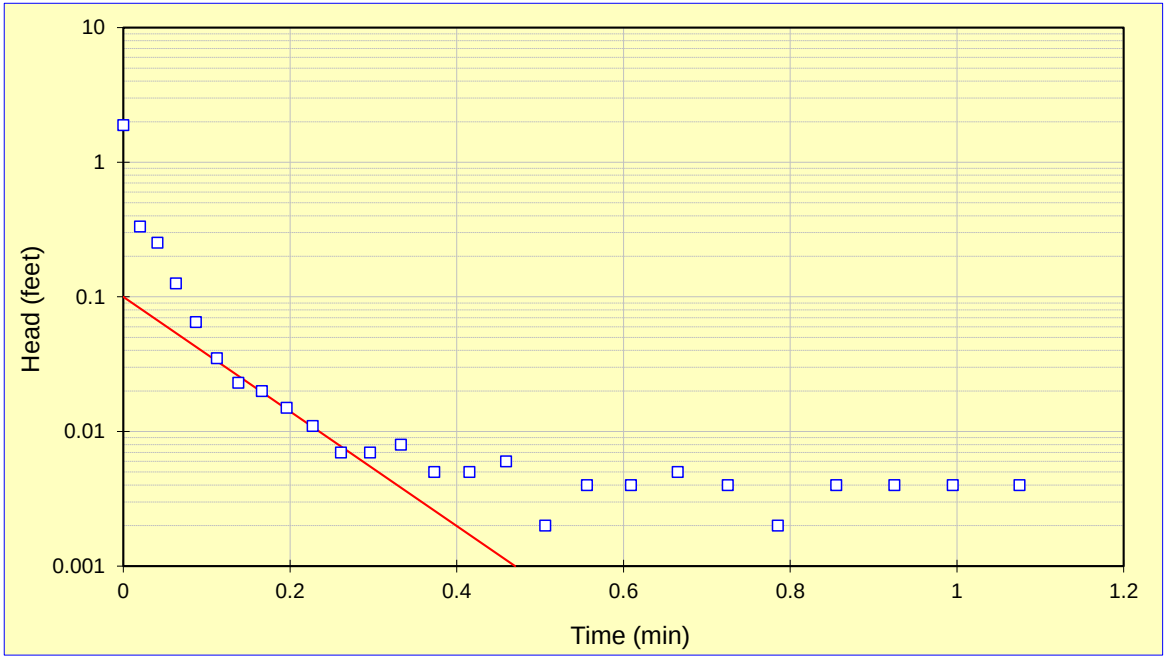
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.20
r_w =	0.34
L_e =	9.705
$\ln(R_e/r_w)$=	2.18
y_0 =	0.10
y_t =	0.001
t =	0.5

RESULTS

K=	2.25E-02	cm/sec
K=	6.38E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

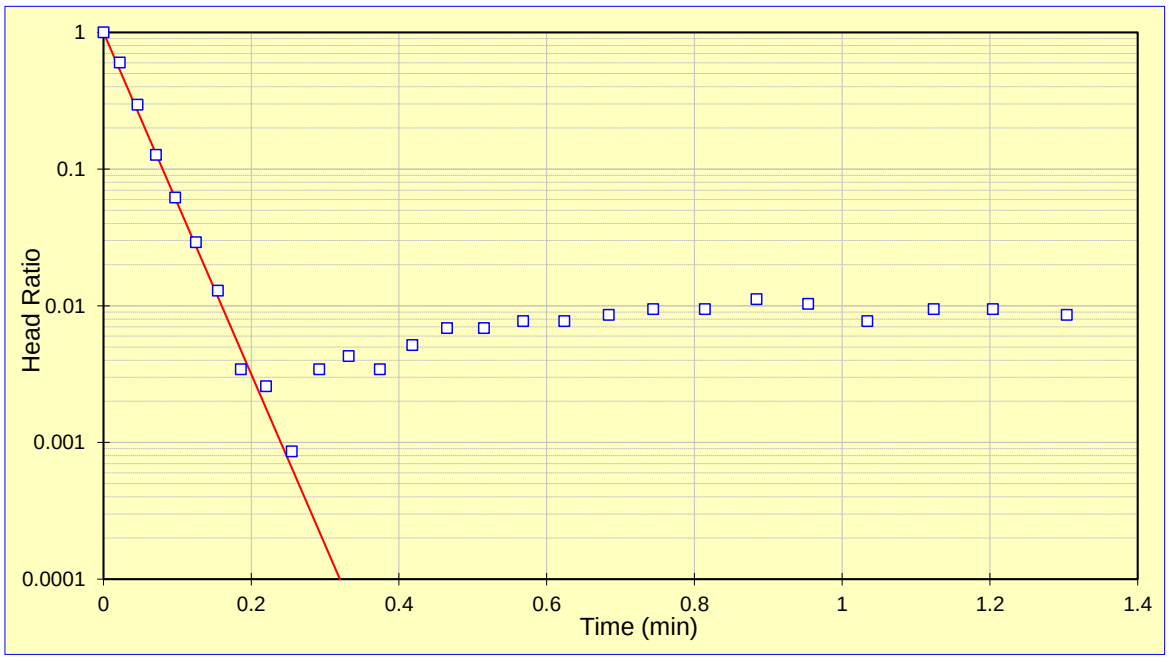
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-19 (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.20			
R_e =	0.34			
L_e =	9.735	K=	1.01E-01	cm/sec
t_1 =	0	K=	2.87E+02	ft/day
t_2 =	0.32			
h_1/h_0 =	1.00			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-19 (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

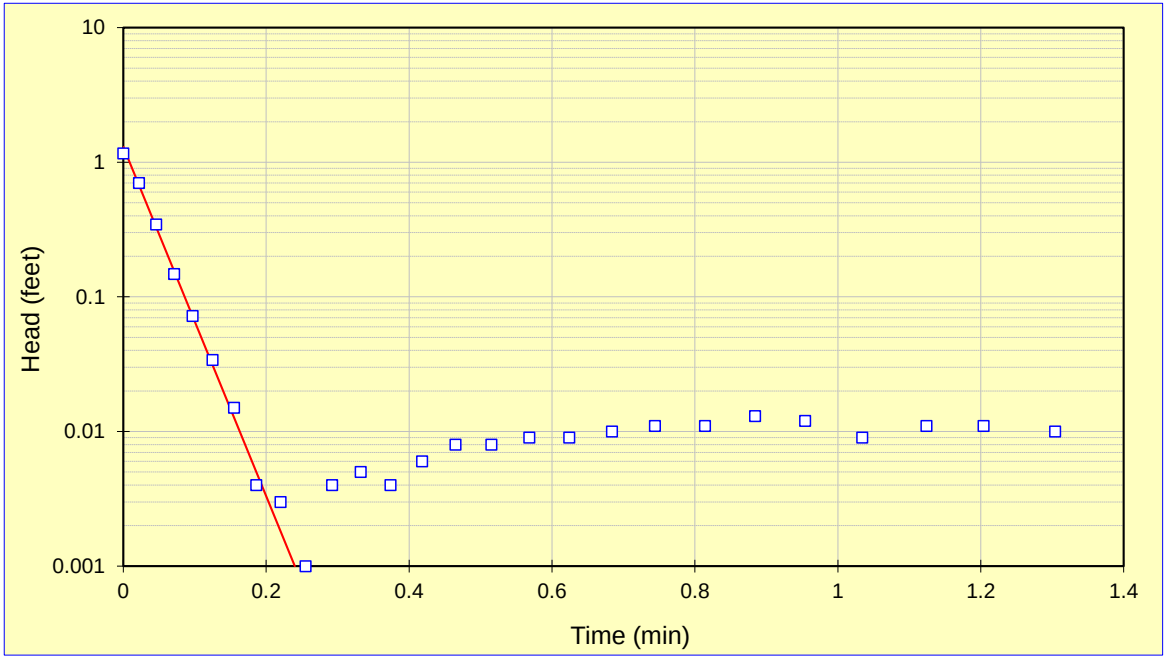
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.20
r_w =	0.34
L_e =	9.735
$\ln(R_e/r_w)$=	2.18
y_0 =	1.30
y_t =	0.001
t =	0.2

RESULTS

K=	6.85E-02	cm/sec
K=	1.94E+02	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

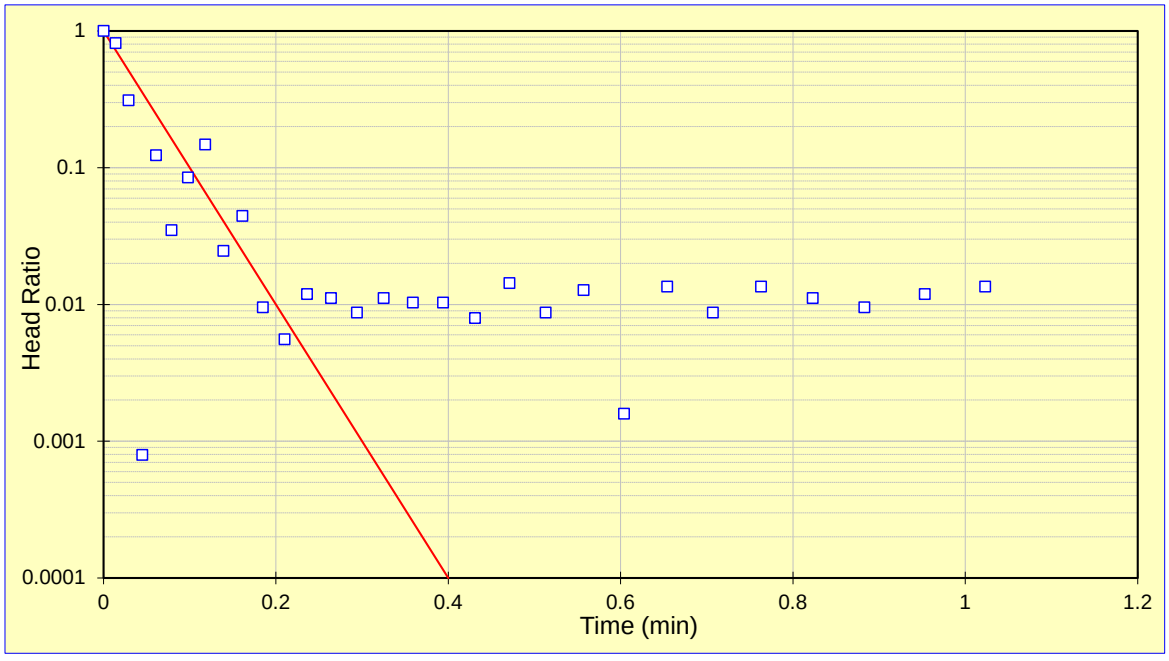
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-19B (TEST 1)

$$K = \frac{r_c^{\,2}}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)} \right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	1.37E-02	cm/sec
t_1 =	0	K=	3.88E+01	ft/day
t_2 =	0.4			
h_1/h_0 =	1.00			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-19B (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

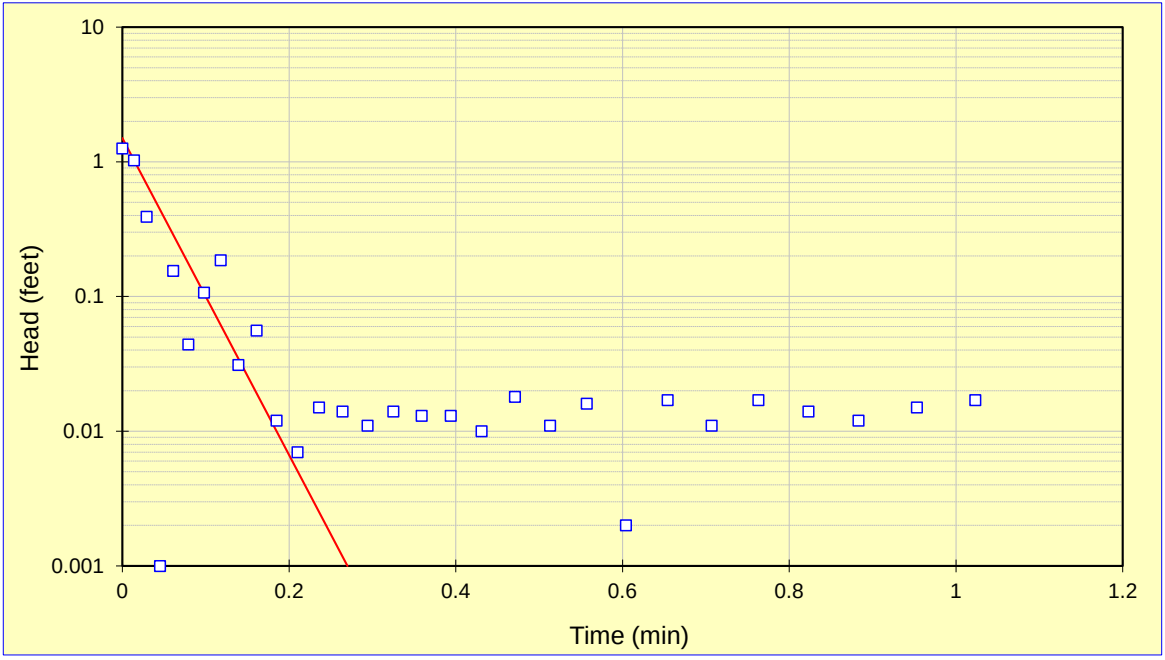
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	3.02
y_0 =	1.50
y_t =	0.001
t =	0.3

RESULTS

K=	1.44E-02	cm/sec
K=	4.09E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

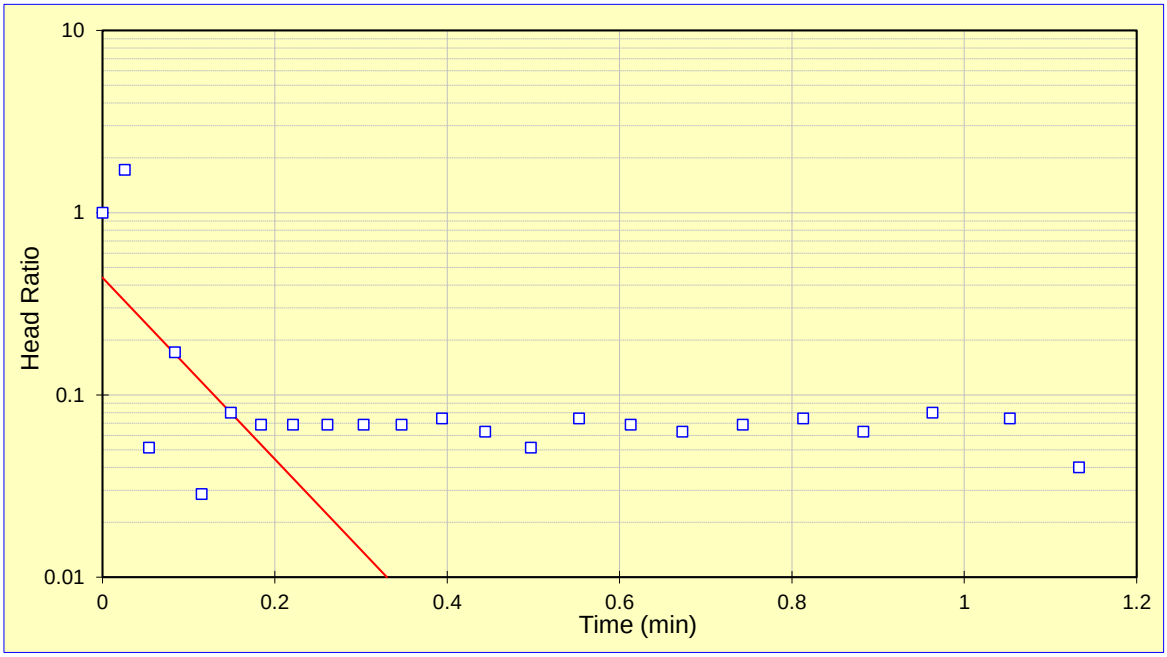
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

HVORSLEV SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-19B (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	6.82E-03	cm/sec
t_1 =	0	K=	1.93E+01	ft/day
t_2 =	0.33			
h_1/h_0 =	0.44			
h_2/h_0 =	0.01			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST GAMW-19B (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

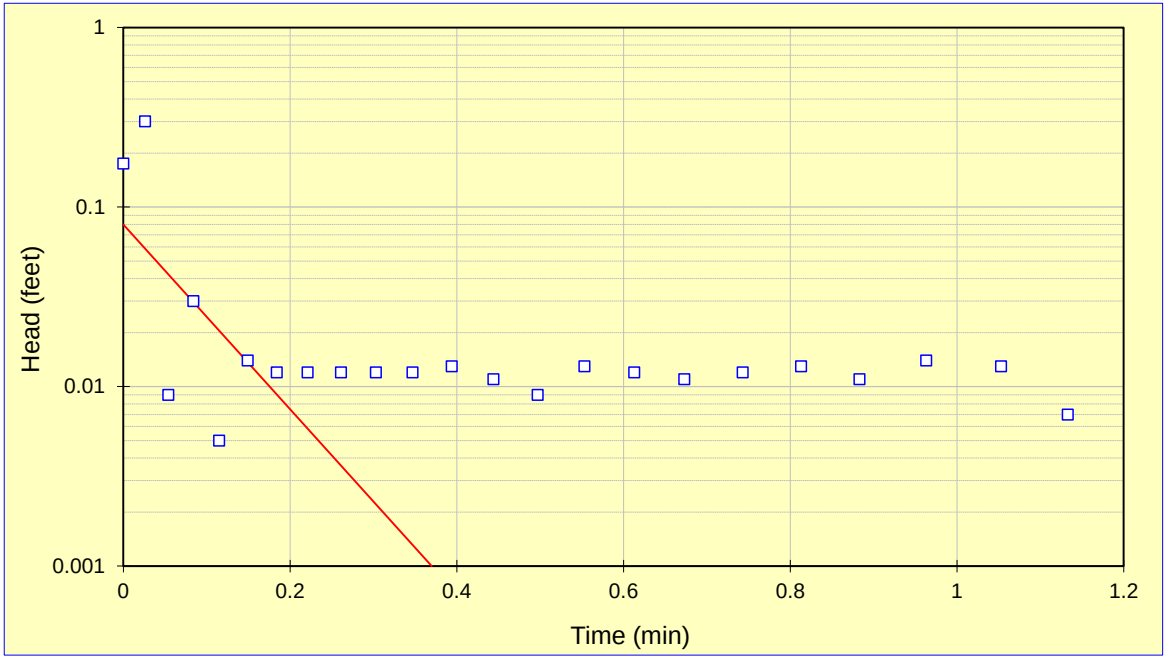
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	3.02
y_0 =	0.08
y_t =	0.001
t =	0.4

RESULTS

K=	6.31E-03	cm/sec
K=	1.79E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

van der KAMP RISING HEAD SLUG TEST ANALYSIS
UNDERDAMPED SLUG TEST GAMW-19B (TEST 1)

$$T = b + a \ln T$$

where:

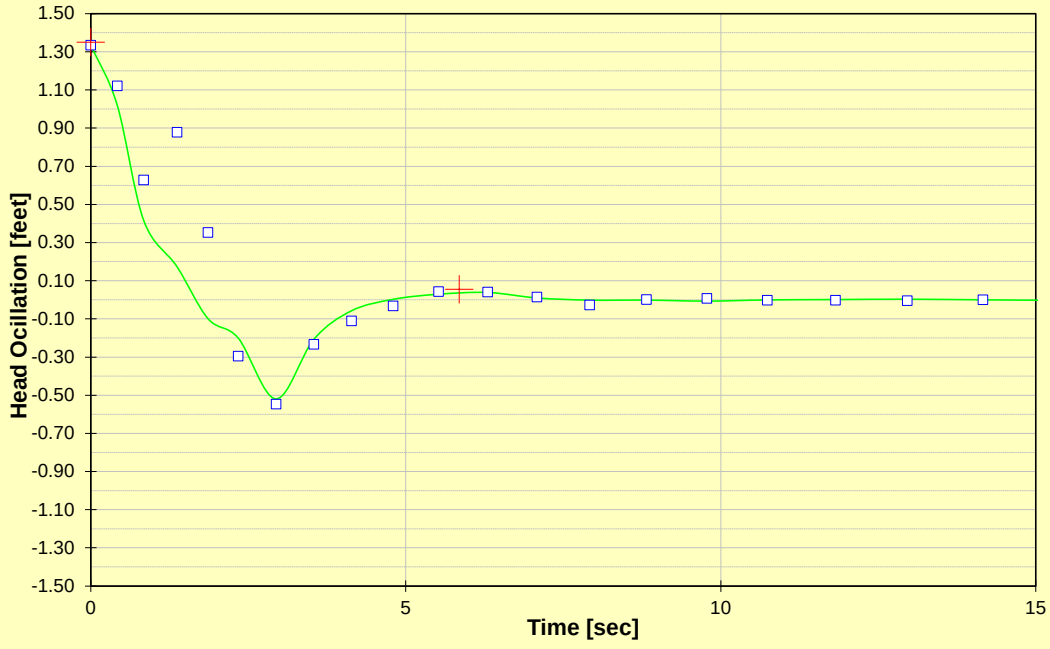
$$b = -a \ln\left[0.79 r_s^2 S (g/L)^{1/2}\right]$$
$$a = r_c^2 \left(g/L^{1/2}\right)/8d$$
$$d = \gamma / (g/L)^{1/2}$$
$$L = g/\left(\omega^2 + \gamma^2\right)$$

INPUT PARAMETERS

r_c =	0.08	ft	$(g/L)^{1/2}$ =	1.20536	ft^2
r_s =	0.08	ft	d =	0.4539	ft^{-1}
L_c =	17.92	ft	a =	0.00231	ft^3
L_s =	10.00	ft	t_1 =	0.00	sec
w =	1.0740	ft^{-1}	t_2 =	5.85	sec
g =	0.5471	ft^{-1}	$h(t_1)$ =	1.35	ft
L =	22.16	ft^3/sec^2	$h(t_2)$ =	0.06	ft
g =	32.19	ft/sec^2	S =	1.00E-02	dim

RESULTS

$b = T_0$ =	2.22E-02	ft^2/sec	a < 0.1?	YES
T =	1.20E-02	ft^2/sec	d < 0.7?	YES
T =	1.04E+03	ft^2/day	L_1 =	22.16
K =	3.67E+01	ft/day	L_2 =	22.92
K =	1.29E-02	cm/sec	L_1:L_2 Diff <20% ?	YES



Project Name: NIPSCO RMSGS
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/31/2017

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-19B (TEST 1)

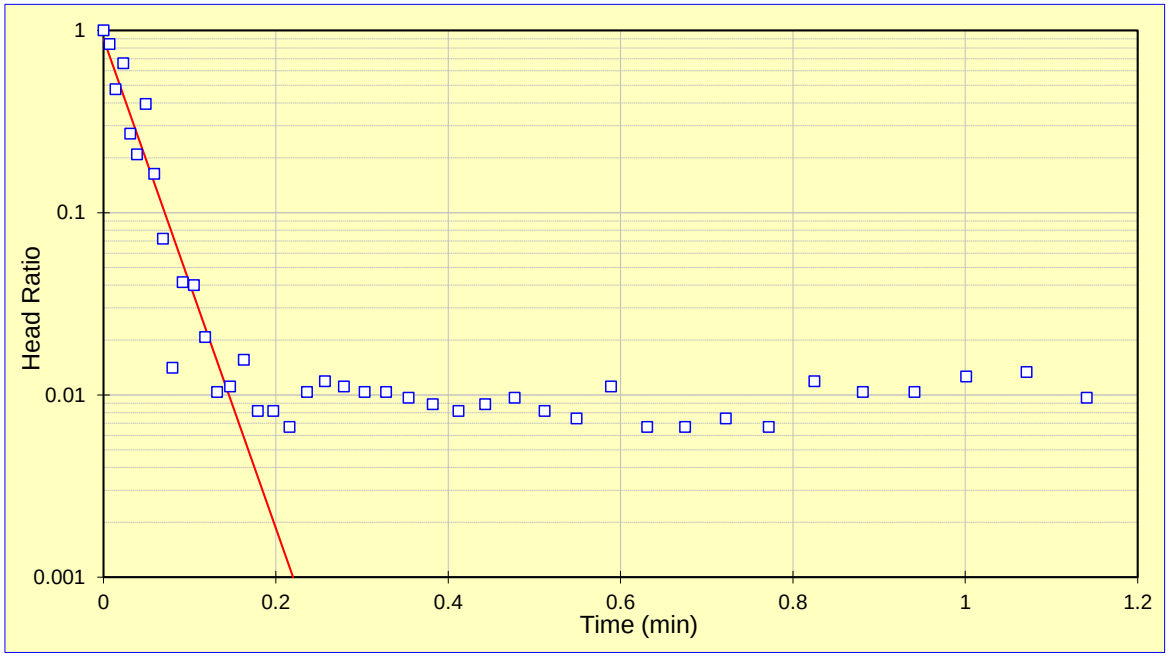
$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS	
r_c =	0.08
R_e =	0.34
L_e =	10
t_1 =	0
t_2 =	0.22
h_1/h_0 =	0.90
h_2/h_0 =	0.00

RESULTS

K=	1.84E-02	cm/sec
K=	5.21E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-19B (TEST 1)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

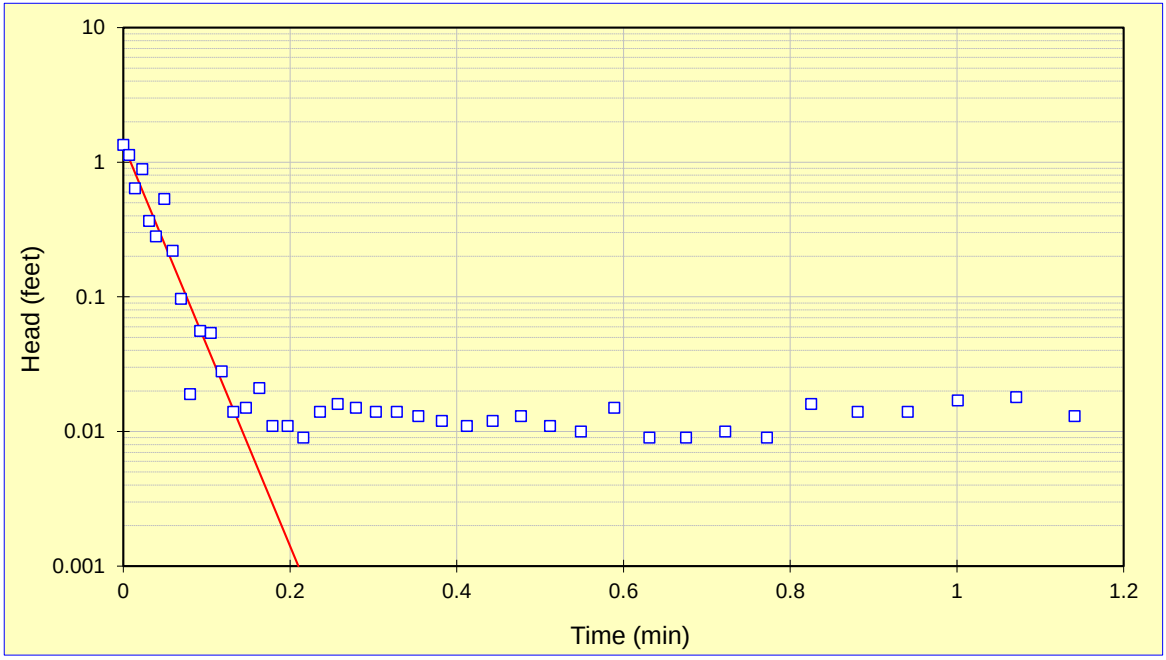
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	3.02
y_0 =	1.35
y_t =	0.001
t =	0.2

RESULTS

K=	1.83E-02	cm/sec
K=	5.18E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

van der KAMP RISING HEAD SLUG TEST ANALYSIS
UNDERDAMPED SLUG TEST GAMW-19B (TEST 2)

$$T = b + a \ln T$$

where:

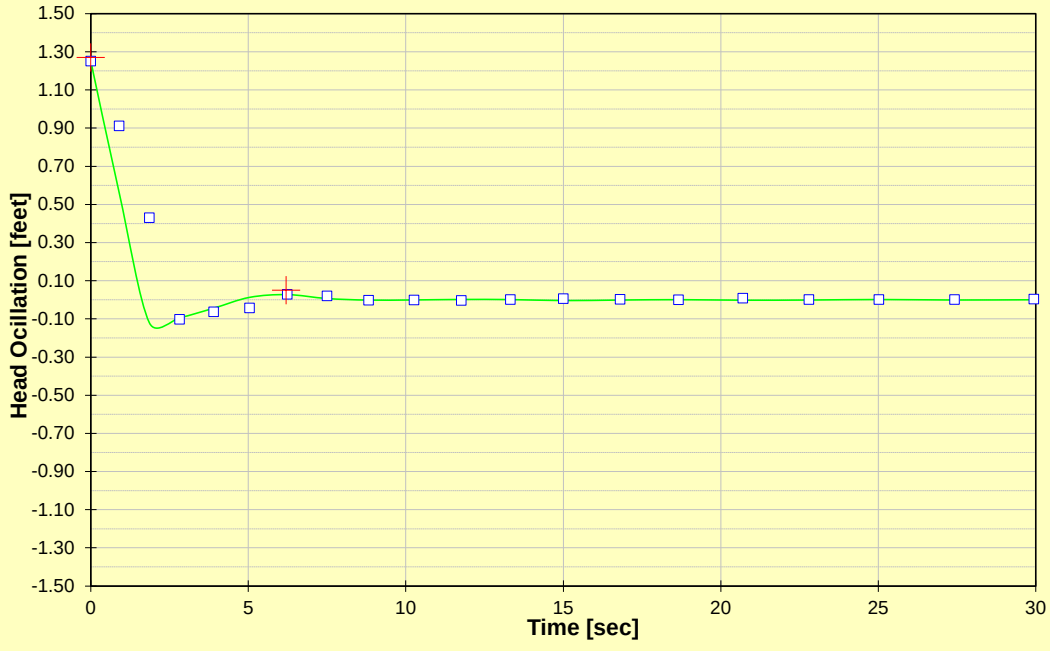
$$b = -a \ln\left[0.79 r_s^2 S (g/L)^{1/2}\right]$$
$$a = r_c^2 \left(g/L^{1/2}\right)/8d$$
$$d = \gamma / (g/L)^{1/2}$$
$$L = g/\left(\omega^2 + \gamma^2\right)$$

INPUT PARAMETERS

r_c =	0.08	ft	$(g/L)^{1/2}$ =	1.13983	ft^2
r_s =	0.08	ft	d =	0.4577	ft^{-1}
L_c =	17.95	ft	a =	0.00216	ft^3
L_s =	10.00	ft	t_1 =	0.00	sec
w =	1.0134	ft^{-1}	t_2 =	6.20	sec
g =	0.5217	ft^{-1}	$h(t_1)$ =	1.27	ft
L =	24.78	ft^3/sec^2	$h(t_2)$ =	0.05	ft
g =	32.19	ft/sec^2	S =	1.00E-02	dim

RESULTS

$b = T_0$ =	2.09E-02	ft^2/sec	a < 0.1?	YES
T =	1.12E-02	ft^2/sec	d < 0.7?	YES
T =	9.69E+02	ft^2/day	L_1 =	24.78
K =	3.43E+01	ft/day	L_2 =	22.95
K =	1.21E-02	cm/sec	L_1:L_2 Diff <20% ?	YES



Project Name: NIPSCO RMSGS
Project No.: 164-8171
Test Date: 07/07/16

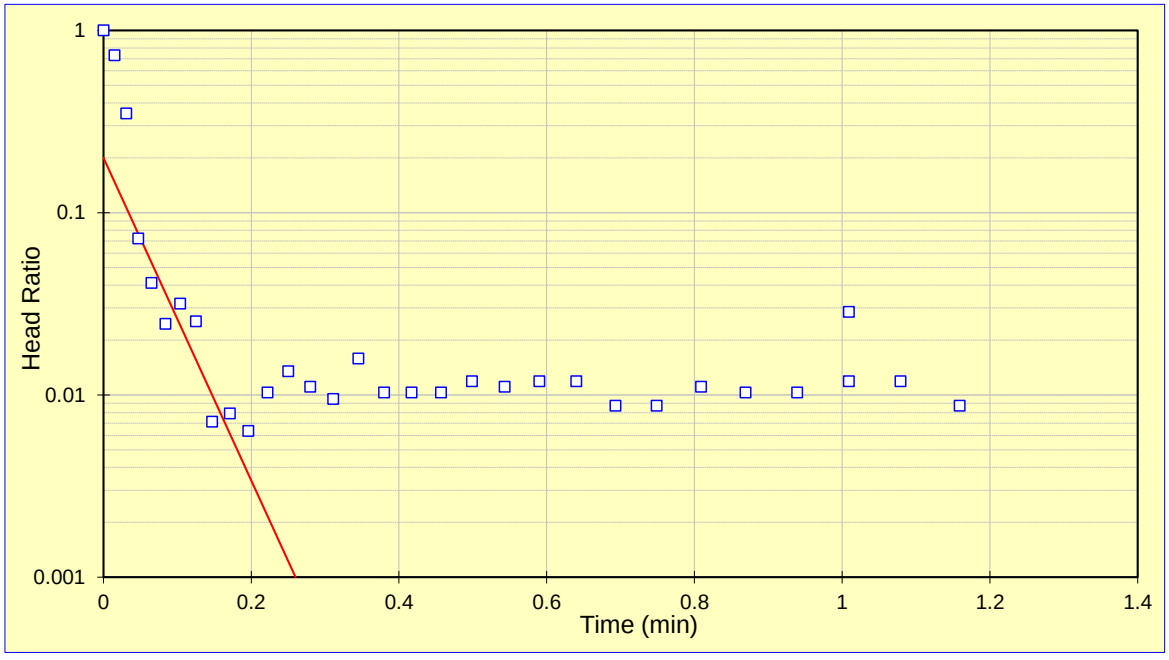
Analysis By: DFS
Checked By: JRS
Analysis Date: 7/31/2017

HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-19B (TEST 2)

$$K = \frac{r_c^{\,2}}{2L_e} \ln\frac{L_e}{R_e}\left[\frac{\ln\left(\frac{h_1}{h_2}\right)}{(t2 - t1)}\right] 30.48$$

where:
- r_c = casing radius (feet)
- R_e = equivalent radius (feet)
- L_e = length of screened interval (feet)
- t = time (minutes)
- h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS		
r_c =	0.08			
R_e =	0.34			
L_e =	10	K=	1.21E-02	cm/sec
t_1 =	0	K=	3.43E+01	ft/day
t_2 =	0.26			
h_1/h_0 =	0.20			
h_2/h_0 =	0.00			



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST GAMW-19B (TEST 2)

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln\frac{y_0}{y_t}$$

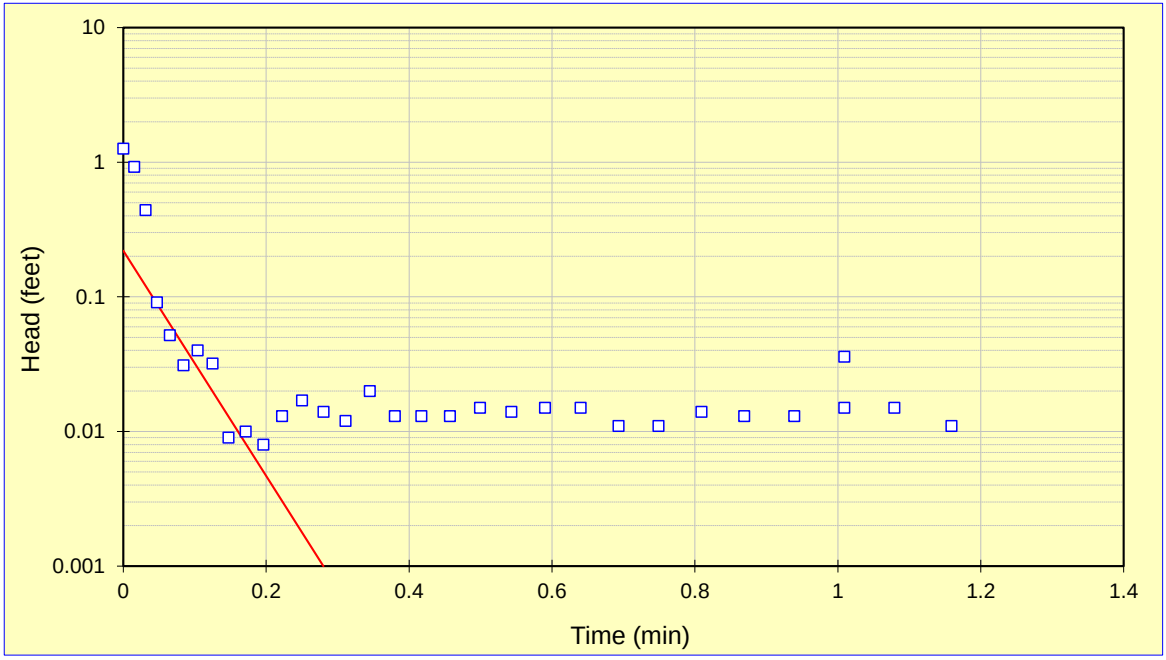
where:

r_c = casing radius (feet);
R_e = effective radius (feet);
L_e = length of screened interval (feet);
r_w = radial distance to undisturbed aquifer (feet)
y_0 = initial drawdown (feet)
y_t = drawdown (feet) at time t (minutes)

INPUT PARAMETERS	
r_c =	0.08
r_w =	0.34
L_e =	10
$\ln(R_e/r_w)$=	3.02
y_0 =	0.22
y_t =	0.001
t =	0.3

RESULTS

K=	1.03E-02	cm/sec
K=	2.91E+01	ft/day



Project Name: NIPSCO Schahfer
Project No.: 164-8171
Test Date: 07/07/16

Analysis By: DFS
Checked By: JRS
Analysis Date: 7/27/2016

APPENDIX C

Vertical Gradient Calculation

Appendix B
VERTICAL GRADIENT FLOW CALCULATIONS

Monitoring Well Locations	Ground Surface Elevation (ft-msl)	Top of Casing Elevation (ft-msl)	Screen Interval				June 13, 2016				July 11, 2016				September 6, 2016				November 7, 2016			
			Top (ft-bgs)	Bottom (ft-bgs)	Center (ft bgs)	Center (ft msl)	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction
GAMW07	666.55	669.89	5	15	10	656.55	10.17	659.72	NA	NA	10.48	659.41	NA	NA	8.57	661.32	NA	NA	7.88	662.01	-1.08E-01	Down
GAMW07B	666.83	669.39	30	40	35	631.83	-	-			-	-			-	-			10.04	659.35		
GAMW08	665.95	669.66	5	15	10	655.95	8.91	660.75	NA	NA	-	-	NA	NA	9.86	659.80	NA	NA	10.40	659.26	-3.95E-02	Down
GAMW08B	665.92	668.47	26	36	31	634.92	-	-			-	-			-	-			10.04	658.43		
GAMW09	665.1	668.99	5	15	10	655.51	9.02	659.97	-2.19E-02	Down	10.09	658.90	-2.14E-02	Down	8.41	660.58	-2.24E-02	Down	8.92	660.07	-2.34E-02	Down
GAMW09B	665.35	668.29	24.5	34.5	29.5	635.87	8.75	659.54			9.81	658.48			8.15	660.14			8.68	659.61		
GAMW15	665.01	668.25	5	15	10	654.54	8.59	659.66	-4.91E-04	Down	8.82	659.43	0.00E+00	Up	7.32	660.93	1.97E-03	Up	6.76	661.49	0.00E+00	Up
GAMW15B	665.14	668.05	27.7	37.7	32.7	634.19	8.40	659.65			8.62	659.43			7.08	660.97			6.56	661.49		
GAMW16	665.2	668.37	5	15	10	655.17	9.21	659.16	-1.33E-02	Down	9.61	658.76	4.44E-04	Up	8.08	660.29	4.44E-04	Up	8.24	660.13	4.39E-02	Up
GAMW16B	665.16	667.76	27.75	37.75	32.75	632.63	8.90	658.86			8.99	658.77			7.46	660.30			6.64	661.12		
GAMW17	668.81	671.93	5	15	10	658.93	13.13	658.80	4.22E-04	Up	9.72	662.21	-1.66E-01	Down	12.05	659.88	-4.22E-04	Down	12.60	659.33	-4.22E-04	Down
GAMW17B	668.86	670.6	28	38	33	635.26	11.79	658.81			12.31	658.29			10.73	659.87			11.28	659.32		
GAMW18	666.04	669.07	5	15	10	656.04	8.75	660.32	NA	NA	9.96	659.11	NA	NA	8.44	660.63	NA	NA	8.86	660.21	-8.86E-02	Down
GAMW18B	665.94	668.47	25	35	30	635.94	-	-			-	-			-	-			10.04	658.43		
GAMW46	661.99	664.80	5	15	10	651.99	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	7.04	657.76	-1.18E-03	Down
GAMW46B	661.98	664.79	22	32	27	634.98	-	-			-	-			-	-			7.05	657.74		
GAMW52	664.07	666.79	5	15	10	654.07	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	7.04	659.75	4.64E-03	Up
GAMW52B	664.50	666.90	27	37	32	632.50	-	-			-	-			-	-			7.05	659.85		
GAMW53	664.68	667.24	5	15	10	654.68	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	6.05	661.19	1.42E-03	Up
GAMW53B	664.62	667.29	26	36	31	633.62	-	-			-	-			-	-			6.07	661.22		
GAMW54	663.87	666.37	5	15	10	653.87	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	6.05	660.32	4.74E-03	Up
GAMW54B	663.98	666.47	22	32	27	636.98	-	-			-	-			-	-			6.07	660.40		
GAMW55	665.06	667.64	5	15	10	655.06	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	10.04	657.60	-1.56E-02	Down
GAMW55B	665.18	667.53	25	35	30	635.18	-	-			-	-			-	-			10.24	657.29		
GAMW56	665.43	667.91	5	15	10	655.43	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	7.04	660.87	-4.98E-03	Down
GAMW56B	665.33	667.82	25	35	30	635.33	-	-			-	-			-	-			7.05	660.77		

Notes:
ft-bgs = Feet below ground surface
ft-msl = Feet above mean sea level
ft-btoc = Feet below top of casing
ft/ft = Feet/Feet
NA= not applicable

Appendix B
VERTICAL GRADIENT FLOW CALCULATIONS

Monitoring Well Locations	Ground Surface Elevation (ft-msl)	Top of Casing Elevation (ft-msl)	Screen Interval				January 4, 2017				February 27, 2017				April 24, 2017				June 26, 2017			
			Top (ft-bgs)	Bottom (ft-bgs)	Center (ft bgs)	Center (ft msl)	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction
GAMW07	666.55	669.89	5	15	10	656.55	10.09	659.80	-1.62E-03	Down	8.82	661.07	-6.67E-02	Down	8.56	661.33	NA	NA	9.52	660.37	NA	NA
GAMW07B	666.83	669.39	30	40	35	631.83	9.63	659.76			9.97	659.42			-	-			-	-		
GAMW08	665.95	669.66	5	15	10	655.95	10.82	658.84	5.41E-15	Up	10.62	659.04	-2.57E-02	Down	9.71*	659.95	NA	NA	10.15	659.51	NA	NA
GAMW08B	665.92	668.47	26	36	31	634.92	9.63	658.84			9.97	658.50			-	-			-	-		
GAMW09	665.1	668.99	5	15	10	655.51	8.95	660.04	-2.09E-02	Down	8.50	660.49	-2.09E-02	Down	7.59	661.40	-1.93E-02	Down	8.30	660.69	-2.14E-02	Down
GAMW09B	665.35	668.29	24.5	34.5	29.5	635.87	8.66	659.63			8.21	660.08			7.27	661.02			8.02	660.27		
GAMW15	665.01	668.25	5	15	10	654.54	8.63	659.62	0.00E+00	Up	7.35	660.90	4.91E-04	Up	7.00	661.25	1.47E-03	Up	8.00	660.25	0.00E+00	Up
GAMW15B	665.14	668.05	27.7	37.7	32.7	634.19	8.43	659.62			7.14	660.91			6.77	661.28			7.80	660.25		
GAMW16	665.2	668.37	5	15	10	655.17	9.18	659.19	4.44E-04	Up	8.66	659.71	2.22E-03	Up	7.87	660.50	8.87E-04	Up	8.72	659.65	1.33E-03	Up
GAMW16B	665.16	667.76	27.75	37.75	32.75	632.63	8.56	659.20			8.00	659.76			7.24	660.52			8.08	659.68		
GAMW17	668.81	671.93	5	15	10	658.93	NA	-	NA	NA	12.67	659.26	0.00E+00	Up	11.75	660.18	8.45E-04	Up	12.30	659.63	1.65E-02	Up
GAMW17B	668.86	670.6	28	38	33	635.26	11.62	658.98			11.34	659.26			10.40	660.20			10.58	660.02		
GAMW18	666.04	669.07	5	15	10	656.04	8.96	660.11	-6.32E-02	Down	8.55	660.52	-1.00E-01	Down	7.45	661.62	NA	NA	8.55	660.52	NA	NA
GAMW18B	665.94	668.47	25	35	30	635.94	9.63	658.84			9.97	658.50			-	-			-	-		
GAMW46	661.99	664.80	5	15	10	651.99	6.75	658.05	-5.88E-04	Down	7.05	657.75	5.88E-04	Up	-	-	NA	NA	-	-	NA	NA
GAMW46B	661.98	664.79	22	32	27	634.98	6.75	658.04			7.03	657.76			-	-			-	-		
GAMW52	664.07	666.79	5	15	10	654.07	6.75	660.04	5.10E-03	Up	7.05	659.74	6.03E-03	Up	-	-	NA	NA	-	-	NA	NA
GAMW52B	664.50	666.90	27	37	32	632.50	6.75	660.15			7.03	659.87			-	-			-	-		
GAMW53	664.68	667.24	5	15	10	654.68	5.85	661.39	2.37E-03	Up	6.07	661.17	2.37E-03	Up	-	-	NA	NA	-	-	NA	NA
GAMW53B	664.62	667.29	26	36	31	633.62	5.85	661.44			6.07	661.22			-	-			-	-		
GAMW54	663.87	666.37	5	15	10	653.87	5.85	660.52	5.92E-03	Up	6.07	660.30	5.92E-03	Up	-	-	NA	NA	-	-	NA	NA
GAMW54B	663.98	666.47	22	32	27	636.98	5.85	660.62			6.07	660.40			-	-			-	-		
GAMW55	665.06	667.64	5	15	10	655.06	9.63	658.01	-1.56E-02	Down	9.97	657.67	-1.51E-02	Down	-	-	NA	NA	-	-	NA	NA
GAMW55B	665.18	667.53	25	35	30	635.18	9.83	657.70			10.16	657.37			-	-			-	-		
GAMW56	665.43	667.91	5	15	10	655.43	6.75	661.16	-4.48E-03	Down	7.05	660.86	-3.48E-03	Down	-	-	NA	NA	-	-	NA	NA
GAMW56B	665.33	667.82	25	35	30	635.33	6.75	661.07			7.03	660.79			-	-			-	-		

Notes:
ft-bgs = Feet below ground surface
ft-msl = Feet above mean sea level
ft-btoc = Feet below top of casing
ft/ft = Feet/Feet
NA= not applicable

Appendix B
VERTICAL GRADIENT FLOW CALCULATIONS

Monitoring Well Locations	Ground Surface Elevation (ft-msl)	Top of Casing Elevation (ft-msl)	Screen Interval				August 21, 2017				October 2, 2017				February 26, 2018				March 12, 2018			
			Top (ft-bgs)	Bottom (ft-bgs)	Center (ft bgs)	Center (ft msl)	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction
GAMW07	666.55	669.89	5	15	10	656.55	9.08	660.81	NA	NA	10.16	659.73	NA	NA	-	-	NA	NA	8.8	661.09	NA	NA
GAMW07B	666.83	669.39	30	40	35	631.83	-	-			-	-			-	-			-	-		
GAMW08	665.95	669.66	5	15	10	655.95	10.15	659.51	NA	NA	NA	-	NA	NA	-	-	NA	NA	8.38	661.28	NA	NA
GAMW08B	665.92	668.47	26	36	31	634.92	-	-			-	-			-	-			-	-		
GAMW09	665.1	668.99	5	15	10	655.51	8.11	660.88	-2.24E-02	Down	10.06	658.93	-2.29E-02	Down	-	-	NA	NA	6.23	662.76	-2.14E-02	Down
GAMW09B	665.35	668.29	24.5	34.5	29.5	635.87	7.85	660.44			9.81	658.48			-	-			5.95	662.34		
GAMW15	665.01	668.25	5	15	10	654.54	7.56	660.69	1.47E-03	Up	9.02	659.23	2.46E-03	Up	-	-	NA	NA	7.38	660.87	9.83E-04	Up
GAMW15B	665.14	668.05	27.7	37.7	32.7	634.19	7.33	660.72			8.77	659.28			-	-			7.16	660.89		
GAMW16	665.2	668.37	5	15	10	655.17	8.45	659.92	0.00E+00	Up	10.56	657.81	4.44E-04	Up	-	-	NA	NA	7.38	660.99	4.44E-03	Up
GAMW16B	665.16	667.76	27.75	37.75	32.75	632.63	7.84	659.92			9.94	657.82			-	-			6.67	661.09		
GAMW17	668.81	671.93	5	15	10	658.93	12.24	659.69	-1.69E-03	Down	NA	-	NA	NA	-	-	NA	NA	10.45	661.48	4.80E-15	Up
GAMW17B	668.86	670.6	28	38	33	635.26	10.95	659.65			13.33	657.27			-	-			9.12	661.48		
GAMW18	666.04	669.07	5	15	10	656.04	8.23	660.84	NA	NA	10.03	659.04	NA	NA	-	-	NA	NA	6.3	662.77	NA	NA
GAMW18B	665.94	668.47	25	35	30	635.94	-	-			-	-			-	-			-	-		
GAMW46	661.99	664.80	5	15	10	651.99	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA
GAMW46B	661.98	664.79	22	32	27	634.98	-	-			-	-			-	-			-	-		
GAMW52	664.07	666.79	5	15	10	654.07	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA
GAMW52B	664.50	666.90	27	37	32	632.50	-	-			-	-			-	-			-	-		
GAMW53	664.68	667.24	5	15	10	654.68	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA
GAMW53B	664.62	667.29	26	36	31	633.62	-	-			-	-			-	-			-	-		
GAMW54	663.87	666.37	5	15	10	653.87	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA
GAMW54B	663.98	666.47	22	32	27	636.98	-	-			-	-			-	-			-	-		
GAMW55	665.06	667.64	5	15	10	655.06	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA
GAMW55B	665.18	667.53	25	35	30	635.18	-	-			-	-			-	-			-	-		
GAMW56	665.43	667.91	5	15	10	655.43	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA	-	-	NA	NA
GAMW56B	665.33	667.82	25	35	30	635.33	-	-			-	-			-	-			-	-		

Notes:
ft-bgs = Feet below ground surface
ft-msl = Feet above mean sea level
ft-btoc = Feet below top of casing
ft/ft = Feet/Feet
NA= not applicable

Appendix B
VERTICAL GRADIENT FLOW CALCULATIONS

Monitoring Well Locations	Ground Surface Elevation (ft-msl)	Top of Casing Elevation (ft-msl)	Screen Interval				April 18, 2018				June 12, 2018				August 27-28, 2018				October 22-24, 2018			
			Top (ft-bgs)	Bottom (ft-bgs)	Center (ft bgs)	Center (ft msl)	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction
GAMW07	666.55	669.89	5	15	10	656.55	8.9	660.99	1.78E-01	Up	9.15	660.74	1.75E-01	Up	9.95	659.94	2.83E-03	Up	10.62	659.27	8.09E-04	Up
GAMW07B	666.83	669.39	30	40	35	631.83	4	665.39			4.32	665.07			9.38	660.01			10.1	659.29		
GAMW08	665.95	669.66	5	15	10	655.95	9.58	660.08	2.09E-01	Up	9.55	660.11	1.92E-01	Up	10.22	659.44	4.28E-03	Up	10.6	659.06	2.85E-03	Up
GAMW08B	665.92	668.47	26	36	31	634.92	4	664.47			4.32	664.15			8.94	659.53			9.35	659.12		
GAMW09	665.1	668.99	5	15	10	655.51	7.42	661.57	-2.04E-02	Down	7.5	661.49	-2.19E-02	Down	8.36	660.63	-2.04E-02	Down	8.65	660.34	-2.04E-02	Down
GAMW09B	665.35	668.29	24.5	34.5	29.5	635.87	7.12	661.17			7.23	661.06			8.06	660.23			8.35	659.94		
GAMW15	665.01	668.25	5	15	10	654.54	7.62	660.63	9.83E-04	Up	7.9	660.35	5.06E-02	Up	8.56	659.69	1.97E-03	Up	9.15	659.1	1.47E-03	Up
GAMW15B	665.14	668.05	27.7	37.7	32.7	634.19	7.4	660.65			6.67	661.38			8.32	659.73			8.92	659.13		
GAMW16	665.2	668.37	5	15	10	655.17	8.15	660.22	3.99E-03	Up	8.28	660.09	3.11E-03	Up	8.94	659.43	1.77E-03	Up	9.3	659.07	3.11E-03	Up
GAMW16B	665.16	667.76	27.75	37.75	32.75	632.63	7.45	660.31			7.6	660.16			8.29	659.47			8.62	659.14		
GAMW17	668.81	671.93	5	15	10	658.93	11.75	660.18	4.80E-15	Up	11.65	660.28	0.00E+00	Up	12.28	659.65	-2.11E-03	Down	12.7	659.23	-2.11E-03	Down
GAMW17B	668.86	670.6	28	38	33	635.26	10.42	660.18			10.32	660.28			11	659.6			11.42	659.18		
GAMW18	666.04	669.07	5	15	10	656.04	7.17	661.9	1.28E-01	Up	7.72	661.35	1.39E-01	Up	8.86	660.21	0.00E+00	Up	9.5	659.57	2.89E-02	Up
GAMW18B	665.94	668.47	25	35	30	635.94	4	664.47			4.32	664.15			8.26	660.21			8.32	660.15		
GAMW46	661.99	664.80	5	15	10	651.99	-	-	NA	NA	7.55	657.25	-5.88E-04	Down	9.24	655.56	-5.88E-04	Down	8.75	655.75	-7.23E-02	Down
GAMW46B	661.98	664.79	22	32	27	634.98	-	-			7.55	657.24			9.24	655.55			9.80	654.52		
GAMW52	664.07	666.79	5	15	10	654.07	-	-	NA	NA	-	-	NA	NA	8.50	658.29	4.64E-04	Up	8.80	657.99	4.64E-04	Up
GAMW52B	664.50	666.90	27	37	32	632.50	-	-			-	-			8.60	658.30			8.90	658.00		
GAMW53	664.68	667.24	5	15	10	654.68	-	-	NA	NA	7.13	660.11	7.12E-03	Up	8.80	658.44	4.27E-03	Up	9.10	658.14	4.75E-03	Up
GAMW53B	664.62	667.29	26	36	31	633.62	-	-			7.03	660.26			8.76	658.53			9.05	658.24		
GAMW54	663.87	666.37	5	15	10	653.87	7.20	-7.20	5.92E-03	Up	7.93	658.44	9.47E-03	Up	7.58	658.79	-4.14E-03	Down	7.90	658.47	-2.96E-03	Down
GAMW54B	663.98	666.47	22	32	27	636.98	7.10	-7.10			7.87	658.60			7.75	658.72			8.05	658.42		
GAMW55	665.06	667.64	5	15	10	655.06	-	-	NA	NA	8.64	659.00	2.52E-03	Up	8.68	658.96	-2.52E-03	Down	8.92	658.72	-2.01E-03	Down
GAMW55B	665.18	667.53	25	35	30	635.18	-	-			8.48	659.05			8.62	658.91			8.85	658.68		
GAMW56	665.43	667.91	5	15	10	655.43	-	-	NA	NA	7.55	660.36	-4.48E-03	Down	8.92	658.99	4.98E-04	Up	9.05	658.86	4.98E-04	Up
GAMW56B	665.33	667.82	25	35	30	635.33	-	-			7.55	660.27			8.82	659.00			8.95	658.87		

Notes:
ft-bgs = Feet below ground surface
ft-msl = Feet above mean sea level
ft-btoc = Feet below top of casing
ft/ft = Feet/Feet
NA= not applicable

Appendix B
VERTICAL GRADIENT FLOW CALCULATIONS

Monitoring Well Locations	Ground Surface Elevation (ft-msl)	Top of Casing Elevation (ft-msl)	Screen Interval				February 25, 2019				Average Vertical Gradient (ft/ft)	Flow Direction
			Top (ft-bgs)	Bottom (ft-bgs)	Center (ft bgs)	Center (ft msl)	Depth To Water (ft-btoc)	Groundwater Elevation (ft-msl)	Vertical Gradient (ft/ft)	Flow Direction		
GAMW07	666.55	669.89	5	15	10	656.55	8.85	661.04	4.85E-03	Up	0.0232	Up
GAMW07B	666.83	669.39	30	40	35	631.83	8.23	661.16				
GAMW08	665.95	669.66	5	15	10	655.95	9.46	660.2	6.66E-03	Up	0.0437	Up
GAMW08B	665.92	668.47	26	36	31	634.92	8.13	660.34				
GAMW09	665.1	668.99	5	15	10	655.51	6.78	662.21	-2.04E-02	Down	-0.0214	Down
GAMW09B	665.35	668.29	24.5	34.5	29.5	635.87	6.48	661.81				
GAMW15	665.01	668.25	5	15	10	654.54	7.78	660.47	3.44E-03	Up	0.0042	Up
GAMW15B	665.14	668.05	27.7	37.7	32.7	634.19	7.51	660.54				
GAMW16	665.2	668.37	5	15	10	655.17	8.28	660.09	6.21E-03	Up	0.0037	Up
GAMW16B	665.16	667.76	27.75	37.75	32.75	632.63	7.53	660.23				
GAMW17	668.81	671.93	5	15	10	658.93	11.46	660.47	-1.27E-03	Down	-0.0111	Down
GAMW17B	668.86	670.6	28	38	33	635.26	10.16	660.44				
GAMW18	666.04	669.07	5	15	10	656.04	6.69	662.38	1.19E-02	Up	0.0070	Up
GAMW18B	665.94	668.47	25	35	30	635.94	5.85	662.62				
GAMW46	661.99	664.80	5	15	10	651.99	7.05	657.75	5.88E-04	Up	-0.0106	Down
GAMW46B	661.98	664.79	22	32	27	634.98	7.03	657.76				
GAMW52	664.07	666.79	5	15	10	654.07	8.10	658.69	4.64E-04	Up	0.0029	Up
GAMW52B	664.50	666.90	27	37	32	632.50	8.20	658.70				
GAMW53	664.68	667.24	5	15	10	654.68	8.45	658.79	7.12E-03	Up	0.0042	Up
GAMW53B	664.62	667.29	26	36	31	633.62	8.35	658.94				
GAMW54	663.87	666.37	5	15	10	653.87	6.90	659.47	-5.92E-03	Down	0.0024	Up
GAMW54B	663.98	666.47	22	32	27	636.98	7.10	659.37				
GAMW55	665.06	667.64	5	15	10	655.06	8.03	659.61	5.03E-03	Up	-0.0062	Down
GAMW55B	665.18	667.53	25	35	30	635.18	7.82	659.71				
GAMW56	665.43	667.91	5	15	10	655.43	7.91	660.00	-5.66E-15	Down	-0.0023	Down
GAMW56B	665.33	667.82	25	35	30	635.33	7.82	660.00				

Notes:
ft-bgs = Feet below ground surface
ft-msl = Feet above mean sea level
ft-btoc = Feet below top of casing
ft/ft = Feet/Feet
NA= not applicable

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Reviewed by: MAH

APPENDIX D

Monitored Natural Attenuation Evaluation

REPORT

MONITORED NATURAL ATTENUATION EVALUATION

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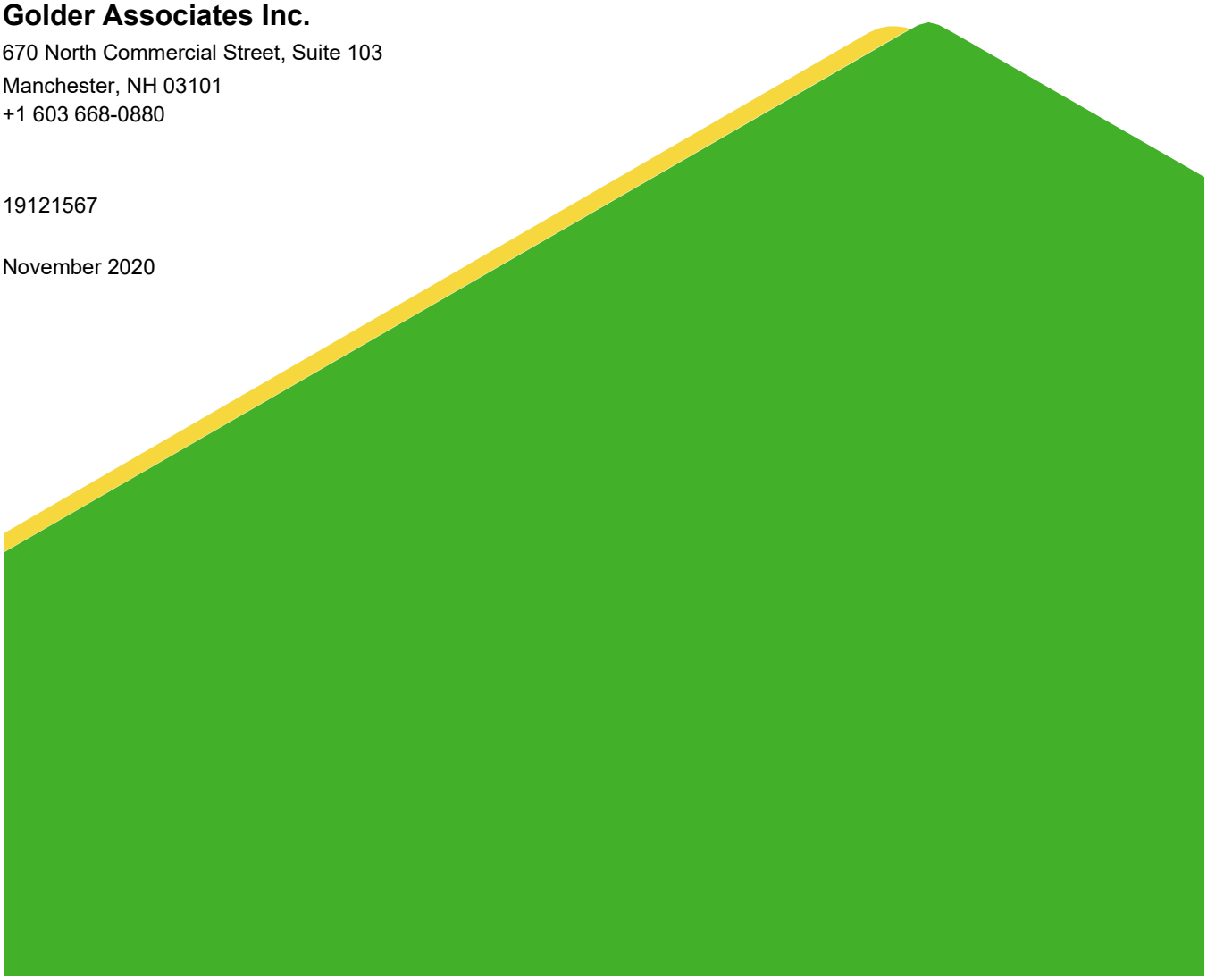


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APPENDICES

APPENDIX A
Groundwater and Porewater Monitoring Data

APPENDIX B
Groundwater Flow Model Technical Memorandum

Acronyms

ACM	Assessment of Corrective Measures
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
DO	Dissolved Oxygen
Eh	Reduction Potential
ft bgs	feet below ground surface
g	Gram
GMPIM	Groundwater Monitoring Program Implementation Manual
GWPS	Groundwater Protection Standards
IAP	Ion Activity Product
IDEM	Indiana Department of Environmental Management
ITRC	Interstate Technology Regulatory Council
kg	kilogram
Ksp	Solubility Product
MCL	Maximum Contaminant Level
MCWB	Metal Cleaning Waste Basin
mg	milligram
mg/L	milligram per liter
MNA	Monitored Natural Attenuation
mV	millivolt
MSRB	Material Storage Runoff Basin
NIPSCO LLC	Northern Indiana Public Service Company LLC
ORP	Oxidation-Reduction Potential
RMSGS	R. M. Schahfer Generating Station
SCM	surface complexation model
SEP	Sequential Extraction Potential
SI	Saturation Index
SSL	Statistically Significant Level
SU	Standard Unit
TAL	Target Analyte List
TDS	Total Dissolved Solids
USEPA	United States Environmental Protection Agency
XRD	X-ray diffraction

1.0 OVERVIEW

Groundwater and solid materials were evaluated to determine the feasibility of Monitored Natural Attenuation (MNA) as part of the assessment of corrective measures process for the Coal Combustion Residuals (CCR) surface impoundments (i.e., Material Storage Runoff Basin (MSRB), Metal Cleaning Waste Basin (MCWB), and the Drying Area (together, the CCR Unit) at the Northern Indiana Public Service Company LLC (NIPSCO LLC) Rollin M. Schahfer Generating Station (RMSGS, or Site). The structure of this feasibility evaluation closely follows the United States Environmental Protection Agency (USEPA) guidance on using MNA as a remedial strategy (USEPA 2007a and 2007b) and considers best practices from the Interstate Technology Regulatory Council (ITRC) document: “A Decision Framework for Applying Monitored Natural Attenuation Processes to Metals and Radionuclides in Groundwater” (ITRC 2010).

RMSGS manages CCR in the surface impoundments subject to applicable requirements of 40 Code of Federal Regulations (CFR) Part 257 as amended (CCR Rule). In April 2019, pursuant to 40 CFR §257.96(a), an assessment of corrective measures (ACM) was completed for the CCR Unit. This evaluation identified MNA as a potential remedial alternative for cobalt due to a detection at a Statistically Significant Level (SSL) in groundwater. Additionally, arsenic, boron, lithium, and molybdenum were evaluated as part of this assessment due to the potential for future SSLs, should they ever occur. The results of the evaluation will be used to assess the performance and reliability of MNA as a potential remedial alternative as required by 40 CFR §257.97, Golder determined the overall feasibility of MNA for the CCR Unit by evaluating the following tiers (USEPA 2007a,b):

1) Demonstrate active constituent removal from groundwater and dissolved plume stability (Tier I)

2) Determine the mechanisms and rates of the operative attenuation processes (Tier II)

3) Determine the long-term capacity for attenuation and the stability of immobilized constituents (Tier III)

Following completion of this multi-tier evaluation, the fourth and final tier of an MNA program, which involves the design of a performance monitoring program and the development of a contingency plan, will be developed.

2.0 APPROACH

Golder evaluated the feasibility, mechanisms, rates, and stability of MNA as a remedy for groundwater impacts from the CCR Unit. In order to perform the evaluation, Golder collected samples of groundwater and overburden soil between July 24, 2018 and March 3, 2020 for geochemical analysis. The supplemental MNA assessment included the following activities:

- Groundwater:
  - Characterization to identify temporal and geographical trends, where present, and to estimate site-wide attenuation rates using temporal and spatial trends in groundwater quality data.
  - Geochemical modeling to identify the major chemical species and evaluate saturation indices of minerals relevant to attenuation of arsenic, boron, cobalt, lithium, and molybdenum.
  - Determination of the capacity of different mechanisms to attenuate arsenic, boron, cobalt, lithium, and molybdenum, including adsorption, precipitation and co-precipitation, and physical attenuation (dilution/dispersion).
  - Geochemical modeling to assess the stability and reversibility of attenuation due to adsorption.

- Overburden soil:
  - Mineralogical analysis of overburden soils to identify and quantify the major mineral components.
  - Chemical analysis of overburden soils to quantify the total metal content and identify the environmentally-available fraction of metals.

The results generated by this supplemental assessment were used by Golder to complete the Tier I, Tier II, and Tier III evaluation (USEPA 2007a,b). In addition, groundwater data collected during previous sampling events were used. The results of the Tier I, Tier II, and Tier III are described in the subsequent sections to establish a basis for the likely success of MNA at the RMSGS site.

2.1 Groundwater and Porewater Sampling

2.1.1 Sample Collection

Golder personnel collected groundwater and porewater samples in accordance with the Golder RMSGS Groundwater Monitoring Program Implementation Manual (GMPIM, Golder 2017) from the background, downgradient, Assessment, and property boundary monitoring wells presented in Table 1, and from piezometers located within the CCR Unit. Piezometer GAPIEZ-06 is located interior of the slurry wall on the western edge of the MSRB and is screened within the CCR materials. Piezometers DAPZ-02A and DAPZ-02B (abandoned in April 2020) were installed interior of the slurry wall on the eastern edge of the Drying Area and were screened in native materials (i.e., below the extent of CCR) from approximately five to 20 feet below ground surface (ft bgs) and 33 to 38 ft bgs, respectively. The monitoring well and former piezometer locations are shown in Figure 1.

Table 1: Overview of the Wells Used in the Monitored Natural Attenuation Assessment

Background Wells	Downgradient Wells	Assessment Wells	Property Boundary Wells
GAMW-04, GAMW-07, GAMW-07B, GAMW-15, GAMW-15B	GAMW-08, GAMW-08B, GAMW-09, GAMW-09B, GAMW-16, GAMW-16B, GAMW-17, GAMW-17B, GAMW-18, GAMW-18B	GAMW-52, GAMW-52B, GAMW-53, GAMW-53B, GAMW-54, GAMW-54B, GAMW-55/55R, GAMW-55B, GAMW-56, GAMW-56B	GAMW-46, GAMW-46B

2.1.2 Groundwater and Porewater Analysis

The geochemical characterization of porewater and groundwater samples included the measurement of field parameters and the laboratory analysis of samples for total metals and major cations and anions. The field parameters and laboratory analyses included:

Field Parameters: Parameters measured in the field included pH, dissolved oxygen (DO), oxidation reduction potential (ORP), conductivity, and temperature. These measurements were used to determine general geochemical conditions in the groundwater and support geochemical modeling.

Metals: Analysis of Appendix III and IV metals concentrations was conducted to understand the geochemical composition of groundwater and porewater. Metals analysis allows for the delineation of a potential plume, evaluation of mineral saturation indices, development of partitioning coefficients (in conjunction with solid material analyses), and evaluation of background contributions from natural sources or anthropogenic sources.

Major Cations and Anions: Geochemical modeling of mineral solubility, metals attenuation and background contributions requires analysis of major cations and anions because they affect and participate in sorption and mineral dissolution or precipitation reactions.

The groundwater and porewater samples were analyzed using the following methods:

- pH following SW846 9040C “pH Electrometric Measurement” (USEPA 2004)
- Total dissolved solids standard method (SM) 2540C “Total Dissolved Solids Dried at 180°C” (USEPA 1993a)
- Total hardness following SM 2340B (USEPA 1997)
- Chloride, fluoride, and sulfide following USEPA SW846 9056A “Determination of Inorganic Anions by Ion Chromatography”, Revision 1 (USEPA 2007c)
- Nitrate and nitrite following USEPA 353.2 “Determination of Nitrate-Nitrite Nitrogen by Automated Colorimetry, Revision 2.0” (USEPA 1993b)
- Alkalinity following SM 2320B “Alkalinity by Titration” (USEPA 2005a)
- Phosphorous following SM 4500-P E “Phosphorous by Ascorbic Acid Method” (USEPA 2005b)
- Total Target Analyte List (TAL) metals following USEPA SW846 6010C “Inductively Coupled Plasma-Atomic Emission Spectrometry”, Revision 3, SW846 6020B “Inductively Coupled Plasma-Mass Spectrometry”, Revision 2, and SW846 6020A “Inductively Coupled Plasma-Mass Spectrometry”, Revision 1 (USEPA 1998a)

2.2 Overburden Soil Sampling and Analysis

2.2.1 Sample Collection

Golder subcontracted a licensed well driller to advance borings into the overburden soil and install monitoring wells using roto sonic drilling methods. During boring operations, the driller collected continuous drill cores from all deep wells (i.e.” B” flagged wells). From the drill cores, Golder staff collected overburden samples from the depth of the screened intervals (i.e. 10-foot screened interval) from one background well soil boring (SB-07B), two downgradient well soil borings (SB-08B and SB-18B) and from five Assessment Monitoring well soil borings (SB-52B, SB-53B, SB-54B, SB-55B, and SB-56B). Golder staff also collected an additional sample from SB-53B (25’-27’) at the top of the screened interval due to minor unidentified visual soil staining encountered within the planned interval itself. An additional soil boring was completed just external to the slurry wall on the eastern side of the MCWB (OW-9) and samples were collected on approximately 10-foot intervals.

The driller used a “marsh buggy” with a hollow stem auger drill rig specifically designed to work in the wet, soft soil/ash conditions inside the CCR Unit to advance eight soil borings within the Drying Area. From these eight borings, 23 samples were analyzed for total metals with one of these samples (DA-14_4-6’) also analyzed using the 7-step sequential extraction. The only sample for which data are included in this report is DA-14_4-6’; all other data, which were obtained for other purposes, are provided in the Ash Pond Assessment Report (Golder 2020).

Soil borings were numbered to match the equivalent monitoring wells, where applicable. Golder field staff prepared a composite overburden sample from boreholes by selecting a two-foot interval from each drill core and submitting it to the laboratory for analysis under chain-of-custody procedures. The unique descriptions used to

identify the samples included the boring name and depth of the sample below ground surface (e.g., SB-07B-35'-37'). The sample type and analytical testing conducted on each sample are provided in Table 2.

Table 2: Summary of Overburden Soil Samples/Analyses

Sample Location	Number of Samples	Analyses
Background boring (SB-07B) 35'-37'	1	Total metals, sequential extraction
Downgradient boring (SB-08B) 30'-32'	1	Total metals, sequential extraction
Downgradient boring (SB-18B) 32'-34'	1	Total metals, sequential extraction
Assessment boring (SB-52B) 35'-37'	1	Total metals, sequential extraction, mineralogical composition
Assessment boring (SB-53B) 25'-27' & 30'-32'	2	Total metals, sequential extraction
Assessment boring (SB-54B) 30'-32'	1	Total metals, sequential extraction, mineralogical composition
Assessment boring (SB-55B) 30'-32'	1	Total metals, sequential extraction
Assessment boring (SB-56B) 30'-32'	1	Total metals, sequential extraction, mineralogical composition
Downgradient boring (OW-9) 10'-12' & 18'-20'	2	Total metals, sequential extraction, mineralogical composition
Drying area boring (DA-14) 4'-6'	1	Total metals, sequential extraction

2.2.2 Overburden Soil Analyses

Multiple geochemical methods were used to assess the mineralogical and chemical composition of the overburden soil samples. The selected geochemical test methods included the following:

- **Mineralogical composition:** The mineralogical analysis was used to identify and quantify the crystalline mineral phases in each sample. This information is required for geochemical modeling as the release or attenuation of constituents of interest is influenced by the mineral phase(s) present in the aquifer (Hem 1985). The mineralogical testing laboratory (SGS Minerals Services) performed the mineralogical analysis using quantitative (Rietveld) X-ray diffraction (XRD) and a Bruker AXS D8 Advance Diffractometer.
- **Total metals:** This analysis was used to quantify the chemical composition of overburden soils. The total mass of metals, in combination with the results of sequential extraction testing, can be used to determine the provenance of metals and verify sequential extraction results. The laboratory analyzed a target analyte list of

metals following the methods USEPA SW846 6010C “Inductively Coupled Plasma-Atomic Emission Spectrometry”, Revision 3 (November 2000) and USEPA SW846 7471B “Mercury in Solid or Semisolid Wastes (Manual Cold-Vapor Technique)”, Revision 2.

- **Sequential extraction:** The sequential extraction procedure (SEP) consisted of a seven-step procedure to extract metals from solids, as per Tessier et al. (1979), to identify the provenance of constituents of interest (i.e. the operationally-defined fraction that contains the metal)[1] and determine their potential environmental mobility. For instance, metals bound in the carbonate fraction, or that are exchangeable, are much more likely to become mobile due to changes in groundwater conditions than metals bound within a sulfide or silicate fraction. The summed concentration of a metal measured from all seven steps (SEP SUM) can be compared to the concentration determined from a total metals analysis (SEP Total) for compositional accountability. The laboratory analyzed the metals content of the extracted samples using the method USEPA SW846 6020B “Inductively Coupled Plasma-Mass Spectrometry”, Revision 2 (July 2014).

2.3 Groundwater Assessment Monitoring

Following the installation of a groundwater monitoring system in 2016 and throughout calendar year 2017, Golder collected background groundwater samples and performed Detection Monitoring around the CCR Unit pursuant to the requirements of 40 CFR §257.94. In 2018, Golder performed the first and second Assessment Monitoring sampling events pursuant to the requirements of 40 CFR §257.95. Following the first Assessment Monitoring sampling event, including verification sampling, the constituents that were detected above the groundwater protection standards (GWPS) at SSLs included:

- Cobalt and Lithium at GAMW-08
- Molybdenum at GAMW-18

The GWPS is the larger value of the Maximum Contaminant Level (MCL) or the unit-specific background concentration for each analyte based on a tolerance/prediction limit statistical procedure. However, USEPA amended the CCR Rule (i.e., Phase 1 Part 1 amendment) and created health-based standards for cobalt, lead, lithium, and molybdenum, constituents that do not have MCLs, as of August 29, 2018. Pursuant to 40 CFR §257.95(h)(2), the health-based standards can be used in place of background levels to calculate the GWPS. Consequently, after the second Assessment Monitoring event (October 2018), cobalt in monitoring well GAMW-08 remained as the only constituent detected at an SSL. Arsenic has never been detected above the GWPS or at an SSL, however, Golder also assessed arsenic as part of this evaluation due to sporadic detections at or above the MCL.

[1] Sequential extraction of metals from overburden samples consisted of seven discrete steps for this investigation:

Step 1 - Exchangeable Phase: This extraction includes trace elements that are reversibly adsorbed to overburden minerals, amorphous solids, and/or organic material by electrostatic forces.

Step 2 - Carbonate Phase: This extraction targets trace elements that are adsorbed or otherwise bound to carbonate minerals.

Step 3 – Non-Crystalline Materials Phase: This extraction targets trace elements that are complexed by amorphous minerals (e.g., iron).

Step 4 - Metal Hydroxide Phase: Trace elements bound to hydroxides of iron, manganese, and/or aluminum.

Step 5 - Organic Phase: This extraction targets trace elements strongly bound via chemisorption to organic material.

Step 6 - Acid/Sulfide Fraction: The extraction is used to identify trace elements precipitated as sulfide minerals.

Step 7 - Residual Fraction: Trace elements remaining in the overburden after the previous extractions will be distributed between silicates, phosphates, and refractory oxides.

Although boron is not currently an Appendix IV constituent, USEPA is reportedly considering adding it to the Appendix IV list. The Indiana Department of Environmental Management (IDEM) has, however, established a health-based standard as part of the state cleanup program. Boron is frequently used as a tracer to indicate the extent of a release from a CCR management unit. Due to these characteristics and as a conservative measure, boron was selected by Golder to assess the nature and extent of groundwater impacts at the Site.

The health-based standards, unit-specific background concentration, and groundwater protection standards used in this evaluation are summarized in Table 3.

Table 3: Summary of Health-Based Standards, Background Concentrations, and Groundwater Protection Standards for the Constituents of Interest

Constituent	Health-Based Standard (mg/L)	Background Concentration (mg/L)	Groundwater Protection Standard (mg/L)
Arsenic	0.01	0.091	0.091
Boron	4(1)		
Cobalt	0.006	0.01	0.01
Lithium	0.04	0.01	0.04
Molybdenum	0.1	0.05	0.1

(1) IDEM health-based standard, not currently part of the CCR Rule

2.4 Groundwater and Porewater Geochemical Analysis

2.4.1 Estimation of Attenuation Rates

To evaluate the attenuation of arsenic, boron, cobalt, lithium, and molybdenum in groundwater at the Site and to assess the rate of attenuation, Golder applied the point decay method (USEPA 2011). The point decay method is used to determine the rate at which a constituent's concentrations are increasing or decreasing in groundwater at a single well between sampling events and this method can thus be used to predict when the constituent's concentrations will fall back below regulatory limits. Equation 1 describes first-order decay for a constituent:

$$Ln(C_t) = kt + Ln(C_0) \qquad \text{(Equation 1)}$$

where C_0 is the initial constituent concentration, C_t is the constituent concentration at time t, t is the amount of time in years that has passed since the initial concentration measurement, and k is the first-order decay rate constant (1 per year). Equation 2 shows Equation 1 reorganized to solve for the decay rate constant:

$$k = (Ln(C_t) - Ln(C_0))/t \qquad \text{(Equation 2)}$$

Groundwater water quality data from the background and downgradient wells collected between July 2016 and November 2019 were used to determine the mean first-order decay rate for each constituent of interest. Due to variable detection limits, results that were reported as below detection limits were not used in the point decay analysis. Using Equation 1 and the mean first-order decay rate, Golder calculated the number of years that it would take for constituents of interest concentrations greater than the GWPS to decrease below their respective thresholds.

2.4.2 Geochemical Speciation Modeling Methods

Golder conducted geochemical modeling to evaluate general groundwater and porewater composition, determine the potential for precipitation of sorbent media, evaluate the potential for mineral precipitation or adsorption in the aquifer, and determine the speciation of metals of interest. The geochemical computer code developed by the United States Geological Survey (USGS), PHREEQC (Parkhurst and Appelo 2013), was used for these simulations. PHREEQC version 3.4 is a general-purpose geochemical modeling code used to simulate reactions in water and between water and solid mineral phases (e.g., rocks and sediments). Reactions include aqueous equilibria, mineral dissolution and precipitation, ion exchange, surface complexation, solid solutions, gas-water equilibrium, and kinetic biogeochemical reactions. The widely-accepted thermodynamic database, Minteq.v4, 2017 edition, was used as a basis for the thermodynamic constants required for modeling (USEPA 1998b).

The Geochemist's Workbench version 12 (Bethke 2015) was used to generate graphical representations of geochemical modeling outputs in the form of predominance, or Pourbaix diagrams (also known as Eh-pH diagrams) for the species of interest (i.e. arsenic, boron, cobalt, lithium, and molybdenum) and trilinear plots (also known as Piper plots) displaying the relative abundance of major ions. The Minteq.v4 database was used as the basis for the Pourbaix diagrams.

2.4.3 Predictive Geochemical Modeling Methods

Golder performed geochemical modeling to assess viable attenuation mechanisms and to predict the quantity and stability of the attenuated constituents of concern.

2.4.3.1 Capacity of Adsorption as an Attenuation Mechanism

Adsorption is an important mechanism by which constituents in groundwater can be attenuated. The adsorptive partitioning between dissolved and solid phases was simulated using a two-layer surface complexation model (SCM). The SCM approach is described in Davis and Kent (1990), with additional parameterization based on Dzombak and Morel (1990) and Karamalidis and Dzombak (2011) utilizing iron (hydrous ferric oxide [Hfo]) as ferrihydrite [$Fe(OH)_{3(am)}$], and aluminum (hydrous aluminum oxide [Hao]) as gibbsite [$Al(OH)_{3(am)}$], as adsorbing surfaces.

The amount of Hfo and Hao available at the site for attenuation was based on the amorphous and metal hydroxide phase iron and aluminum concentrations measured in the SEP as described in Section 3.2.2. The minimum, mean, and maximum concentrations in soil borings were used in the adsorption models to capture the range of expected site concentrations. The Hfo and Hao surface properties (i.e., surface area, site density, and types of sites) from Dzombak and Morel (1990) and Karamalidis and Dzombak (2011) were used to quantify the iron and aluminum adsorption sites per mole of mineral.

The calculation methodology of Appelo and Postma (2010) was used to determine the specific quantity of sites on each mineral surface type as a function of the amount of mineral available to participate in these reactions. The methodology assumes the number of surface sites (sites) equals the product of the moles of iron ([Fe]) and the moles of surface sites per mole of iron ([sites]/[Fe]= 0.2 moles of sites per mole of iron). For the amount of ferrihydrite available for sorption, the Appelo and Postma methodology further assumes the mass of ferrihydrite (M_{HFO}) in grams (g) available equals the product of the [Fe] and the molecular weight of ferrihydrite (MW_{HFO} = 88.85 g/mole). The same approach was used to calculate the number of sites from gibbsite, assuming the [sites]/[Al] is 0.41 moles of sites per mole of aluminum and the molecular weight of gibbsite is 78.003 g/mole.

The geochemical thermodynamic database Minteq V.4 was used to conduct adsorption modeling. However, new and updated thermodynamic data have been released in scientific literature. These new data are important to include in the geochemical modeling exercises for certain elements or minerals as they allow further refinement of potential reactions, or for correction of previous data that may have been less accurate or more broadly defined. For groundwater modeling at the Site, Golder made numerous updates to the Minteq V.4 database, including the addition of data relating to partitioning coefficients for metals on gibbsite, developed by Karamalidis and Dzombak (2011). Of the five constituents of interest, the database did not contain partitioning coefficients for ferrihydrite or gibbsite for lithium, so its potential for adsorption could not be assessed.

To quantify current levels of adsorption, the concentration of constituents that adsorb in soils (as milligram (mg) of constituent/kilogram (kg) of soil) was modeled for the minimum, maximum, and mean Hfo and Hao contents when equilibrated with the range of groundwater qualities observed at the Site. To quantify the capacity of soil to adsorb additional amounts of each constituent, Golder simulated a step-wise increase in arsenic, boron, cobalt, and molybdenum concentrations (similar in concept to a titration, using the mean proportions observed in porewater) into the range of observed groundwater qualities while allowing equilibration with the sorption surfaces in soils (minimum, maximum and mean Hfo and Hao). The model was then used to predict the quantity of each constituent that would adsorb with this titration of additional arsenic, boron, cobalt, and molybdenum.

2.4.3.2 Mineral Precipitation and Co-precipitation

The potential for mineral precipitation was assessed in PHREEQC using a saturation index (SI) calculated according to Equation 3.

$$SI = \log (IAP/Ksp) \quad \text{(Equation 3)}$$

The saturation index is the ratio of the ion activity product (IAP) of a mineral to the solubility product (Ksp). An SI value greater than zero indicates that the solution is supersaturated with respect to a particular mineral phase and, therefore, precipitation of this mineral may occur. An evaluation of precipitation kinetics is then required to determine whether the supersaturated mineral will indeed form. An SI value less than zero indicates the solution is undersaturated with respect to a particular mineral phase. An SI value close to zero indicates equilibrium conditions exist between the mineral and the solution. SI values between -0.5 and 0.5 are considered to represent ‘equilibrium’ in this report to account for the uncertainties inherent in the analytical methods and geochemical modeling.

Co-precipitation was evaluated based on published literature and known association between minerals and constituents of concern. For example, cobalt is known to coprecipitate with iron oxyhydroxides as well as adsorb to Hfo (Norstrom and Alpers 1999). Therefore, to evaluate co-precipitation, minerals identified by PHREEQC to be at equilibrium (SI > -0.5) were evaluated for their potential to host arsenic, boron, cobalt, lithium, and molybdenum.

2.4.3.3 Capacity of Dilution and Dispersion as Attenuation Mechanisms

Dilution and dispersion are physical mechanisms of attenuation by which concentrations of constituents in groundwater decrease with migration along groundwater flowpaths.

To assess the potential for dilution and dispersion downgradient of the CCR Unit, Golder used MODPATH (Pollack 1989) and the calibrated Site Groundwater Flow model (discussed in Section 4.0 and Appendix B) to simulate travel times for particles released from the MCWB. The length of the particle traces produced by

MODPATH along with travel time estimates were used to calculate average groundwater velocities for the following flow paths: (see Figure 1):

- GAMW-16 to GAMW-53
- GAMW-18 to GAMW-55
- GAMW-17 to GAMW-54
- GAMW-09 to GAMW-54

The results of these flow path travel time simulations are presented in Table 4.

Golder estimated the capacity of dilution and dispersion to attenuate constituent concentrations from the CCR Unit using ratios of concentrations measured in monitoring wells along these flow paths, as presented in Table 8. For example, along the flow path from GAMW-16 to GAMW-53, concentrations of boron decreased from 9.7 milligram per liter (mg/L) to 3.1 mg/L, representing an estimated 68% decrease in concentration along the flow path due to dilution and attenuation.

2.4.3.4 Long Term Stability of Attenuated Constituents

Three sensitivity analyses were performed to assess the stability of adsorbed constituents under variable pH, redox, and ionic strength conditions. Variations in pH, redox, and ionic strength are the most likely types of changes that will occur in an aquifer over time affecting the stability of the constituents of interest (ITRC 2010). The sensitivity analyses were conducted applying the minimum, mean, and maximum Hfo and Hao contents determined for the Site soils, equilibrated with the groundwater qualities observed at the Site at the measured pH and redox conditions. For each sensitivity analysis, a single parameter was varied:

- **pH -** Hydrochloric acid or sodium hydroxide addition was modeled to vary the pH between 4 and 12 standard units (SU). A pH range of 4 to 10 is the typical range considered for evaluating metal speciation.
- **Redox -** DO addition was simulated to adjust reduction potential (Eh) values between -200 and +700 millivolts (mV) based on the historical and anticipated range of Eh in the region.
- **Ionic Strength -** Total dissolved solids (TDS) concentrations were increased by titrating in calcium, magnesium, sodium, potassium, chloride, and sulfate in the proportions observed in porewater. TDS concentrations were evaluated up to 10,000 mg/L, which is approximately four times higher than the highest TDS concentration observed in groundwater at the CCR Unit.

2.4.4 Geochemical Modeling Assumptions and Data Handling

Geochemical modeling assumptions and data handling included the following:

- **Groundwater continuity:** Three or four groundwater quality samples were collected from each well during sampling events conducted between September 2018 and November 2019. Samples from this period were selected for the geochemical modeling because all wells related to the CCR Unit were sampled and analyzed for the full suite of parameters described in Section 2.1.2 and the resulting data are assumed to provide a comprehensive overview of groundwater conditions. Temporal trend analysis for arsenic, boron, cobalt, lithium, and molybdenum made use of all available sampling events between July 2016 and November 2019.

- **Porewater chemistry:** Porewater samples collected from GAPIEZ-06 (three samples total in August, September, and October 2018), DAPZ-02A (one sample collected in March 2020), and DAPZ-02B (one sample collected in March 2020) were assumed to be representative of porewater found in the CCR Unit. Data from three sampling events from GAPIEZ-06 were used to evaluate porewater trends.
- **Redox values:** ORP values measured in the field were converted to Eh by adding 200 mV to the field-measured values as per YSI Tech Note (YSI 2015).
- **Non-detect values:** Constituents with concentrations less than their respective method reporting limits were assumed to have a concentration equal to half the reporting limit in model simulations.
- **Total recoverable concentrations:** Total recoverable fraction results were used for geochemical modeling.
- **Charge balance:** Groundwater and porewater compositions with charge balance errors less than 10% were considered valid. Compositions with charge balance errors greater than 10% were flagged as potentially less reliable, but still included in the geochemical modeling effort.

3.0 SUPPLEMENTAL ASSESSMENT RESULTS

3.1 Groundwater and Porewater

3.1.1 Groundwater Characterization

Groundwater quality data for background, downgradient, and Assessment Monitoring wells used for this evaluation were collected from September 2016 to November 2019. Non-regulated (per the CCR Rule) groundwater parameters (e.g., alkalinity, potassium, sodium) are only available from September 2018 to November 2019. The assessment of trends in arsenic, boron, cobalt, lithium, and molybdenum concentrations in groundwater included observations of all validated data collected during that time frame. Groundwater quality monitoring data are presented in Appendix A and can be summarized as follows:

- **Charge balance error:** Charge balance errors could only be assessed for samples for which the full suite of cations and anions was reported. Eleven groundwater samples had charge balance errors greater than 10%. Eight out of the eleven samples (GAMW-07 in November 2019, GAMW-07B in November 2019, GAMW-08B October 2018, GAMW-08B in November 2019, GAMW-18 in October 2018, GAMW-18B in October 2018, GAMW-18B in November 2019 and GAMW-56B in April 2019) reported charge balance errors between 10% and 15%. Only samples from GAMW-07B in September 2018, GAMW-18B in April 2019, and GAMW-56 in April 2019 had a charge balance error greater than 40%. All eleven results were flagged (Table 5) and retained, with the understanding that they may be somewhat less reliable. Upon subsequent sampling, charges balance errors decreased to <10 % in these wells.
- **pH:** Groundwater pH across background, downgradient, and Assessment Monitoring wells ranged from 5.2 to 8.7. The geometric mean pH across all wells was 7.2. GAMW-07B, GAMW-52B, GAMW-54B were the only wells that produced samples with a pH exceeding 8.0.
- **ORP (Redox):** Field-measured redox, corrected to Eh (+200 millivolts [mV]) values, ranged from -115 to +335 mV in the background monitoring well, downgradient monitoring well, Assessment Monitoring well, and porewater samples collected between September 2018 to November 2019. There was no apparent trend in redox conditions based on sample location or depth.

- **Total Dissolved Solids:** Groundwater TDS concentrations were variable. Generally, the lowest TDS concentrations (less than 400 mg/L) were measured in groundwater at Assessment Monitoring wells (GAMW-46, GAMW-46B, GAMW-52, GAMW-53) while TDS concentrations up to an order of magnitude higher were determined in groundwater at wells located immediately downgradient of the CCR Unit (e.g., GAMW-08B). In general, deep wells demonstrated higher TDS concentrations than shallower companion wells at the same locations.

- **Major ion chemistry:** A Piper plot was generated for all porewater samples and groundwater samples from background, downgradient, and Assessment Monitoring wells to facilitate the identification of water types and changes in major ion chemistry over time (Figure 2a-c). The majority of background, downgradient, and porewater samples are calcium-sulfate dominated. In general, deep wells have a higher proportion of sodium and sulfate than the shallower companion wells. The differences between shallow and deep companion wells are more pronounced in the Assessment Monitoring wells. Except for GAMW-54 and GAMW-55, the shallow samples from the assessment wells are calcium-(bi)carbonate dominated and plot in a different location on the Piper plot than background, downgradient, and porewater samples. Shallow wells GAMW-54 and GAMW-55, along with all the deep Assessment Monitoring wells, are calcium-sulfate dominated and plot with background, downgradient, and porewater samples. The water types have remained generally unchanged between September 2018 and November 2019. Generally, this indicates that groundwater types are consistent. However, based on major ion chemistry, there are different water types on the site that are likely influenced by variable site geology.

- **Arsenic:** Arsenic concentrations in groundwater samples collected from downgradient monitoring and Assessment Monitoring wells between September 2016 to November 2019 ranged from non-detect (<0.005 mg/L) to 0.022 mg/L (Figure 4a-c). The highest measured arsenic concentration in groundwater at the CCR Unit (0.091 mg/L) was reported in a sample collected from background well GAMW-15 in September 2018 (Figure 4a). No downgradient monitoring well has ever exceeded the GWPS of 0.091 mg/L designated for the CCR Unit. Arsenic concentrations in groundwater appear to be stable or decreasing in all downgradient monitoring wells (Figure 4b). Arsenic concentrations in the CCR Unit porewater (GAPIEZ-06) ranged from 0.011 to 0.012 mg/L in August and October 2018 (Appendix A-2). Arsenic concentrations collected from the Drying Area in March 2020 (DAPZ-02A and DAPZ-02B) were an order of magnitude lower (<0.0010 and 0.0018 mg/L, respectively). Based on the observed pH and Eh conditions, arsenic predominately occurs as an oxidized arsenate (As^{+5}) species, with arsenic in only a small number of samples present as a reduced arsenite (As^{+3}) species (Figure 3a). Arsenite is less readily adsorbed than arsenate and is thus generally regarded to be more mobile in natural environments (Nordstrom 2014).

- **Boron:** Boron concentrations in downgradient groundwater samples collected between September 2016 to November 2019 ranged from 0.056 mg/L to 25 mg/L (Figure 5a-c). The highest boron concentration (25 mg/L) was measured in monitoring well GAMW-09B in September 2017. Two background wells (GAMW-07B and GAMW-15B), seven downgradient wells (GAMW-08B, GAMW-09, GAMW-09B, GAMW-16B, GAMW-17, GAMW-17B, and GAMW-18B) and two Assessment Monitoring wells (GAMW-54B and GAMW-55B) reported boron concentrations greater than the health-based standards (4 mg/L). Boron concentrations in porewater were between 7.4 mg/L and 13.8 mg/L. Based on pH conditions on the Site, boron in all wells occurs predominately in the form of protonated boric acid (H_3BO_3) (Figure 3b). Generally, boron concentrations in the background and downgradient wells have remained stable or has decreased. This is also the case for all assessment and boundary well except for GAMW-55B, where boron has increased slightly. GAMW-55B is a deep well and heavily influenced by bedrock.

- **Cobalt:** Cobalt concentrations ranged from non-detect (<0.001 mg/L) to 0.059 mg/L in groundwater samples collected between September 2016 to November 2019 at the CCR Unit (Figure 6a-c). GAMW-08 had the highest cobalt concentration of all monitoring wells (0.059 mg/L in November 2016) and generally reported a decreasing trend thereafter (Figure 6b). The second highest concentration (0.010 mg/L in June 2017 and October 2018) occurred in GAMW-07, a background well (Figure 6a). GAMW-08 is the only well on Site to have reported a historic cobalt level greater than the GWPS (0.010 mg/L). Cobalt in porewater ranged from below the laboratory reporting limit (<0.0010 mg/L) to 0.0022 mg/L. Cobalt in all wells occurs predominately as the divalent cation Co^{+2}, based on pH and Eh conditions (Figure 3c). Cobalt concentrations appear to be stable or decreasing in groundwater samples collected from the upgradient, downgradient, and Assessment Monitoring wells.
- **Lithium:** Lithium concentrations in groundwater ranged from non-detect (<0.008 mg/L) to 0.025 mg/L between September 2016 to November 2019 (Figure 7a-c). Two downgradient wells, GAMW-18B and GAMW-08, located directly downgradient of the MCWB, have historically had the highest lithium concentrations (Figure 7b). Lithium concentrations historically have not exceeded 0.040 mg/L, the health-based standard. Lithium levels in GAMW-08 appear generally consistent over time, and a trend cannot be determined for GAMW-18B, as the well was recently installed and fewer than four sampling events have been conducted. Lithium concentrations in groundwater at all other wells downgradient of the CCR Unit appear to be stable. Lithium was not detected above the laboratory reporting limit (0.008 mg/L) in the CCR Unit porewater (GAPIEZ-06). Lithium concentrations collected from the Drying Area in March 2020 (DAPZ-02A and DAPZ-02B) were <0.008 mg/L and 0.016 mg/L, respectively. Lithium predominately occurs as the monovalent cationic species Li^{+} based on field pH and Eh conditions (Figure 3d).
- **Molybdenum:** Molybdenum concentrations in groundwater ranged from non-detect (<0.010 mg/L) to 0.18 mg/L (Figure 8a-c). Although GAMW-18 has reported historical levels of up to 0.18 mg/L, concentrations have been below 0.1 mg/L (the health-based standard) since August 2017. No other CCR Unit monitoring wells have reported concentrations exceeding 0.1 mg/L. The molybdenum concentration in porewater has ranged from 0.063 mg/L to 0.81 mg/L. Molybdenum is predominately present in the form of the divalent anionic molybdate (MoO_4^{-2}) species based on field-measured pH and Eh conditions (Figure 3e).
- **Iron:** Total (un-filtered) iron concentrations were variable, ranging from non-detect (<0.1 mg/L) to 13 mg/L between September 2018 and November 2019 (Appendix A-1). The highest concentration of 13 mg/L was observed in the groundwater sample collected from Assessment Monitoring well GAMW-56. No geographical trend is apparent; however, deeper “B wells” generally tended to have higher total iron contents. Ferric iron (Fe^{+3}) concentrations were higher than ferrous iron (Fe^{+2}) concentrations in all samples, except for those collected from wells GAMW-15, GAMW-55B, and GAMW-56.
- **Nutrients:** Total nitrogen (nitrate + nitrite) was measured in groundwater samples collected in October 2018 and was present at low levels (i.e. less than 2.8 mg/L). Nitrate concentrations were measured in samples collected in 2019 and concentrations ranged from below the detection limit (<0.05 mg/L) to 7.7 mg/L. The highest reported nitrate concentration was found in GAMW-08 in May 2019 (7.7 mg/L-N). The presence of low-level nitrate confirms oxidized conditions surround the CCR Unit. Phosphate concentrations exceeding 1 mg/L were detected in groundwater samples from GAMW-15 and GAMW-16. Phosphate concentrations were below detection in groundwater samples collected from 18 of the 25 wells between September 2018 and November 2019. No geographical or temporal trend is apparent in the phosphate concentrations related to the CCR Unit (Appendix A).

The monitoring data also indicate that sulfate generally occurs at the highest concentrations immediately downgradient of the CCR Unit and in background monitoring wells (Figure 9a-c). As identified in Figure 2a-c, considering major groundwater chemistry and sulfate, the CCR Unit is likely influencing groundwater quality in Assessment Monitoring wells GAMW-54/54B and GAMW-55/55B. However, while affected by the CCR Unit, these wells report low concentrations of arsenic, cobalt, lithium, and molybdenum below health-based standards or below detection limits. Boron concentrations were elevated above its GWPS in both upgradient and downgradient wells, suggesting elevated concentrations are naturally occurring or due to an alternate source at the Site.

3.1.2 Evaluation of Attenuation Rates

The results of the point decay analysis for groundwater at background and downgradient wells (including Assessment Monitoring wells) between September 2016 and November 2019 are provided in Table 6, as mean site attenuation rates. This evaluation reveals that, despite concentrations generally increasing in background wells over time (as indicated by positive point decay constants), boron, cobalt, lithium, and molybdenum concentrations in downgradient wells have decreased (negative point decay constants) over that same monitoring period. The mean downgradient decay rates can be used to estimate the number of years it would take for elevated groundwater concentrations to decrease to the GWPS. Maximum concentrations of boron, cobalt and molybdenum observed in downgradient monitoring wells over the period of monitoring would take approximately 41 years, 39 years, and 20 years, respectively, to attenuate to concentrations below GWPS (or health-based standard for boron) based on these decay rates. The durations required to achieve regulatory standards for arsenic and lithium were not calculated because there are no exceedances of the GWPS for these constituents.

The positive mean point decay rate for arsenic in downgradient monitoring wells indicates that, on average, concentrations are increasing. Given the low concentrations in the porewater samples (≤ 0.012 mg/L), this trend is unlikely to be caused by the CCR Unit. Low-level increasing arsenic concentrations in Assessment Monitoring wells GAMW-52B, GAMW-53B, GAMW-54, and GAMW-54B are driving the positive point decay rate, but the arsenic concentrations in these wells remain sufficiently low (≤ 0.005 mg/L) and are likely caused by natural variability. Although an increasing trend of arsenic at these wells currently may exist, it is unlikely this trend will continue given the potential for attenuation (e.g., through sorption and dilution) to maintain arsenic concentrations below the GWPS.

3.1.3 Mineralogical Controls in Groundwater and Porewater

The results of speciation modeling of groundwater data from background, downgradient, and Assessment Monitoring wells between September 2018 and November 2019 are provided in Table 5, including saturation indices for relevant minerals. Mineral saturation can play an important role in attenuation of metals, either directly by their removal through mineral precipitation, or indirectly by providing sorptive surfaces or opportunities for co-precipitation.

- **Iron-bearing minerals:** Ferrihydrite was indicated to be at equilibrium with groundwater or oversaturated in nearly all samples, indicating a strong potential for ongoing precipitation of solid-phase iron oxides. Only two samples from Assessment Monitoring well GAMW-53 (April 2019 and November 2019) were modeled to be undersaturated with respect to ferrihydrite. Thus, it is assumed that iron (hydr)oxides are prevalent in the Site aquifers.
- **Other minerals:** Nearly all groundwater samples, with the exception of samples from GAMW-07 and GAMW-52, were simulated to be in equilibrium or oversaturated with respect to barite ($BaSO_4$). Fluorite

(CaF_2) equilibrium was indicated in wells GAMW-07B, GAMW-08/08B, GAMW-17, and GAMW-52B. Gypsum ($CaSO_4.2H_2O$) was modeled to be in equilibrium in seven wells (GAMW-07B, GAMW-08B, GAMW-15B, GAMW-16B, GAMW-18, GAMW-18B, and GAMW-55B), most of which were deeper "B-wells" nearer to bedrock. Calcite ($CaCO_3$) equilibrium was indicated in all wells except GAMW-53.

In summary, several mineral phases likely control groundwater composition at some or all wells: barite, calcite, fluorite, ferrihydrite, and gypsum. In the case of ferrihydrite, the dissolved concentrations of constituents of interest can be reduced through its ability to act as a substrate for adsorption.

3.2 Overburden Soil

3.2.1 Mineralogical Composition

Quantitative XRD with Rietveld refinement was used to identify and quantify minerals in five overburden soil samples collected during the drilling activities (Table 7). Three of the samples were collected from the Assessment Monitoring well's soil borings and two samples were collected from the downgradient soil boring (OW-9). These samples were obtained to better understand the mineralogical composition of the aquifer system and identify any minerals that would potentially influence attenuation of constituents of interest. In addition, and in contrast, the presence of certain minerals could also indicate a potential for naturally occurring release of metals into groundwater, for instance due to oxidation of sulfide minerals.

The mineralogical analysis identified the iron sulfide minerals pyrite and marcasite at low levels in three of the five overburden soil samples, at concentrations up to 0.6 wt.%. These minerals can oxidize in the presence of even trace amounts of dissolved oxygen, which would lead to the liberation of trace metals or metalloids known to associate with sulfide minerals (e.g., arsenic, cobalt, and molybdenum) into groundwater (Smith and Huyck 1997). In addition, the associated release of iron creates the potential for formation of minerals with the ability to sorb trace elements.

The presence of the oxidized iron mineral hematite (Fe_2O_3) at 0.3 to 0.6 wt.% in three of the five overburden soil samples in the presence of reduced iron sulfide minerals indicates a spectrum of oxidation occurring in overburden soil samples. As pyrite or marcasite is oxidized, intermediate amorphous iron phases, such as ferrihydrite, would likely occur first. Over time, crystallization would progress, forming iron oxide-oxyhydroxides such as hematite or goethite (FeOOH). Therefore, it is likely a range of iron solid phases is present in the overburden soil, and the potential exists over time for an increased presence of amorphous and crystallized iron oxides-oxyhydroxides with a strong affinity to attenuate certain metals and metalloids (Dzombak and Morel 1990).

The mineralogical analysis also identified the carbonate minerals calcite ($CaCO_3$) and dolomite ($CaMg(CO_3)_2$) in all overburden soil samples, with combined concentrations between 9 and 16 wt.%. Carbonate minerals are known to adsorb cobalt (Brady et al. 2003) while sorption and uptake of arsenic are possible as well (e.g., Romero et al. 2004). Carbonate minerals can dissolve when exposed to sulfuric acid formed by oxidation of sulfide minerals and release associated trace metals and metalloids (Section 3.2.2) into groundwater. Iron can also be released as carbonate minerals dissolve and potentially form metal hydroxide minerals.

3.2.2 Chemical Composition and Sequential Extraction

Chemical analysis and sequential extraction were conducted to determine the chemical composition and the distribution of constituents of interest over various operationally defined fractions of the overburden soil. This testing was completed per Table 2 on nine overburden soil samples from eight monitoring well locations, two samples from the OW-9 borehole, and one sample from within the Drying Area (reported in Table 8). Soil samples

from soil borings that correspond to well locations were collected from within the screened depth (except SB-53B 25'-27' which was collected above the screened depth).

A description of the individual fractions determined by sequential extraction is presented in Section 2.2.2, footnote 1. Metals extracted in steps 1 through 5 are considered environmentally available, whereas metals extracted in steps 6 and 7 are present in refractory fractions and are not expected to be released under conditions typically encountered in aquifers (Tessier et al. 1979). The sum of metal concentrations from the sequential extraction steps is expressed as "SEP SUM" in Table 8 and does not represent an analytically determined value. The concentration measured by total metals analysis is referred to as "SEP Total" in Table 8. Boron was not included in the SEP analysis due to method limitations.

The results from the chemical analysis and sequential extraction can be summarized as follows:

- **Iron:** Iron was present in all twelve samples analyzed, varying from 3,400 milligram per kilogram (mg/kg) (DA-14) to 9,900 mg/kg (SB-54B). In all samples, the refractory sulfide and residual fractions accounted for the largest proportion of total iron and, as such, most of the iron is not environmentally available (Figure 10). The labile fraction in steps 1 through 5 can generally be considered representative of the amount of iron in the overburden that may be available as a sorbing medium. While not a constituent of interest, iron and its minerals commonly represent the most important reservoir for metal/metalloid attenuation in soils or overburden. The labile fraction calculated from sequential extraction, therefore, can be used as a proxy for determining the total number of adsorption sites available for attenuation of arsenic, boron, cobalt, and molybdenum in the environment.
- **Arsenic:** Total arsenic in the soil overburden samples ranged from 1.9 to 6.2 mg/kg while the environmentally-available fraction ranged from 0.44 mg/kg in SB-55B to 3.0 mg/kg in SB-53B, representing from 31% to 59% of total arsenic (Figure 11). The majority of arsenic was present in the refractory fraction, predominantly associated with sulfide minerals. The amorphous metal and metal hydroxide fractions hosted all arsenic that was environmentally available except in SB-52B, where the carbonate fraction represented 8.5% of total arsenic. The highest concentrations of environmentally-available arsenic occurred in sample SB-56B, and the lowest concentrations were encountered in samples DA-14, SB-53B and SB-55B. The Drying Area sample (DA-14) had the second lowest environmentally-available arsenic concentrations (0.45 mg/kg) of all samples analyzed. Arsenic in DA-14 predominantly occurred in the sulfide and insoluble fractions.
- **Cobalt:** Total cobalt in soil borings ranged from 2.5 mg/kg to 6.1 mg/kg while the environmentally-available fraction ranged from 1.1 mg/kg in OW-9 to 2.9 mg/kg in SB-53B, representing from 27% to 60% of total cobalt (Figure 12). Those samples downgradient of the CCR Unit had similar total cobalt in the environmentally-available fraction as the background samples. In all boring samples, cobalt was most abundant in the metal hydroxide, sulfide, and residual fractions. Cobalt was also present in the carbonate phase in the nine soil bore samples (5% to 14% of total). Cobalt in the carbonate phase is most likely sorbed onto or coprecipitated with the calcite that was indicated to be in equilibrium with groundwater in geochemical modeling. Cobalt was not detected in the exchangeable phase. DA-14 reported the lowest total and environmentally-available cobalt concentrations (0.87 mg/L and 0.39 mg/L, respectively) of all samples analyzed, predominantly in the metal hydroxide and sulfide fractions.
- **Lithium:** Total lithium ranged from 4.2 to 11 mg/kg while the environmentally-available fraction ranged from 0.5 mg/kg in DA-14 to 11.4 mg/kg in SB-18B, representing from 12% to 74% of total lithium (Figure 13). The

majority of lithium was present in either the organic or the refractory fraction. The organic, carbonate, and metal hydroxide fractions hosted all lithium that was environmentally available. The highest concentrations of environmentally-available lithium occurred in samples SB-18B, SB-54B, SB-55B and SB-56B, and the lowest amount was encountered in SB-53B. Lithium concentrations in DA-14 were generally lower than in background and downgradient monitoring wells, with the majority of the lithium present in the sulfide and residual fractions.

- **Molybdenum:** Total molybdenum in overburden ranged from 0.15 to 3.8 mg/kg while the environmentally-available fraction ranged from non-detect to 2.83 mg/kg, in SB-53B (25'-27'), and accounted for 100% of all molybdenum in SB-18B and SB-53B (30'-32') (Figure 14). Molybdenum was most commonly present in the amorphous and metal hydroxide fractions. Notably, in background boring SB-07B and in SB-08B, a downgradient boring in close proximity of the CCR Unit, molybdenum was non-detect in overburden soil samples. The soil boring with the highest total molybdenum content, SB-53B, is located further downgradient from the CCR Unit. The Drying Area sample (DA-14) had the highest concentrations (15 mg/kg) of all samples analyzed. Molybdenum in DA-14 was present predominantly in the exchangeable fraction.

In summary, no definitive trends were present for arsenic, cobalt, lithium or molybdenum that indicated a higher concentration immediately downgradient of the CCR Unit relative to background locations or locations further downgradient. Based on the above results, attenuation by adsorption of all four constituents of interest is likely occurring, with the carbonates, amorphous metal oxides, and metal hydroxide fractions accounting for the majority of the attenuation.

4.0 GROUNDWATER MODELING RESULTS

Through standard numerical groundwater modeling procedures, Golder developed a steady state groundwater flow model for the Site that is considered calibrated and verified. Details of the flow model development are presented in Appendix B. This model was utilized to inform the natural attenuation study by simulating travel times for particles released from the MCWB, as presented in Table 4.

5.0 GEOCHEMICAL MODELING RESULTS

5.1 Identification and Capacity of Attenuation Mechanisms

5.1.1 Adsorption to Iron and Aluminum Oxyhydroxides

The Hfo and Hao surface area and sorption site calculations for the minimum, mean, and maximum soil boring iron and aluminum concentrations are presented in Table 10. Adsorption modeling in PHREEQC revealed a large range of adsorption capacities expected for the different constituents at the site. Figure 15 displays the predicted trajectories of aqueous concentrations before and after adsorption onto Hfo and Hao in soils (minimum, mean and maximum Hfo and Hao), as additional arsenic, boron, cobalt, and molybdenum are titrated into solution. The bold lines display the geometric means for all groundwater scenarios within each soil scenario and the grey area represents the range for the 5th to 95th percentile of all soil scenarios. As mentioned in Section 2.4.3.1.2, lithium adsorption to iron and aluminum oxyhydroxides was not modeled due to a lack of available thermodynamic data.

The predicted trajectories are compared against the GWPS and porewater concentrations. On the plots, the further the predicted trajectories are to the right of the 1:1 line, the larger the amount of the constituent that has sorbed to Hfo and Hao surface sites in soils and is no longer predicted to reside in the aqueous phase. For boron, little to no adsorption is predicted by the model, so aqueous concentration before adsorption are almost identical to concentrations after adsorption. For arsenic, a large proportion is expected to adsorb, with a capacity to bring

average arsenic concentrations to below 0.01 mg/L when concentrations are at approximately 10 mg/L or lower prior to adsorption. At higher arsenic concentrations (> 10 mg/L), the relative sorption capacity is diminished as sorption sites are filled and aqueous concentrations after adsorption are predicted to increase above its GWPS. For cobalt and molybdenum, the trajectories run parallel to the 1:1 line, indicating that sorption capacity is directly proportional to the concentration before adsorption. The modeling results suggest that adsorption has the capacity to reduce cobalt concentrations below approximately 0.1 mg/L down to the GWPS of 0.01 mg/L and molybdenum concentrations below approximately 0.2 mg/L down to the GWPS of 0.1 mg/L. The 95th percentile of modeled trajectories show that a minority of pH and redox conditions at site were less favorable for attenuating cobalt or molybdenum, as seen by the proximity to the 1:1 line.

5.1.2 Co-precipitation

In addition to adsorption, co-precipitation or the direct incorporation of trace metals such as cobalt into precipitated iron oxide-oxyhydroxides has been well studied in literature (Butt et al. 2000; Dzombak and Morel 1990; Smith 1999). For the soils analyzed by sequential extraction (Section 3.2.2), all samples had higher concentrations of cobalt in the amorphous and metal hydroxide phases than indicated by adsorption modeling. This suggests that cobalt concentrations also may be attenuated during the formation of ferrihydrite (Butt et al. 2000; Tebo et al. 2004). Cobalt was also identified by SEP to be associated with carbonate minerals, likely due to co-precipitation with the dolomite or calcite identified by mineralogical analysis. Arsenic co-precipitation with amorphous phases of iron and other metal oxyhydroxides is also considered possible. However, per the SEP results, no arsenic was found to be associated with carbonate minerals. Co-precipitation is either not likely or relevant for boron, lithium, and molybdenum.

5.1.3 Physical Attenuation

Table 9 presents the predicted concentrations at Assessment Monitoring wells, assuming the minimum and maximum amount of dilution and dispersion downgradient of the CCR Unit (Section 4.0). The highest concentrations of arsenic, boron, cobalt, lithium, and molybdenum measured in porewater were “diluted” in the geochemical simulations with the maximum concentrations observed in side-gradient wells GAMW-52, GAMW-52B, GAMW-56, and GAMW-56B to provide a conservative estimate of dilution and dispersion.

For arsenic, cobalt, and lithium, the maximum concentrations in porewater were below the GWPS. Dilution and dispersion with groundwater from side-gradient wells generally resulted in a further decrease below the GWPS. At GAMW-56, arsenic and cobalt concentrations were elevated over those in porewater. Consequently, dilution/dispersion of porewater with water from GAMW-56 resulted in higher concentrations relative to porewater, though still below GWPS.

For boron the maximum porewater concentrations were elevated above the health-based standard (345%) and for molybdenum, the maximum porewater concentrations were elevated above the GWPS (810%). The 32 to 63 percent reduction in concentrations by dilution and dispersion alone was not sufficient to bring the maximum porewater concentrations below the relevant standards. For boron, concentrations in background monitoring well GAMW-15 were twice as high as those in porewater. Due to this background source, boron concentrations in side-gradient wells are also relatively high and limit the effectiveness of dilution to reduce boron concentrations downgradient of the CCR Unit. For molybdenum, concentrations in monitoring wells have been below GWPS since March 2018, indicating additional dilution/dispersion or other attenuating processes have reduced porewater concentrations between the CCR Unit and the monitoring wells. As a consequence, molybdenum concentrations will likely remain below the GWPS.

5.2 Long-Term Stability of Attenuated Constituents

The expected variations in dissolved concentration as a function of pH, Eh, and TDS are presented in Figures 16, 17, and 18, respectively. Results are presented along with GWPS values and the range of pH, Eh, or TDS values (5th percentile to 95th percentile) observed at the Site. Responses to changes in pH, Eh, and TDS vary widely by constituent. The results of the adsorption stability modeling for arsenic, boron, cobalt, and molybdenum can be summarized as follows:

- **Arsenic:** For the range of pH values observed at the site, greater than 95% of the arsenic is expected to sorb to Hfo and Hao (Figure 16a). At pH values below 6.0, a conversion of arsenate to arsenite is modeled to release the adsorbed arsenic into groundwater. For alkaline pH values between 8.0 and 10.0, there is a small amount of additional capacity for arsenic to adsorb. At extremely alkaline conditions (pH greater than 10.0), higher proportions of negatively-charged sorption sites on Hfo and Hao limit the effectiveness of sorption of anionic species, resulting in higher amounts of desorbed arsenic. Under reducing conditions (Eh less than -100 mV), arsenic is largely present as arsenite and sorption is limited (Figure 17a). Over intermediate redox conditions (Eh between 0 and 500 mV), adsorbed arsenic is relatively stable. Above 500 mV, arsenic is expected to desorb again. Under increasing TDS concentrations (Figure 18a), arsenic sorption declines as other anions compete with and replace arsenic from sorption surfaces. For arsenic, TDS concentrations at the Site could quadruple relative to observed values before aqueous concentrations increase above the GWPS.
- **Boron:** Based on the relatively small proportion of boron that can be adsorbed to Hfo and Hao surface sites, changes in pH, Eh, and TDS concentrations are modeled to have only a minor impact on aqueous concentrations, as evidenced by the horizontal trends in Figures 16b, 17b, and 18b.
- **Cobalt:** The pH response of cobalt (Figure 16c) is broadly similar to that of arsenic, with cobalt being nearly completely in dissolved form under acidic conditions but generally sorbed under alkaline conditions. Cobalt was generally modeled to be unresponsive to changes in redox conditions (Figure 17c), with little additional cobalt sorbing or desorbing over the range of tested Eh conditions. Cobalt was also not responsive to increases in TDS concentrations (Figure 18c), with sorption remaining relatively unchanged as TDS concentrations increased 4- to 40-fold above the commonly-observed range at the Site.
- **Molybdenum:** For molybdenum, lower pH values (more acidic conditions) were generally more favorable for adsorption (Figure 16d). At alkaline pH values (pH greater than 10), nearly all molybdenum is desorbed and present in the dissolved phase. Over the range of common Eh values at site (Figure 17d), molybdenum sorption is relatively stable. Highly reducing conditions are predicted to increase molybdenum adsorption and highly oxidizing conditions are predicted to reduce adsorption. Molybdenum adsorption is generally insensitive to increases in TDS concentrations (Figure 18d), with TDS concentrations up to 10,000 mg/L less than doubling the aqueous concentrations due to desorption.

6.0 TIER I EVALUATION

The potential for natural attenuation of arsenic, boron, cobalt, lithium, and molybdenum was evaluated in accordance with recommended practices and guidance promulgated by the USEPA and the ITRC (USEPA 2007a; USEPA 2007b; ITRC 2010). According to USEPA (USEPA 2007a), the purpose of the Tier 1 evaluation is to “Demonstrate that the groundwater plume is not expanding and that sorption of the contaminant onto aquifer solids is occurring where immobilization is the predominant attenuation process.” Based on this definition, the following observations support MNA as a viable corrective measure for the CCR Unit:

- **Plume Stability:** Based on the water quality monitoring data presented in this Assessment Monitoring, groundwater concentrations of arsenic, boron, cobalt, lithium, and molybdenum outside of the CCR Unit appear to be stable or decreasing. Evaluation of trend charts generally did not reveal increasing trends in wells downgradient of the CCR Unit (Figures 4 to 8), including for parameters such as boron and sulfate, which are considered common indicators of CCR leaching (Figures 5 and 10). These observations indicate that the distribution of arsenic, boron, cobalt, lithium, and molybdenum in the aquifer is stable.
- **Magnitude of Exceedances:** Arsenic has remained below the CCR Unit GWPS (0.091 mg/L) in all downgradient monitoring wells. Boron concentrations exceed the health-based standard (4 mg/L) in nine of the downgradient (Downgradient Monitoring and Assessment Monitoring) wells, but concentrations are generally within the range of background monitoring well concentrations, suggesting naturally-elevated levels or an alternative source of boron causing the concentrations in groundwater at the Site. The cobalt concentration in groundwater at GAMW-08, the only downgradient monitoring well exceeding the GWPS, has shown a decreasing trend since 2016. The most recent concentration of cobalt (0.011 mg/L in November 2019) was just 0.001 mg/L above the GWPS of 0.010 mg/L. No wells exceed the health-based lithium standard (0.04 mg/L). Molybdenum concentrations in all wells have been consistently below the health-based standard of 0.1 mg/L since August 2017, indicating a low likelihood of a future exceedances based on historical trends.
- **CCR Unit Porewater:** The CCR Unit at RMSGS was placed into service in 1976 and historical records are not available for ash additions or porewater concentrations over the CCR Unit's lifespan. However, based on recent porewater data, the arsenic concentration in the CCR Unit (0.011 mg/L to 0.018 mg/L) is well below the GWPS of 0.091 mg/L. Cobalt and lithium concentrations in porewater in the CCR Unit were low and only detected above their laboratory reporting limit in a single sample (0.0022 mg/L and 0.016 mg/L, respectively). This indicates that the CCR Unit is not a potential source for these metals. Boron concentrations in the porewater (8.3 mg/L to 13.8 mg/L) are elevated above the health-based standard of 4 mg/L but are below levels observed in the two deep background monitoring wells GAMW-07B (15-23 mg/L) and GAMW-15B (13-18 mg/L). Molybdenum in the CCR Unit was measured at concentrations up to 0.81 mg/L, above its GWPS. Even so, molybdenum concentrations in groundwater downgradient of the CCR Unit are currently below the GWPS.
- **Groundwater Chemistry:** The groundwater monitoring results and the findings of the geochemical modeling support the potential for natural attenuation of arsenic, boron, cobalt, lithium, and molybdenum. Equilibrium of groundwater with the mineral phase ferrihydrite was modeled to occur in all groundwater samples and calcite equilibrium was indicated in all downgradient monitoring wells except GAMW-53. This is consistent with the results from the sequential extraction analysis that indicate carbonate, amorphous, and metal hydroxide fractions sequester arsenic, boron, cobalt, lithium, and molybdenum.
- **Confirmation of Attenuation/Immobilization:** Based on both mineralogical and chemical analysis, it is evident that attenuation of arsenic, cobalt, lithium, and molybdenum by aquifer materials is occurring. Iron, capable of forming (hydr)oxide phases that facilitate metals attenuation (Dzombak and Morel 1990), was identified in all overburden samples. Mineralogical analysis confirmed iron was present as an oxide phase in the form of hematite in all overburden samples. Arsenic, cobalt, lithium, and molybdenum demonstrated a high degree of immobilization due to attenuation on carbonate, amorphous, and metal hydroxide fractions. This indicates that these phases have been and are scavenging or attenuating constituents that were once present in solution. Groundwater samples from Assessment Monitoring wells GAMW-53/53B, GAMW-

54/54B, GAMW-55/55B, and GAMW-56/56B report a similar major ion signature as groundwater in monitoring wells proximal to the CCR Unit. However, no arsenic, cobalt, lithium, or molybdenum has been detected in these wells above background levels. In addition, soil borings from these wells contained significant proportions of constituents attenuated in various phases, especially in the case of lithium. As a result, the groundwater concentrations of these constituents are maintained at low levels, demonstrating attenuation.

Based on these findings, arsenic, boron, cobalt, lithium, and molybdenum were considered candidates for an MNA remedy application and were deemed to meet the criteria for Tier I MNA in accordance with USEPA guidance (USEPA 2007a,b).

7.0 TIER II EVALUATION

The purpose of the Tier II evaluation is to "Identify mechanisms and rates of the operative attenuation process." Based on this definition, the following modeling results and observations support MNA as a viable corrective measure for the CCR Unit:

- **Adsorption Capacity Modeling:** PHREEQC modeling results show that adsorption is likely attenuating arsenic, cobalt and, to a lesser degree, molybdenum downgradient of the CCR Unit. This is concluded based on equilibration of site-specific groundwater compositions with the range of Hfo and Hao concentrations observed in SEP results of Site overburden soils. Minor amounts of boron are also expected to attenuate. The sorbing capacity of Hfo and Hao surface sites is partially dependent on the concentrations of the constituents of interest in groundwater. The titration modeling (Figure 15) shows how the soil's capacity to adsorb constituents increases if groundwater concentrations of arsenic, boron, cobalt, and molybdenum were to increase above current levels. In addition to metal oxyhydroxides, clay minerals and/or particular organics can also act as a substrate for attenuation (Goldberg et al. 1993; Goldberg and Forster 1996), but this mechanism was not included in the current evaluation.

  The findings from the modeling are supported by the results of the sequential extraction testing. The presence of arsenic, cobalt, lithium, and molybdenum in the amorphous and metal oxyhydroxide fractions of soils indicates that adsorption is occurring spatially across the monitored area downgradient of the CCR Unit.

- **Co-precipitation:** In addition to adsorption, co-precipitation or the direct incorporation of trace metals such as cobalt into precipitated iron oxide-oxyhydroxides has been well studied in literature (Butt et al. 2000; Dzombak and Morel 1990; Smith 1999). For the soils analyzed by sequential extraction (Section 3.2.2), all samples had higher concentrations of cobalt in the amorphous and metal hydroxide phases than indicated by adsorption modeling. This suggests that cobalt concentrations also may be attenuated during the formation of ferrihydrite (Butt et al. 2000; Tebo et al. 2004). Cobalt was also identified by SEP to be associated with carbonate minerals, likely the result of co-precipitation with dolomite or calcite, which were identified by mineralogical analysis. Arsenic co-precipitation with amorphous phases of iron and other metal oxyhydroxides is also possible. However, there was no arsenic associated with carbonate minerals as identified by SEP. Co-precipitation is either not likely or relevant for boron, lithium, and molybdenum.

- **Estimated Site Attenuation Rates:** Concentrations of boron, cobalt, lithium, and molybdenum are decreasing in downgradient monitoring wells, resulting in negative calculated point decay rates. A positive point decay rate for arsenic suggests that its concentrations are increasing, but low concentrations in porewater indicate that the trend does not imply an impact from the CCR Unit. Increasing arsenic concentrations in Assessment Monitoring wells GAMW-52B, GAMW-53B, GAMW-54, and GAMW-54B are

driving the positive point decay rate, but the arsenic concentrations in these wells are low (less than 0.005 mg/L) and are likely driven by natural variability. Using the mean decay rate, maximum concentrations of boron, cobalt and molybdenum observed in downgradient and Assessment monitoring wells would take approximate 41 years, 39 years, and 20 years, respectively, to attenuate to below GWPS. Arsenic and lithium concentrations in downgradient and Assessment Monitoring wells are already below the GWPS.

- **Advanced Groundwater Modeling:** Groundwater flow results indicate between 32% and 63% dilution and dispersion of groundwater at monitoring wells with upgradient and side-gradient water as it flows towards the Assessment Monitoring wells. This dilution and dispersion attenuate concentrations along the flow paths. Arsenic, cobalt, and lithium concentrations in porewater are already below GWPS in the available monitoring data (August 2018 to March 2020). Dilution and dispersion with groundwater from side-gradient Assessment Monitoring wells (GAMW-52/52B and GAMW-56/56B) would further reduce these concentrations relative to the GWPS. Boron and molybdenum concentrations are elevated above the health-based standards in porewater (and in background wells for boron). As such, while dilution and dispersion reduce concentrations by about 30% to 60%, this is insufficient to dilute porewater to such a degree that the resulting boron and molybdenum concentration decline to below the health-based standards. The concentrations of molybdenum measured in downgradient groundwater at Assessment Monitoring wells have remained below the GWPS, so additional physical and/or chemical attenuation is likely occurring between the CCR Unit and the Assessment Monitoring wells. Modeled groundwater velocities indicate that travel times between downgradient and Assessment Monitoring wells are between 4.5 and 31 years. The modeling results also indicate that groundwater would take between 27 and 130 years to travel from the downgradient monitoring wells to the property boundary (GAMW-46/46B).

Based on these findings, arsenic, boron, cobalt, lithium, and molybdenum were considered to be candidates for an MNA remedy application and deemed to meet the criteria for Tier II MNA in accordance with USEPA guidance (USEPA 2007a and 2007b).

8.0 TIER III EVALUATION

According to USEPA (USEPA 2007a), the purpose of the Tier III evaluation is to eliminate sites for an MNA remedy where (1) “Capacity of the aquifer is insufficient to attenuate the COC mass to regulatory standards” and/or (2) “Stability of the immobilized COC is insufficient to prevent remobilization due to future changes in groundwater chemistry”. Based on this definition, the following observations support MNA as a viable corrective measure for the CCR Unit:

- **Adsorption Capacity Modeling:** For arsenic, titration modeling shows that groundwater concentrations could increase up to approximately 2.5 mg/L before exceeding the capacity of soils (95th percentile of scenarios) to attenuate arsenic below the GWPS (0.091 mg/L). Groundwater arsenic concentrations up to 10 mg/L are predicted to attenuate below the GWPS for the average soil capacity scenario. Similarly, cobalt concentrations in groundwater could increase up to approximately 0.02 mg/L before exceeding the capacity of soils (95th percentile of scenarios) to attenuate cobalt below the GWPS (0.01 mg/L). Under the average soil capacity scenario, the aquifer has the capacity to reduce cobalt concentrations as high as 0.1 mg/L to below the GWPS.

  For boron and molybdenum, modeling suggests that adsorption can reduce a portion of the dissolved load, but that there is not sufficient adsorption capacity alone to reduce the concentrations observed in porewater below the health-based standard. However, current molybdenum concentrations observed in downgradient

and Assessment Monitoring wells indicate that the combined long-term attenuation from sorption, dilution, and dispersion is sufficient to reduce concentrations below health-based standards. In addition to iron oxyhydroxides, molybdenum and boron (as well as arsenic and cobalt) are known to adsorb to other metal (hydr)oxides (e.g., manganese, aluminum), clay minerals and particulate organic matter, providing additional sorption capacity in the soils.

- **Stability Modeling for Adsorbed Constituents:** Stability modeling indicates that for the conditions (i.e. pH, Eh, and TDS ranges) determined in groundwater at the Site, adsorbed species of arsenic, boron, cobalt, and molybdenum are relatively stable and remain attenuated. The modeling results further suggest that the adsorption of arsenic, cobalt, and molybdenum could be reversed with sufficiently large fluctuations in pH and Eh conditions at the Site, but there is no historical basis to expect such occurrences. Based on the mineralogical test results for Site soils, carbonate minerals are widely distributed downgradient of the CCR Unit. Groundwater that is in contact with carbonate minerals is typically buffered against large fluctuations in pH. Total alkalinity concentrations in groundwater at the Site (generally between 50 and 410 mg $CaCO_3$/L) support the notion that the groundwater has significant buffering capacity.

  Modeling results also indicate that increasing TDS concentrations could result in an increase in aqueous concentrations of arsenic, cobalt, and molybdenum due to competition for sorption sites. However, the impact is predicted to be relatively minor over the range of TDS concentrations observed at the site. The maximum TDS concentration measured in porewater was 3,830 mg/L and even at those levels, there is sufficient attenuation capacity from the soils to maintain arsenic, boron, cobalt, and molybdenum concentrations below GWPS

9.0 CONCLUSIONS

Golder performed a supplemental Assessment Monitoring followed by an attenuation evaluation, which serve as the Tier I, II, and III evaluation of MNA feasibility at RMSGS for arsenic, boron, cobalt, lithium, and molybdenum with respect to the CCR Unit. This evaluation has been completed in accordance with guidance and best practices promulgated by the USEPA (USEPA 2007a and 2007b) and the ITRC (ITRC 2010). Based on the results of this evaluation, Golder makes the following assessment for the individual parameters:

- Arsenic: Physical and chemical attenuation is occurring and co-precipitation is possible, levels are stable, and the aquifer has the capacity to attenuate arsenic. Arsenic is a candidate for MNA at the RMSGS Site.
- Boron: Physical attenuation of boron is occurring at the RMSGS based on substantial decreases of boron in assessment wells. However, the high levels of boron upgradient of the CCR impoundments make it difficult to determine if the evaluation of if MNA will be successful. An alternative or natural source of boron should be further investigated prior to making a MNA determination for boron based on current findings.
- Cobalt: Chemical and physical attenuation is occurring and co-precipitation is possible, levels are stable, and the aquifer has the capacity to attenuate arsenic. Cobalt is a candidate for MNA at the RMSGS Site.
- Lithium: Physical attenuation is occurring, levels are stable, and the aquifer has the capacity to attenuate arsenic. Lithium is a candidate for MNA at the RMSGS Site.
- Molybdenum: Physical and some chemical attenuation is occurring, levels are stable, and the aquifer has the capacity to attenuate arsenic. Molybdenum is a candidate for MNA at the RMSGS Site.

Therefore, it is recommended that a Tier IV evaluation be completed to design a long-term monitoring plan and contingent remedy for arsenic, boron, cobalt, lithium, and molybdenum.

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Tables

Table 4: Summary of Travel Time Simulations and Attenuation Estimates
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

	Shallow Flow Paths				Deep Flow Paths			
Starting Well	**GAMW-16**	**GAMW-18**	**GAMW-17B**	**GAMW-09B**	**GAMW-16B**	**GAMW-18B**	**GAMW-17B**	**GAMW-09B**
Ending Well	**GAMW-53**	**GAMW-55**	**GAMW-54B**	**GAMW-54B**	**GAMW-53B**	**GAMW-55B**	**GAMW-54B**	**GAMW-54B**
Distance (ft)	**1521**	**1964**	**1200**	**1714**	**1521**	**1964**	**1200**	**1714**
Effective Porosity = 16%								
Travel Time (years)	4.8	11.0	4.5	8.9	5.0	11.0	5.5	9.0
Velocity (ft/year)	317	179	267	193	304	179	218	190
Time to Davis Ditch (years)	5.5	-	-	-	6	-	-	-
Time to property boundry near GAMW46B (years)	-	27	49	41	-	28.5	45	41
Effective Porosity = 30%								
Travel Time (years)	8.5	19.8	8.0	16.0	8.9	20.0	10.0	16.5
Velocity (ft/year)	179	99	150	107	171	98	120	104
Time to Davis Ditch (years)	10	-	-	-	9.9	-	-	-
Time to property boundry near GAMW46B (years)	-	49.8	79	75	-	51.5	80	76
Effective Porosity = 46%								
Travel Time (years)	13.0	31.0	12.0	25.0	13.5	29.0	15.0	25.0
Velocity (ft/year)	117	63	100	69	113	68	80	69
Time to Davis Ditch (years)	15	-	-	-	15	-	-	-
Time to property boundry near GAMW46B (years)	-	76.8	122	117	-	77	130	120
Estimate of Dilution/Attenuation Along Flow Path								
Starting concentration (mg/L)	9.7	13	12	12	9.7	13	12	12
End concentration (mg/L)	3.1	8.2	6.4	6.4	3.1	8.2	6.4	6.4
End Concentration as % of starting concentration	32%	63%	53%	53%	32%	63%	53%	53%
Dilution/Attenuation along flow path	68%	37%	47%	47%	68%	37%	47%	47%

Notes:
ft = feet
mg/L = milligrams per liter

Prepared by: GOL
Checked by: PJN
Reviewed by: RWB

Table 5: Groundwater Geochemical Modeling Results
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Parameter	Units	GAPIEZ06 08-2018	GAPIEZ06 09-2018	GAPIEZ06 10-2018	DAPZ-02A 03-2020	DAPZ-02B 03-2020	GAMW04 10-2018	GAMW04 04-2019	GAMW04 11-2019	GAMW07 10-2018	GAMW07 05-2019	GAMW07 11-2019	GAMW07B 09-2018	GAMW07B 10-2018	GAMW07B 05-2019	GAMW07B 11-2019
Charge Balance	% error	-3.9	-1.3	-5.5	-7.8	-4.3	5.1	-1.3	-9.0	-3.7	-3.7	**-10.8**	**82.8**	-6.8	-7.0	**-10.1**
MINERAL PHASES - Saturation Indices [a]																
Otavite	$CdCO_3$	-2.3	-2.3	-1.1	-3.2	-2.6	-2.9	-3.1	-2.4	-3.8	-2.3	-2.1	-1.5	-3.2	-2.4	-2.8
Ferrihydrite	$Fe(OH)_3$	**2.1**	**2.1**	**3.1**	**0.5**	**2.2**	**2.9**	**1.4**	**0.5**	-6.6	**1.9**	**0.4**	**3.6**	-1.6	**4.2**	**-0.2**
Siderite	$FeCO_3$	**-0.1**	**-0.1**	-0.8	**-0.4**	-0.7	-2.1	**0.5**	-1.7	-3.3	-3.6	-1.4	**1.1**	-0.5	-0.7	**-0.3**
Melanterite	$FeSO_4$ $7H_2O$	-4.9	-5.0	-7.2	-4.5	-5.1	-6.1	-4.0	-6.5	-6.7	-8.3	-6.5	-6.8	-4.4	-5.3	-4.5
Anglesite	$PbSO_4$	-4.5	-4.5	-6.1	-4.2	-4.4	-4.0	-4.2	-4.5	-4.2	-4.5	-4.7	-7.4	-4.0	-4.3	-4.1
Gypsum	$CaSO_4$:$2H_2O$	-0.6	-0.6	-0.6	-0.7	-1.0	**0.0**	**-0.4**	-0.7	-0.6	-0.7	-0.7	-2.5	**-0.2**	**-0.2**	**-0.2**
Jarosite-H	$(H_3O)Fe_3(SO_4)_2(OH)_6$	-7.1	-6.9	-11.4	-7.6	-5.6	-3.6	-8.9	-10.7	-26.4	-6.7	-12.2	-10.2	-15.0	-0.7	-12.1
Jarosite-K	$KFe_3(SO_4)_2(OH)_6$	**-0.4**	**-0.3**	-3.0	-2.1	**1.3**	**4.5**	-1.3	-4.3	-21.4	**0.2**	-5.3	-2.2	-8.4	**6.8**	-5.1
Jarosite-Na	$NaFe_3(SO_4)_2(OH)_6$	-2.5	-2.4	-4.9	-5.0	-1.8	**1.6**	-3.0	-6.7	-24.5	-3.0	-8.6	-4.3	-10.6	**4.5**	-7.6
Calcite	$CaCO_3$	**0.3**	**0.2**	**1.8**	-0.6	**-0.4**	**0.0**	**0.1**	**0.1**	-1.2	**0.2**	**0.4**	**1.3**	**-0.3**	**0.4**	**0.0**
Magnesite	$MgCO_3$	-0.9	-1.0	**0.5**	-2.1	-1.7	-1.5	-1.4	-1.3	-2.6	-1.1	-0.9	**0.0**	-1.5	-0.8	-1.3
Barite	$BaSO_4$	**0.7**	**0.6**	**0.7**	**1.0**	**0.9**	**0.9**	**1.1**	**0.9**	**0.9**	**0.9**	**0.7**	-1.2	**1.2**	**1.1**	**1.0**
Witherite	$BaCO_3$	-3.8	-3.9	-2.3	-4.4	-3.9	-4.4	-3.7	-3.6	-5.1	-3.7	-3.5	-2.7	-4.3	-3.6	-4.1
Fluorite	CaF_2	-1.0	-0.8	-1.0	-2.0	-2.4	-2.3	-1.5	-2.1	-1.1	-0.8	-1.0	**0.8**	**-0.4**	-0.6	-0.6
CoCO3	$CoCO_3$	-4.2	-4.4	-2.9	-4.3	-4.2	-4.1	-4.2	-4.3	-4.3	-3.1	-3.0	-3.2	-5.0	-4.2	-4.6
Cerrusite	$PbCO_3$	-2.0	-2.1	-2.1	-2.6	-2.0	-2.2	-2.0	-2.1	-3.2	-2.0	-2.0	-1.9	-2.5	-2.0	-2.2
Carbon Dioxide	$pCO_2(g)$ [b]	-2.3	-2.2	-4.5	-1.0	-1.8	-2.4	-2.4	-1.7	**-0.3**	-1.8	-2.1	-3.2	-1.6	-2.4	-2.0

Notes:
Charge balances errrors highlighted in **red** are greater than +/-10%
Non-detect values assumed equal to 1/2 analytical detection limit
Redox converted from field ORP to Eh by +200 mV
[a] Saturation indices greater than -0.5 are identified by bold type and grey shading
[b] pCO2(g) values presented at 10^^value atm

Table 5: Groundwater Geochemical Modeling Re
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Parameter	Units	GAMW08 10-2018	GAMW08 05-2019	GAMW08 11-2019	GAMW08B 09-2018	GAMW08B 10-2018	GAMW08B 05-2019	GAMW08B 11-2019	GAMW09 10-2018	GAMW09 05-2019	GAMW09 11-2019	GAMW09B 09-2018	GAMW09B 10-2018	GAMW09B 05-2019	GAMW09B 11-2019
Charge Balance	% error	-2.9	-3.7	-6.6	-9.7	**-12.2**	-8.3	**-11.7**	-5.0	-5.0	-6.0	-5.7	-6.7	-3.0	-6.5
MINERAL PHASES - Saturation Indices [(a)]															
Otavite	$CdCO_3$	-2.5	-2.1	-2.0	-2.3	-2.5	-2.5	-2.2	-3.0	-2.8	-2.8	-2.4	-2.3	-2.2	-2.2
Ferrihydrite	$Fe(OH)_3$	**1.7**	**2.3**	**2.4**	**1.8**	**3.1**	**4.1**	**3.6**	**0.2**	**1.3**	**0.7**	**2.0**	**2.5**	**3.7**	**2.2**
Siderite	$FeCO_3$	-1.8	-2.2	-2.1	**0.2**	**0.1**	**-0.4**	**0.1**	-2.3	-3.1	-2.5	**-0.2**	**-0.1**	**-0.2**	**0.1**
Melanterite	$FeSO_4\ 7H_2O$	-6.7	-7.3	-7.2	-4.5	-4.4	-4.9	-4.6	-6.7	-7.3	-7.0	-5.1	-5.1	-5.2	-5.0
Anglesite	$PbSO_4$	-4.6	-4.8	-4.8	-4.4	-4.2	-4.2	-4.4	-4.3	-4.2	-4.3	-4.5	-4.6	-4.7	-4.7
Gypsum	$CaSO_4{:}2H_2O$	-0.7	-0.6	-0.5	**-0.2**	**-0.2**	**-0.2**	**-0.2**	-0.7	-0.6	-0.8	-0.8	-0.7	-0.8	-0.9
Jarosite-H	$(H_3O)Fe_3(SO_4)_2(OH)_6$	-6.6	-6.5	-6.5	-8.4	-3.5	-0.9	-3.6	-10.6	-8.2	-10.1	-6.8	-6.1	-2.6	-7.3
Jarosite-K	$KFe_3(SO_4)_2(OH)_6$	**0.0**	**0.9**	**1.0**	-1.3	**3.4**	**6.2**	**4.0**	-4.3	-1.3	-3.7	**-0.3**	**0.5**	**4.2**	-0.7
Jarosite-Na	$NaFe_3(SO_4)_2(OH)_6$	-2.9	-2.1	-1.9	-3.1	**1.4**	**4.3**	**2.0**	-7.1	-4.2	-6.5	-2.2	-1.5	**2.1**	-2.9
Calcite	$CaCO_3$	**0.2**	**0.5**	**0.7**	**0.6**	**0.3**	**0.3**	**0.6**	**-0.3**	**-0.3**	**-0.4**	**0.0**	**0.3**	**0.2**	**0.2**
Magnesite	$MgCO_3$	-1.2	-0.7	-0.6	-0.9	-1.1	-1.2	-0.8	-2.0	-1.8	-2.0	-1.0	-0.8	-0.8	-0.8
Barite	$BaSO_4$	**0.7**	**0.9**	**1.0**	**1.0**	**0.9**	**0.8**	**0.8**	**0.6**	**0.8**	**0.6**	**0.8**	**0.8**	**0.7**	**0.5**
Witherite	$BaCO_3$	-3.7	-3.3	-3.2	-3.6	-4.0	-4.0	-3.7	-4.3	-4.2	-4.3	-3.7	-3.6	-3.6	-3.7
Fluorite	CaF_2	**-0.4**	**-0.1**	**-0.2**	**-0.4**	**-0.5**	**-0.2**	**-0.3**	-1.9	-1.9	-1.9	-0.5	-0.6	-0.6	-0.6
CoCO3	$CoCO_3$	-2.9	-2.8	-2.5	-4.0	-4.4	-4.3	-4.0	-4.8	-4.7	-4.8	-4.1	-4.3	-4.4	-4.0
Cerrusite	$PbCO_3$	-2.2	-1.9	-1.9	-2.0	-2.1	-2.1	-1.9	-2.4	-2.2	-2.3	-2.1	-2.0	-2.0	-2.0
Carbon Dioxide	$pCO_2(g)$ [(b)]	-1.5	-1.8	-2.0	-2.6	-2.3	-2.5	-2.7	-1.7	-2.1	-2.0	-2.1	-2.2	-2.2	-2.4

Notes:

Charge balances errrors highlighted in **red** are greater than +/-10%

Non-detect values assumed equal to 1/2 analytical detection limit

Redox converted from field ORP to Eh by +200 mV

[(a)] Saturation indices greater than -0.5 are identified by bold type and grey shading

[(b)] pCO2(g) values presented at $10^{\wedge value}$ atm

Table 5: Groundwater Geochemical Modeling Re
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Parameter	Units	GAMW15 10-2018	GAMW15 05-2019	GAMW15 11-2019	GAMW15B 09-2018	GAMW15B 10-2018	GAMW15B 05-2019	GAMW15B 11-2019	GAMW16 10-2018	GAMW16 05-2019	GAMW16 11-2019	GAMW16B 09-2018	GAMW16B 10-2018	GAMW16B 05-2019	GAMW16B 11-2019
Charge Balance	% error	0.4	-4.5	-7.1	-5.7	-3.8	-5.0	-5.3	-0.7	-7.5	8.2	-3.0	-2.7	-4.4	-8.7
MINERAL PHASES - Saturation Indices [a]															
Otavite	$CdCO_3$	-4.3	-2.6	-2.3	-2.0	-3.0	-2.5	-2.3	-2.3	-2.2	-4.1	-1.8	-2.7	-2.4	-2.1
Ferrihydrite	$Fe(OH)_3$	-6.2	**2.7**	**2.5**	**3.3**	-2.6	**3.8**	**1.1**	**0.0**	**3.3**	**4.1**	**4.1**	**0.5**	**4.2**	**3.8**
Siderite	$FeCO_3$	-1.6	**0.1**	**0.2**	**0.0**	-0.9	-0.8	**0.0**	**-0.3**	-0.7	-3.0	**0.6**	**-0.1**	**-0.1**	**0.5**
Melanterite	$FeSO_4\ 7H_2O$	-4.7	-4.4	-4.9	-5.1	-5.0	-5.2	-4.8	-5.3	-5.6	-6.2	-4.8	-4.6	-4.8	-4.5
Anglesite	$PbSO_4$	-4.3	-4.4	-4.7	-4.7	-4.1	-4.2	-4.5	-4.6	-4.5	-4.1	-4.9	-4.3	-4.4	-4.6
Gypsum	$CaSO_4{:}2H_2O$	-1.1	-0.9	-1.1	-0.6	-0.6	**-0.3**	**-0.4**	-0.9	-0.6	-0.6	**-0.4**	**-0.4**	**-0.3**	**-0.3**
Jarosite-H	$(H_3O)Fe_3(SO_4)_2(OH)_6$	-23.5	-4.2	-5.9	-4.8	-18.1	-1.4	-10.2	-13.0	-3.6	-2.5	-2.9	-9.9	-0.7	-3.0
Jarosite-K	$KFe_3(SO_4)_2(OH)_6$	-19.4	**2.5**	**0.5**	**2.3**	-12.0	**5.9**	-3.2	-6.6	**3.4**	**4.5**	**4.3**	-3.7	**6.4**	**4.3**
Jarosite-Na	$NaFe_3(SO_4)_2(OH)_6$	-21.9	**-0.1**	-2.0	**0.3**	-13.9	**3.9**	-5.3	-9.1	**0.8**	**1.9**	**2.1**	-5.9	**4.1**	**2.6**
Calcite	$CaCO_3$	-2.1	**-0.3**	**-0.1**	**0.6**	**-0.4**	**0.2**	**0.4**	**0.1**	**0.3**	-1.5	**0.9**	**0.1**	**0.4**	**0.7**
Magnesite	$MgCO_3$	-3.4	-1.4	-1.3	-0.8	-1.8	-0.9	-1.0	-1.4	-1.1	-3.0	**-0.5**	-1.4	-0.9	-0.7
Barite	$BaSO_4$	**0.5**	**0.8**	**0.5**	**1.1**	**1.0**	**1.4**	**1.0**	**0.5**	**0.7**	**0.6**	**1.0**	**1.0**	**1.2**	**1.1**
Witherite	$BaCO_3$	-5.8	-4.0	-3.8	-3.1	-4.2	-3.5	-3.5	-3.9	-3.7	-5.6	-3.0	-3.9	-3.4	-3.2
Fluorite	CaF_2	-1.3	-1.5	-1.3	-1.4	-1.3	-1.0	-0.9	-0.8	-0.8	-0.8	-1.0	-1.1	-1.0	-0.9
CoCO3	$CoCO_3$	-5.5	-3.6	-3.6	-4.0	-4.8	-4.3	-4.1	-4.1	-4.0	-5.8	-3.6	-4.5	-4.2	-3.9
Cerrusite	$PbCO_3$	-3.7	-2.1	-2.1	-1.9	-2.4	-2.0	-2.0	-2.1	-2.0	-3.4	-1.9	-2.3	-2.0	-2.0
Carbon Dioxide	$pCO_2(g)$ [b]	**0.1**	-1.9	-2.1	-2.6	-1.5	-2.2	-2.4	-2.0	-2.2	-4.8	-2.7	-1.7	-2.3	-2.6

Notes:

Charge balances errrors highlighted in **red** are greater than +/-10%

Non-detect values assumed equal to 1/2 analytical detection limit

Redox converted from field ORP to Eh by +200 mV

[a] Saturation indices greater than -0.5 are identified by bold type and grey shading

[b] pCO2(g) values presented at $10^{\wedge value}$ atm

Table 5: Groundwater Geochemical Modeling Re
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Parameter	Units	GAMW17 10-2018	GAMW17 05-2019	GAMW17 11-2019	GAMW17B 09-2018	GAMW17B 10-2018	GAMW17B 05-2019	GAMW17B 11-2019	GAMW18 10-2018	GAMW18 04-2019	GAMW18 11-2019	GAMW18B 09-2018	GAMW18B 10-2018	GAMW18B 04-2019	GAMW18B 11-2019
Charge Balance	% error	0.8	-0.5	-6.6	-3.6	1.1	0.6	-4.3	**-10.9**	-6.4	-9.2	-3.2	**-10.4**	**-48.7**	**-10.9**
MINERAL PHASES - Saturation Indices [a]															
Otavite	$CdCO_3$	-2.8	-2.2	-1.9	-2.0	-2.2	-2.3	-2.0	-3.0	-3.0	-2.5	-2.0	-2.9	-4.7	-2.1
Ferrihydrite	$Fe(OH)_3$	-2.9	**2.5**	**2.9**	**3.3**	**0.1**	**3.6**	**4.3**	-0.7	**1.7**	**0.9**	**2.8**	**0.6**	**2.1**	**2.2**
Siderite	$FeCO_3$	-2.1	-2.6	-2.6	**0.4**	**0.3**	**0.1**	**-0.1**	-2.5	-2.9	-1.8	**0.6**	-0.5	-5.1	**0.1**
Melanterite	$FeSO_4\ 7H_2O$	-6.8	-7.7	-8.1	-5.0	-4.9	-5.0	-5.5	-6.7	-6.8	-6.4	-4.5	-4.7	-7.3	-4.9
Anglesite	$PbSO_4$	-4.5	-4.8	-5.0	-4.9	-4.8	-4.8	-4.9	-4.3	-4.1	-4.3	-4.6	-4.1	-3.7	-4.6
Gypsum	$CaSO_4{:}2H_2O$	-0.8	-1.0	-1.1	-0.9	-0.9	-1.0	-0.9	-0.6	**-0.4**	**-0.3**	**-0.4**	**-0.5**	**-0.4**	-0.6
Jarosite-H	$(H_3O)Fe_3(SO_4)_2(OH)_6$	-19.9	-6.7	-6.3	-4.5	-13.3	-2.1	-1.6	-12.0	-5.3	-9.3	-5.6	-8.8	-5.3	-7.6
Jarosite-K	$KFe_3(SO_4)_2(OH)_6$	-14.0	**0.2**	**0.6**	**2.5**	-6.5	**4.7**	**5.5**	-6.4	**0.8**	-2.8	**1.6**	-2.6	**1.1**	-0.5
Jarosite-Na	$NaFe_3(SO_4)_2(OH)_6$	-16.7	-2.4	-2.1	**0.2**	-8.8	**1.8**	**2.9**	-9.0	-1.7	-5.3	**-0.3**	-4.4	-2.5	-2.4
Calcite	$CaCO_3$	**-0.2**	**0.1**	**0.4**	**0.5**	**0.3**	**0.2**	**0.4**	**-0.4**	**-0.4**	**0.3**	**0.6**	**-0.3**	-2.1	**0.4**
Magnesite	$MgCO_3$	-1.4	-0.8	-0.7	-0.9	-1.0	-0.9	-0.7	-2.2	-2.1	-1.5	-0.6	-1.5	-4.6	-0.7
Barite	$BaSO_4$	**0.8**	**0.6**	**0.6**	**0.7**	**0.8**	**0.9**	**0.8**	**0.7**	**0.9**	**1.0**	**1.0**	**0.9**	**1.0**	**0.6**
Witherite	$BaCO_3$	-4.0	-3.6	-3.3	-3.2	-3.4	-3.3	-3.2	-4.5	-4.5	-3.8	-3.3	-4.3	-6.0	-3.7
Fluorite	CaF_2	**-0.5**	-0.6	-0.6	-1.1	-1.3	-1.3	-1.3	-3.3	-2.9	-2.3	-1.2	-1.3	-0.9	-1.0
CoCO3	$CoCO_3$	-4.6	-4.0	-3.8	-4.0	-4.0	-4.2	-3.8	-4.8	-5.2	-4.3	-4.1	-5.0	-6.8	-4.3
Cerrusite	$PbCO_3$	-2.4	-2.0	-2.0	-2.0	-2.0	-2.1	-2.0	-2.5	-2.4	-2.1	-2.0	-2.3	-3.8	-2.0
Carbon Dioxide	$pCO_2(g)$ [b]	-1.6	-2.4	-2.6	-2.3	-2.1	-1.7	-2.4	-1.2	-1.5	-1.8	-2.4	-1.5	-3.9	-2.4

Notes:

Charge balances errrors highlighted in **red** are greater than +/-10%

Non-detect values assumed equal to 1/2 analytical detection limit

Redox converted from field ORP to Eh by +200 mV

[a] Saturation indices greater than -0.5 are identified by bold type and grey shading

[b] pCO2(g) values presented at $10^{\wedge value}$ atm

Table 5: Groundwater Geochemical Modeling Re
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Parameter	Units	GAMW52 09-2018	GAMW52 10-2018	GAMW52 05-2019	GAMW52 11-2019	GAMW52B 09-2018	GAMW52B 10-2018	GAMW52B 05-2019	GAMW52B 11-2019	GAMW53 09-2018	GAMW53 10-2018	GAMW53 04-2019	GAMW53 11-2019	GAMW53B 09-2018	GAMW53B 10-2018
Charge Balance	% error	-2.9	3.4	4.0	-1.3	-7.2	1.1	-1.7	-6.4	3.9	2.9	-1.5	1.3	-0.7	-1.6
MINERAL PHASES - Saturation Indices [a]															
Otavite	$CdCO_3$	-1.9	-2.7	-2.3	-1.9	-1.6	-2.9	-2.3	-2.4	-3.5	-3.0	-4.0	-3.5	-2.2	-2.2
Ferrihydrite	$Fe(OH)_3$	**2.9**	**2.2**	**2.3**	**2.3**	**3.4**	**1.5**	**3.8**	**2.0**	**-0.1**	-1.9	-0.8	-1.1	**1.1**	**1.3**
Siderite	$FeCO_3$	-1.0	-2.7	-3.1	-1.3	**1.2**	**-0.1**	**-0.4**	**-0.1**	-1.4	-1.1	-2.9	-2.3	**0.1**	**0.1**
Melanterite	$FeSO_4\ 7H_2O$	-6.9	-8.4	-8.9	-7.3	-5.2	-5.3	-5.7	-5.3	-5.9	-6.0	-6.7	-6.7	-5.1	-5.1
Anglesite	$PbSO_4$	-5.4	-5.3	-5.5	-5.5	-5.9	-4.9	-5.0	-4.8	-4.4	-4.6	-4.5	-4.7	-4.8	-4.7
Gypsum	$CaSO_4{:}2H_2O$	-1.6	-2.0	-2.3	-1.7	-1.2	-1.2	-1.3	-1.1	-2.0	-1.9	-2.4	-2.3	-0.8	-0.7
Jarosite-H	$(H_3O)Fe_3(SO_4)_2(OH)_6$	-6.2	-7.4	-7.9	-8.7	-7.5	-8.4	-2.7	-7.4	-9.6	-16.9	-11.6	-13.6	-9.8	-9.2
Jarosite-K	$KFe_3(SO_4)_2(OH)_6$	**0.3**	-1.3	-1.7	-2.0	**0.1**	-1.9	**4.2**	-0.7	-5.0	-11.7	-6.6	-8.6	-3.6	-2.8
Jarosite-Na	$NaFe_3(SO_4)_2(OH)_6$	-2.4	-4.1	-4.5	-4.7	-1.8	-3.8	**2.2**	-2.6	-7.9	-14.6	-9.6	-11.7	-5.6	-4.8
Calcite	$CaCO_3$	**0.2**	**-0.4**	**-0.4**	**0.2**	**1.1**	**0.0**	**0.1**	**0.1**	-1.7	-1.1	-2.6	-2.0	**0.3**	**0.3**
Magnesite	$MgCO_3$	-1.1	-1.6	-1.5	-1.0	**-0.2**	-1.3	-1.1	-1.2	-2.9	-2.4	-3.5	-3.0	-1.3	-1.3
Barite	$BaSO_4$	**0.0**	-0.6	-0.8	**-0.3**	**1.1**	**1.1**	**1.1**	**1.3**	**-0.3**	**-0.3**	**-0.3**	**-0.3**	**0.6**	**0.7**
Witherite	$BaCO_3$	-3.5	-4.3	-4.3	-3.7	-1.9	-3.1	-2.8	-2.9	-5.3	-4.8	-5.9	-5.3	-3.5	-3.5
Fluorite	CaF_2	-2.0	-2.2	-2.4	-2.1	**0.4**	-2.4	-2.4	-2.3	-2.8	-2.7	-4.8	-4.7	-1.5	-1.6
CoCO3	$CoCO_3$	-3.7	-4.4	-4.2	-3.8	-3.2	-4.5	-4.0	-4.1	-5.1	-4.6	-5.9	-5.4	-4.0	-4.0
Cerrusite	$PbCO_3$	-2.0	-2.1	-2.0	-2.0	-2.0	-2.2	-2.0	-2.1	-2.6	-2.3	-3.1	-2.8	-2.1	-2.1
Carbon Dioxide	$pCO_2(g)$ [b]	-2.1	-1.8	-1.9	-2.3	-3.0	-1.8	-2.1	-2.1	-0.9	-1.3	-1.2	-1.3	-1.9	-2.0

Notes:

Charge balances errrors highlighted in **red** are greater than +/-10%

Non-detect values assumed equal to 1/2 analytical detection limit

Redox converted from field ORP to Eh by +200 mV

[a] Saturation indices greater than -0.5 are identified by bold type and grey shading

[b] pCO2(g) values presented at $10^{\wedge value}$ atm

Table 5: Groundwater Geochemical Modeling Re
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Parameter	Units	GAMW53B 04-2019	GAMW53B 11-2019	GAMW54 09-2018	GAMW54 10-2018	GAMW54 04-2019	GAMW54 11-2019	GAMW54B 09-2018	GAMW54B 10-2018	GAMW54B 05-2019	GAMW54B 11-2019	GAMW55 09-2018	GAMW55 10-2018	GAMW55B 09-2018	GAMW55B 10-2018
Charge Balance	% error	-2.8	-2.7	-1.7	2.0	-3.0	-3.0	-1.5	1.8	-6.0	-3.8	-1.3	0.7	-6.0	-2.6
MINERAL PHASES - Saturation Indices [a]															
Otavite	$CdCO_3$	-2.1	-2.1	-3.3	-1.7	-2.8	-2.3	-2.7	-1.2	-2.4	-2.4	-2.8	-2.5	-2.6	-2.5
Ferrihydrite	$Fe(OH)_3$	**4.1**	**3.3**	**1.5**	**-0.3**	**1.4**	**1.0**	**1.0**	**2.9**	**3.4**	**2.8**	**2.1**	**0.9**	**1.2**	**1.7**
Siderite	$FeCO_3$	**-0.4**	**0.1**	-2.5	-0.6	-2.1	-1.1	**-0.1**	**1.5**	**0.1**	**0.1**	-1.2	-1.4	**-0.1**	**0.0**
Melanterite	$FeSO_4\ 7H_2O$	-5.8	-5.3	-6.7	-6.6	-6.6	-6.5	-4.7	-4.7	-4.8	-4.7	-5.8	-6.1	-4.7	-4.7
Anglesite	$PbSO_4$	-4.9	-4.9	-4.5	-5.4	-4.5	-5.1	-4.3	-5.8	-4.5	-4.5	-4.4	-4.5	-4.4	-4.4
Gypsum	$CaSO_4{:}2H_2O$	-0.9	-1.0	-1.3	-1.4	-1.2	-1.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.5	-0.5	**-0.5**
Jarosite-H	$(H_3O)Fe_3(SO_4)_2(OH)_6$	-1.4	-4.2	-4.8	-17.1	-7.5	-10.3	-8.3	-9.7	-2.4	-3.8	-4.3	-9.0	-7.9	-6.8
Jarosite-K	$KFe_3(SO_4)_2(OH)_6$	**5.2**	**2.4**	**0.0**	-10.5	-1.7	-4.4	-2.1	-1.6	**4.2**	**2.7**	**1.7**	-2.6	-1.7	**-0.4**
Jarosite-Na	$NaFe_3(SO_4)_2(OH)_6$	**3.0**	**0.2**	-2.4	-12.9	-4.1	-7.0	-4.0	-3.6	**2.2**	**0.7**	-0.9	-5.2	-3.6	-2.3
Calcite	$CaCO_3$	**0.4**	**0.3**	-1.1	**0.5**	-0.7	**-0.2**	**-0.1**	**1.6**	**0.2**	**0.2**	**-0.1**	**0.1**	**0.1**	**0.2**
Magnesite	$MgCO_3$	-1.1	-1.2	-2.5	-0.8	-1.8	-1.5	-1.5	**0.2**	-1.1	-1.1	-1.7	-1.4	-1.4	-1.2
Barite	$BaSO_4$	**0.5**	**0.7**	**0.4**	**0.3**	**0.4**	**-0.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.0**	**0.9**	**1.3**	**1.2**
Witherite	$BaCO_3$	-3.5	-3.3	-4.8	-3.2	-4.4	-4.0	-3.7	-2.1	-3.5	-3.5	-3.8	-3.7	-3.5	-3.4
Fluorite	CaF_2	-1.5	-1.3	-2.6	-2.6	-2.7	-2.2	-1.7	-1.5	-1.4	-1.3	-1.4	-1.5	-2.0	-2.1
CoCO3	$CoCO_3$	-3.9	-3.9	-5.1	-3.5	-4.6	-4.2	-4.5	-3.0	-4.2	-4.2	-3.5	-3.4	-4.6	-4.3
Cerrusite	$PbCO_3$	-2.0	-2.1	-2.8	-2.0	-2.2	-2.1	-2.3	-2.0	-2.1	-2.1	-2.4	-2.2	-2.3	-2.2
Carbon Dioxide	$pCO_2(g)$ [b]	-2.0	-2.2	-1.0	-2.7	-1.6	-1.7	-1.6	-3.5	-1.9	-1.8	-1.4	-1.7	-1.7	-1.9

Notes:

Charge balances errrors highlighted in **red** are greater than +/-10%

Non-detect values assumed equal to 1/2 analytical detection limit

Redox converted from field ORP to Eh by +200 mV

[a] Saturation indices greater than -0.5 are identified by bold type and grey shading

[b] pCO2(g) values presented at $10^{\wedge value}$ atm

Table 5: Groundwater Geochemical Modeling Re
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Parameter	Units	GAMW55B 05-2019	GAMW55B 11-2019	GAMW55R 11-2019	GAMW56 09-2018	GAMW56 10-2018	GAMW56 04-2019	GAMW56 11-2019	GAMW56B 09-2018	GAMW56B 10-2018	GAMW56B 04-2019	GAMW56B 11-2019
Charge Balance	% error	-5.4	-6.2	-5.5	4.4	-1.6	**61.8**	3.5	0.7	2.6	**-13.1**	-4.8
MINERAL PHASES - Saturation Indices [a]												
Otavite	$CdCO_3$	-2.4	-2.2	-2.3	-2.4	-2.0	-2.7	-2.2	-2.3	-2.3	-2.3	-2.3
Ferrihydrite	$Fe(OH)_3$	**3.0**	**2.0**	**1.4**	**1.5**	**2.5**	**2.9**	**1.7**	**1.2**	**2.0**	**3.7**	**1.7**
Siderite	$FeCO_3$	**0.0**	**0.2**	-1.9	**0.5**	**0.8**	-0.7	**0.1**	**0.2**	**0.1**	**0.2**	**0.1**
Melanterite	$FeSO_4\ 7H_2O$	-4.8	-4.8	-6.9	-5.1	-5.1	-5.9	-5.6	-5.0	-5.2	-4.8	-4.9
Anglesite	$PbSO_4$	-4.5	-4.6	-4.6	-5.4	-5.5	-5.1	-5.4	-5.0	-5.1	-4.7	-4.7
Gypsum	$CaSO_4{:}2H_2O$	-0.6	-0.6	-0.8	-1.7	-1.7	-1.9	-1.7	-1.2	-1.3	-1.0	-0.9
Jarosite-H	$(H_3O)Fe_3(SO_4)_2(OH)_6$	-3.6	-7.1	-8.6	-8.3	-6.6	-4.3	-8.7	-8.8	-6.6	-1.5	-7.8
Jarosite-K	$KFe_3(SO_4)_2(OH)_6$	**2.9**	**-0.5**	-1.9	-2.5	**-0.4**	**2.4**	-2.6	-2.6	**-0.4**	**4.6**	-1.2
Jarosite-Na	$NaFe_3(SO_4)_2(OH)_6$	**1.0**	-2.4	-4.4	-5.4	-3.2	**0.4**	-5.7	-5.0	-2.7	**1.7**	-3.5
Calcite	$CaCO_3$	**0.2**	**0.4**	**0.2**	**-0.1**	**0.2**	-0.6	**0.1**	**0.0**	**0.0**	**0.0**	**0.1**
Magnesite	$MgCO_3$	-1.1	-1.0	-1.2	-1.5	-1.1	-1.2	-1.2	-1.2	-1.1	-1.3	-1.1
Barite	$BaSO_4$	**1.0**	**1.0**	**0.6**	**0.0**	**0.0**	**-0.1**	**-0.1**	**0.6**	**0.4**	**0.8**	**0.9**
Witherite	$BaCO_3$	-3.5	-3.4	-3.8	-3.7	-3.5	-4.2	-3.7	-3.6	-3.6	-3.5	-3.5
Fluorite	CaF_2	-2.0	-2.0	-1.3	-0.8	-1.0	-1.7	-1.2	-1.7	-1.9	-1.7	-1.7
CoCO3	$CoCO_3$	-4.2	-4.0	-4.1	-3.8	-2.9	-3.4	-2.9	-4.2	-4.2	-4.2	-4.2
Cerrusite	$PbCO_3$	-2.1	-2.1	-2.1	-2.2	-2.0	-2.2	-2.1	-2.1	-2.1	-2.0	-2.0
Carbon Dioxide	$pCO_2(g)$ [b]	-2.0	-2.1	-2.0	-1.2	-1.6	-1.6	-1.6	-1.4	-1.3	-1.6	-1.8

Notes:

Charge balances errrors highlighted in **red** are greater than +/-10%

Non-detect values assumed equal to 1/2 analytical detection limit

Redox converted from field ORP to Eh by +200 mV

[a] Saturation indices greater than -0.5 are identified by bold type and grey shading

[b] pCO2(g) values presented at 10^value atm

Prepared by: GOL
Checked by: PJN
Reviewed by: RV

Table 6: Average Point Decay Rates in Background and Downgradient Wells
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Constituent	Units	Point Decay Constants (first-order decay)	
		Background Wells	All Downgradient Wells (including Assessment Wells)
Arsenic	yr^{-1}	-0.33	**0.11**
Boron	yr^{-1}	0.04	**-0.04**
Cobalt	yr^{-1}	0.36	**-0.05**
Lithium	yr^{-1}	0.20	**-0.06**
Molybdenum	yr^{-1}	0.28	**-0.03**

Notes:
yr^{-1} = rate per year

Prepared by: GOL
Checked by: PJN
Reviewed by: RV

Table 7: Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Mineral	Mineral Formula	OW-9 18-20' (wt %)	OW-9 10-12' (wt %)	SB-52B-35'-37' (wt %)	SB-54B-30'-32' (wt %)	SB-56B-30'-32' (wt %)
Quartz	SiO_2	69	60	53	61	72
Pyrite	FeS_2	-	-	0.39	0.10	0.12
Marcasite	FeS_2	-	-	0.22	-	-
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	3.6	3.5	7.8	1.7	1.3
Biotite	$K(Mg,Fe)_3(AlSi_3O_{10})(OH)_2$	-	-	1.1	0.57	0.16
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$	-	-	2.6	1.0	1.1
Microcline	$KAlSi_3O_8$	5.2	9.1	9.2	7.5	6.6
Orthoclase	$KAlSi_3O_8$	-	-	2.2	0.65	0.57
Hematite	Fe_2O_3	-	-	0.26	0.44	0.57
Dolomite	$CaMg(CO_3)_2$	6.5	9.8	7.9	9.6	5.3
Calcite	$CaCO_3$	4.8	3.6	4.7	5.8	3.9
Albite	$NaAlSi_3O_8$	8.3	11	7.3	9.1	6.4
Epidote	$Ca_2(Al,Fe)Al_2O(SiO_4)(Si_2O_7)(OH)$	1.6	1.5	2.8	2.1	1.9
Anatase	TiO_2	-	-	-	-	-
Cancrinite	$Na_6Ca(CO_3)(AlSiO_4)_6{\cdot}2H_2O$	0.87	1.7	-	-	-
TOTAL		100	100	100	100	100

Notes:

wt % = percent by weight of each mineral

Non-detect minerals within a sample are represented with "-"

Prepared by: GOL
Checked by: PJN
Reviewed by: RV

Table 8: Sequential Extraction Procedure and Total Metal Solids Results
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Sample Location		SB-07B	DA-14	OW-9	OW-9	SB-08B	SB-52B	SB-53B	SB-53B	SB-54B	SB-55B	SB-56B
Sample Start Depth (ft bgs)		35	4	10	18	30	35	25	30	30	30	30
Sample End Depth (ft bgs)		37	6	12	20	32	37	27	32	32	32	32
Well Type		Background	Drying Well	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	SEP Step											
Aluminum	Total Metal Result	1900	3100 J+	2200 J+	1100	1300	3200	1500	1400	2000	2200	1600
Aluminum	SEP Step 1	52 U	48 U	47 U	47 U	51 U	44 U	48 U	44 U	49 U	48 U	49 U
Aluminum	SEP Step 2	15 J	63 J	16 J	35 UJ	38 UJ	8.8 J	11 J	33 UJ	12 J	36 UJ	5.9 J
Aluminum	SEP Step 3	44	540	60	15	31	33	75	30	34	23	29
Aluminum	SEP Step 4	300	1600	280	160	130	110	130	100	130	100	360
Aluminum	SEP Step 5	200 UJ	80 J	180 U	170 U	190 UJ	28 J	31 J	34 J	180 UJ	180 UJ	180 UJ
Aluminum	SEP Step 6	1000	1600	840	520	1100	1200	750	820	1400	1200	1300
Aluminum	SEP Step 7	22000	11000	23000	15000	23000	25000	16000	19000	23000	21000	25000
Aluminum	SEP SUM	23000	15000	24000	16000	24000	26000	17000	20000	24000	22000	27000
Aluminum	SEP TOTAL	25000	21000	29000	19000	23000	28000	18000	20000	29000	31000	23000
Antimony	Total Metal Result	7.7 U	18 U	17 U	17 U	7 U	6.3 UJ	6.9 UJ	6.6 UJ	7 U	7 U	7 U
Antimony	SEP Step 1	16 U	14 U	14 U	14 U	15 U	13 U	14 U	13 U	15 U	14 U	15 U
Antimony	SEP Step 2	12 U	11 U	11 U	10 U	12 U	10 U	11 U	10 U	11 U	11 U	11 U
Antimony	SEP Step 3	3.9 U	3.6 U	3.5 U	3.5 U	3.8 U	3.3 U	3.6 U	3.3 U	3.7 U	3.6 U	3.6 U
Antimony	SEP Step 4	3.9 U	3.6 U	3.5 U	3.5 U	3.8 U	3.3 U	3.6 U	3.3 U	3.7 U	3.6 U	3.6 U
Antimony	SEP Step 5	59 U	54 U	53 U	52 U	58 U	50 U	53 U	50 U	55 U	54 U	55 U
Antimony	SEP Step 6	3.9 U	3.6 U	3.5 U	3.5 U	3.8 U	3.3 U	3.6 U	3.3 U	3.7 U	3.6 U	3.6 U
Antimony	SEP Step 7	0.45 J	3.6 U	3.5 U	3.5 U	0.54 J	3.3 U	3.6 U	0.16 J	0.29 J	3.6 U	0.3 J
Antimony	SEP SUM	0.45 J	3 U	3 U	3 U	0.54 J	3 U	3 U	0.16 J	0.29 J	3 U	0.3 J
Antimony	SEP TOTAL	0.53 J	3.6 U	3.5 U	3.5 U	0.27 J	3.3 U	3.6 J	3.3 U	0.33 J	3.6 U	0.29 J
Arsenic	Total Metal Result	1.7 J	0.62 J	1.7 J	0.69 J	1.9 J	5.4 J	5	1.3 J	2.3	2 J	5
Arsenic	SEP Step 1	2.6 U	2.4 U	2.3 U	2.3 U	2.6 U	2.2 U	2.4 U	2.2 U	2.4 U	2.4 U	2.4 U
Arsenic	SEP Step 2	2 U	1.8 UJ	1.8 U	1.7 U	1.9 U	0.46 J	1.8 U	1.7 U	1.8 UJ	1.8 UJ	1.8 UJ
Arsenic	SEP Step 3	0.37 J	0.45 J	0.43 J	0.17 J	0.27 J	0.83	0.83	0.44 J	0.45 J	0.37 J	1.9
Arsenic	SEP Step 4	0.69	0.6 U	0.94	0.73	0.66	0.71 J+	0.59 U	0.56 U	0.68	0.5 J	1.1
Arsenic	SEP Step 5	9.8 U	9 U	8.8 U	8.7 U	9.6 U	8.3 UJ	8.9 UJ	8.3 UJ	9.1 U	9 U	9.1 U
Arsenic	SEP Step 6	1.2	0.3 J	0.56 J	0.54 J	1.7	2.2	1.6	0.89	1.8	1.4	3.8
Arsenic	SEP Step 7	1.3 U	0.7	0.39 J	0.34 J	1.3 U	1.2	1	0.88	1.2 U	0.6 U	1.2 U
Arsenic	SEP SUM	2.2	1.4	2.3	1.8	2.6	5.4	4	2.7	2.9	2.7	7.3
Arsenic	SEP TOTAL	2.1	2.2	1.9	3	3.1	5.4 J	5.6	2.5	4.7	3.9	6.2

Table 8: Sequential Extraction Procedure and Total Metal Solids Results
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Sample Location		SB-07B	DA-14	OW-9	OW-9	SB-08B	SB-52B	SB-53B	SB-53B	SB-54B	SB-55B	SB-56B
Sample Start Depth (ft bgs)		35	4	10	18	30	35	25	30	30	30	30
Sample End Depth (ft bgs)		37	6	12	20	32	37	27	32	32	32	32
Well Type		Background	Drying Well	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	SEP Step											
Barium	Total Metal Result	6.9 J+	7.3 J+	13	4.1	4.3 J+	8.4 J+	4.6 J+	4.3 J+	6.2	6.1	6.1
Barium	SEP Step 1	13 U	1.1 J	0.58 J	12 U	13 U	11 U	12 U	11 U	12 U	12 U	12 U
Barium	SEP Step 2	0.5 J	1.7 J	0.62 J	8.7 UJ	0.46 J	0.52 J	0.54 J	0.54 J	0.56 J	0.44 J	0.96 J
Barium	SEP Step 3	3.3 U	3.6	2.9 U	2.9 U	3.2 U	2.8 U	3 U	2.8 U	3 U	3 U	3 U
Barium	SEP Step 4	2.2 J	2.6 J	5.3	1.6 J	1.4 J	2.4 J	0.97 J	1.1 J	2.2 J	1.9 J	2.2 J
Barium	SEP Step 5	49 UJ	45 UJ	44 UJ	44 UJ	48 UJ	42 UJ	45 UJ	42 UJ	46 UJ	45 UJ	46 UJ
Barium	SEP Step 6	2.3 J	2.2 J	2.2 J	1.2 J	1.9 J	2 J	1.6 J	1.5 J+	2.3 J	2 J	2.4 J
Barium	SEP Step 7	250	230	350	220	220	250 J	190	220	230	190	260
Barium	SEP SUM	250	240	360	220	230	250	190	220	240	190	260
Barium	SEP TOTAL	270	300	390	210	190	200	170	200	220	200	230
Beryllium	Total Metal Result	1.3 U	0.053 J	0.12 J	0.064 J	1.2 U	0.19 J	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U
Beryllium	SEP Step 1	1.3 U	1.2 U	1.2 U	1.2 U	1.3 U	1.1 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U
Beryllium	SEP Step 2	0.98 UJ	0.9 UJ	0.88 UJ	0.87 UJ	0.96 UJ	0.83 UJ	0.89 UJ	0.83 UJ	0.91 UJ	0.9 UJ	0.91 UJ
Beryllium	SEP Step 3	0.33 U	0.026 J	0.021	0.29 U	0.32 U	0.28 U	0.3 U	0.28 U	0.3 U	0.3 U	0.3 U
Beryllium	SEP Step 4	0.33 U	0.026 J	0.024 J	0.02 J	0.32 U	0.28 U	0.3 U	0.28 U	0.3 U	0.3 U	0.03 J
Beryllium	SEP Step 5	4.9 UJ	4.5 UJ	4.4 UJ	4.4 UJ	4.8 UJ	4.2 UJ	4.5 UJ	4.2 UJ	4.6 UJ	4.5 UJ	4.6 UJ
Beryllium	SEP Step 6	0.045 J	0.024 J	0.036 J	0.027 J	0.039 J	0.042 J	0.026 J	0.027 J	0.045 J	0.037 J	0.067 J
Beryllium	SEP Step 7	0.29 J	0.21 J	0.39	0.24 J	0.31 J	0.35	0.23 J	0.28	0.3	0.25 J	0.46
Beryllium	SEP SUM	0.34	0.29	0.47	0.28	0.35	0.39	0.25	0.31	0.34	0.29	0.56
Beryllium	SEP TOTAL	0.37	0.3	0.41	0.28 J	0.26 J	0.35	0.25 J	0.27 J	0.33	0.27 J	0.33
Boron	Total Metal Result	26 U	5.5	7.4	3.6	23 U	21 U	23 U	22 U	23 U	23 U	23 U
Cadmium	Total Metal Result	0.64 U	0.24 U	0.11 J	0.072 J	0.59 U	0.53 U	0.57 U	0.55 U	0.58 U	0.58 U	0.3 J
Cadmium	SEP Step 1	1.3 U	1.2 U	1.2 U	1.2 U	1.3 U	1.1 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U
Cadmium	SEP Step 2	0.98 U	0.9 U	0.88 U	0.87 U	0.96 U	0.83 U	0.89 U	0.83 U	0.91 U	0.9 U	0.91 U
Cadmium	SEP Step 3	0.33 U	0.3 UJ	0.29 UJ	0.29 UJ	0.32 U	0.28 UJ	0.3 UJ	0.28 UJ	0.3 UJ	0.3 UJ	0.3 UJ
Cadmium	SEP Step 4	0.077 J	0.059 J	0.09 J	0.083 J	0.076 J	0.086 J	0.08 J	0.076 J	0.069 J	0.065 J	0.059 J
Cadmium	SEP Step 5	4.9 U	4.5 U	4.4 U	4.4 U	4.8 U	4.2 U	4.5 U	4.2 U	4.6 U	4.5 U	4.6 U
Cadmium	SEP Step 6	0.33 U	0.3 U	0.29 U	0.29 U	0.32 U	0.28 U	0.3 U	0.28 U	0.026 J	0.013 J	0.3 U
Cadmium	SEP Step 7	0.33 U	0.3 U	0.29 U	0.29 U	0.32 U	0.28 U	0.3 U	0.28 U	0.3 U	0.3 U	0.3 U
Cadmium	SEP SUM	0.077 J	0.11 J	0.09 J	0.083 J	0.076 J	0.086 J	0.08 J	0.076 J	0.095 J	0.077 J	0.059 J
Cadmium	SEP TOTAL	0.015 J	0.3 U	0.29 U	0.29 U	0.065 J	0.28 U	0.3 U	0.28 U	0.18 J	0.12 J	0.058 J

Table 8: Sequential Extraction Procedure and Total Metal Solids Results
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Sample Location		SB-07B	DA-14	OW-9	OW-9	SB-08B	SB-52B	SB-53B	SB-53B	SB-54B	SB-55B	SB-56B
Sample Start Depth (ft bgs)		35	4	10	18	30	35	25	30	30	30	30
Sample End Depth (ft bgs)		37	6	12	20	32	37	27	32	32	32	32
Well Type		Background	Drying Well	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	SEP Step											
Chromium	Total Metal Result	4.3	2.9	4.4	2.5	2.8	8.2 J	5.1	3.4	5	6	3.2
Chromium	SEP Step 1	2.6 U	2.4 U	2.3 U	2.3 U	2.6 U	2.2 U	2.4 U	2.2 U	2.4 U	2.4 U	2.4 U
Chromium	SEP Step 2	2 UJ	1.8 U	0.28 J	1.7 U	1.9 UJ	0.37 J	0.37 J	1.7 U	0.31 J	1.8 U	1.8 U
Chromium	SEP Step 3	0.29 J	0.37 J	0.52 J	0.16 J	0.17 J	1.1	0.97	0.27 J	1.1	0.14 J	0.19 J
Chromium	SEP Step 4	1.2	1.1	0.94	0.57 J	0.55 J	0.68	0.58 J	0.51 J	0.73	0.6	1
Chromium	SEP Step 5	9.8 U	9 UJ	1.5 J	1.3 J	9.6 U	8.3 U	8.9 U	8.3 U	9.1 U	9 U	9.1 U
Chromium	SEP Step 6	2.5	0.99	2.1	1.7	3.1	3.5	2.2	2.2	3.7	3.3	3
Chromium	SEP Step 7	5.5	3.7	7.3	5.2	7.2	9	5	7.3	8.5	6.7	13
Chromium	SEP SUM	9.4	8.1	13	8.8	11	15	9.1	10	14	11	17
Chromium	SEP TOTAL	9.5	6.9	11	8.3	8.8	16 J	10	8.7	17	13	9.2
Cobalt	Total Metal Result	3.5 J	1.1	1.8	2.2	2.9 J	5.2 J	5.7	2.6 J	5.7 J	3.9 J	3 J
Cobalt	SEP Step 1	13 U	12 U	12 U	12 U	13 U	11 U	12 U	11 U	12 U	12 U	12 U
Cobalt	SEP Step 2	0.54 J	9 U	8.8 U	8.7 U	0.35 J	0.44 J	0.63 J	0.38 J	0.62 J	0.41 J	0.26 J
Cobalt	SEP Step 3	0.55 J	0.1 J	0.27 J	0.19 J	0.37 J	0.45 J	1.2 J	0.53 J	0.47 J	0.39 J	0.37 J
Cobalt	SEP Step 4	0.83 J	0.29 J	0.87 J	1.2 J	0.97 J	0.71 J	1.1 J	0.66 J	1.6 J	0.91 J	0.76 J
Cobalt	SEP Step 5	49 UJ	45 UJ	44 UJ	44 UJ	48 UJ	42 UJ	45 UJ	42 UJ	46 UJ	45 UJ	46 UJ
Cobalt	SEP Step 6	1.3 J	0.3 J	0.66 J	0.68 J	1.8 J	2.1 J	1.5 J	0.97 J	2.5 J	1.5 J	2.9 J
Cobalt	SEP Step 7	0.8 J	3 U	0.69 J	0.69 J	1.1 J	0.82 J	0.44 J	0.43 J	1.5 J	0.8 J	0.81 J
Cobalt	SEP SUM	4	0.69 J	2.5	2.8	4.6	4.5	4.8	3	6.7	4	5.1
Cobalt	SEP TOTAL	4.2 J	0.87 J	2.5 J	3.2	4.8 J	4.7 J	5.2 J	3.2	6.1	4.3	4.5 J
Iron	Total Metal Result	4900	1500	4400	2600	3400	6800	7900	3700	5800	5900	5600
Iron	SEP Step 1	26 U	24 U	23 U	23 U	26 U	22 U	24 U	22 U	24 U	24 U	24 U
Iron	SEP Step 2	260 J	31 J	61 J	29 J	190 J	130 J	200 J	99 J	280 J	160 J	140 J
Iron	SEP Step 3	950	280	710	150	600	590	2600	470	740	700	1200
Iron	SEP Step 4	1100	770	1700	1100	1000	1200	1100	830	1400	1500	1400
Iron	SEP Step 5	98 UJ	90 UJ	88 UJ	87 UJ	96 UJ	83 UJ	89 UJ	83 UJ	91 UJ	90 UJ	91 UJ
Iron	SEP Step 6	2600	870	2100	1500	2800	3300	2600	2000	3800	3300	4600
Iron	SEP Step 7	1800	1300	2400	2000	2900	2500	2000	2100	3700	2400	3100
Iron	SEP SUM	6700	3200	7100	4700	7600	7700	8500	5500	9900	8100	10000
Iron	SEP TOTAL	6300	3400	7500	5500	7000	8400	8700	5700	9900	8600	6800

Table 8: Sequential Extraction Procedure and Total Metal Solids Results
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Sample Location		SB-07B	DA-14	OW-9	OW-9	SB-08B	SB-52B	SB-53B	SB-53B	SB-54B	SB-55B	SB-56B
Sample Start Depth (ft bgs)		35	4	10	18	30	35	25	30	30	30	30
Sample End Depth (ft bgs)		37	6	12	20	32	37	27	32	32	32	32
Well Type		Background	Drying Well	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	SEP Step											
Lead	Total Metal Result	4.4	1.4	3.1	1.8	2.9	6.6 J	3.2	2.4	4.2	3.7	3.5
Lead	SEP Step 1	2.6 U	2.4 U	2.3 U	2.3 U	2.6 U	2.2 U	2.4 U	2.2 U	2.4 U	2.4 U	2.4 U
Lead	SEP Step 2	1.9 J	1.8 U	1.8 U	1.7 U	0.92 J	0.85 J	1.8 U	0.66 J	0.86 J	0.82 J	0.75 J
Lead	SEP Step 3	0.66 UJ	0.61 J	0.59 UJ	0.58 UJ	0.64 UJ	0.55 UJ	0.59 UJ	0.56 UJ	0.61 UJ	0.6 UJ	0.61 UJ
Lead	SEP Step 4	1.2	0.65	1.7	1.2	1.4	2.3	1.8	1.5	2.3	1.8	2
Lead	SEP Step 5	9.8 UJ	9 UJ	8.8 UJ	8.7 UJ	9.6 UJ	8.3 UJ	8.9 UJ	8.3 UJ	9.1 UJ	9 UJ	9.1 UJ
Lead	SEP Step 6	1.1	0.67	0.67	0.35 J	0.78	1.8	1.1	0.72	1.6	1.3	3.4
Lead	SEP Step 7	3.2	3.1	5.3	3.2	3.5	3.3	2.5	2.6	2.8	4.7	2.9
Lead	SEP SUM	7.4	5	7.7	4.8	6.6	8.2	5.3	5.5	7.5	8.6	9.1
Lead	SEP TOTAL	7	5.7	7.4	5.6	5	7.5 J	4.9	5.1	6.7	5.6	6.2
Lithium	Total Metal Result	4.6 J	1.4 J	3.6 J	2.2 J	3.3 J	6.6 J+	3.1 J+	3.4 J+	5.4 J	5.2 J	3.5 J
Lithium	SEP Step 1	13 U	12 U	12 U	12 U	13 U	11 U	12 U	11 U	12 U	12 U	12 U
Lithium	SEP Step 2	9.8 U	9 U	8.8 U	8.7 U	9.6 U	8.3 U	8.9 U	8.3 U	0.71 J	0.72 J	9.1 U
Lithium	SEP Step 3	3.3 U	3 U	2.9 U	2.9 U	3.2 U	2.8 U	3 U	2.8 U	3 U	3 U	3 U
Lithium	SEP Step 4	0.78 J	0.5 J	0.81 J	0.55 J	0.62 J	1 J	0.64 J	0.71 J	1.1 J	1 J	1.3 J
Lithium	SEP Step 5	49 U	45 U	44 U	44 U	48 U	42 U	45 U	42 U	46 U	45 U	46 U
Lithium	SEP Step 6	2.3 J	1.1 J	1.8 J	1.2 J	2.2 J	3	1.7 J	1.9 J	3.5	2.9 J	2.8 J
Lithium	SEP Step 7	4.4	2.5 J	3.4	2.1 J	3.8	6.1	2.6 J	3.1	5.6	4.2	7.1
Lithium	SEP SUM	12	4.1	6	3.8	11	14	7.8	5.7	19	18	19
Lithium	SEP TOTAL	8	4.2	6.8	5.4	7.5	10	6	7.5	11	10	7.2
Molybdenum	Total Metal Result	5.1 U	6.3	1.1 U	1.1 U	4.7 U	3.8 J	4 J	4.4 U	0.88 J	4.7 U	2.1 J
Molybdenum	SEP Step 1	10 U	13	9.4 U	9.3 U	10 U	8.9 U	9.5 U	8.9 U	9.8 U	9.6 U	9.7 U
Molybdenum	SEP Step 2	7.9 U	0.51 J	7 U	7 U	7.7 U	6.7 U	7.1 U	6.7 U	7.3 U	7.2 U	7.3 U
Molybdenum	SEP Step 3	2.6 U	1.2 J	2.3 U	2.3 U	2.6 U	0.51 J	2.2 J	0.27 J	0.59 J	2.4 U	0.5 J
Molybdenum	SEP Step 4	2.6 U	1.3 J	2.3 U	2.3 U	2.6 U	0.39 J	0.63 J	0.24 J	0.53 J	2.4 U	0.36 J
Molybdenum	SEP Step 5	39 U	36 U	35 U	35 U	38 U	33 U	36 U	33 U	37 U	36 U	1.7 J
Molybdenum	SEP Step 6	2.6 U	0.13 J	2.3 U	2.3 U	2.6 U	0.21 J	0.13 J	2.2 U	0.18 J	0.2 J	1.5 J
Molybdenum	SEP Step 7	2.6 U	2.4 U	2.3 U	2.3 U	2.6 U	2.2 U	2.4 U	2.2 U	2.4 U	2.4 U	0.16 J
Molybdenum	SEP SUM	2 U	16	2 U	2 U	2 U	1.1 J	3	0.51 J	1.3 J	0.2 J	4.3
Molybdenum	SEP TOTAL	0.94 J	15	0.22 J	0.15 J	0.54 J	2.4	3.8	0.67 J	2.4	0.48 J	2.4

Table 8: Sequential Extraction Procedure and Total Metal Solids Results
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Sample Location		SB-07B	DA-14	OW-9	OW-9	SB-08B	SB-52B	SB-53B	SB-53B	SB-54B	SB-55B	SB-56B
Sample Start Depth (ft bgs)		35	4	10	18	30	35	25	30	30	30	30
Sample End Depth (ft bgs)		37	6	12	20	32	37	27	32	32	32	32
Well Type		Background	Drying Well	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	SEP Step											
Selenium	Total Metal Result	1.9 U	4.8 U	4.6 U	4.6 U	0.53 J	1.6 U	0.51 J	0.74 J	0.68 J	0.65 J	1.8 U
Selenium	SEP Step 1	2.6 U	2.4 U	2.3 U	2.3 U	2.6 U	2.2 U	2.4 U	2.2 U	2.4 U	2.4 U	2.4 U
Selenium	SEP Step 2	2 U	1.8 U	1.8 U	1.7 U	1.9 U	1.7 U	1.8 U	1.7 U	1.8 UJ	1.8 UJ	1.8 UJ
Selenium	SEP Step 3	0.66 U	0.6 U	0.22 J	0.58 U	0.64 U	0.55 U	0.59 U	0.56 U	0.61 U	0.6 U	0.61 U
Selenium	SEP Step 4	1.1 J	0.6 UJ	0.6 J+	0.75 J+	1.3 J	0.64 J	0.59 UJ	0.56 UJ	0.71 J	0.6 UJ	0.59 J
Selenium	SEP Step 5	9.8 U	9 U	8.8 U	8.7 U	9.6 U	8.3 U	3.3 J	8.3 U	9.1 U	9 U	9.1 U
Selenium	SEP Step 6	0.66 U	0.6 U	0.59 U	0.58 U	0.64 U	0.55 U	0.59 U	0.56 U	0.61 U	0.6 U	0.61 U
Selenium	SEP Step 7	1.3 U	0.6 U	0.59 U	0.58 U	1.3 U	1.1 U	0.59 U	0.56 U	0.74 J	0.6 U	1.2 U
Selenium	SEP SUM	2.7	0.5 U	0.82	0.75	2.5	0.64	3.3	0.5 U	1.5	0.5 U	0.59
Selenium	SEP TOTAL	1.3 U	1.2 U	0.59 U	0.58 U	1.3 U	1.1 U	1.2 U	0.56 U	0.61 U	0.24 J	1.2 U
Thallium	Total Metal Result	4.5 U	7.2 U	6.9 U	6.8 U	4.1 U	3.7 u	4 U	3.9 U	4.1 U	4.1 U	4.1 U
Thallium	SEP Step 1	9.2 U	8.4 U	8.2 U	8.2 U	8.9 U	7.8 U	8.3 U	7.8 U	8.5 U	8.4 U	8.5 U
Thallium	SEP Step 2	6.9 U	6.3 U	6.2 U	6.1 U	6.7 U	5.8 U	6.2 U	5.8 U	6.4 U	6.3 U	6.4 U
Thallium	SEP Step 3	2.3 U	2.1 U	2.1 U	2 U	2.2 U	1.9 U	2.1 U	1.9 U	2.1 U	2.1 U	2.1 U
Thallium	SEP Step 4	2.3 U	2.1 U	2.1 UJ	2 UJ	2.2 U	1.9 U	2.1 U	1.9 U	2.1 U	2.1 U	2.1 U
Thallium	SEP Step 5	34 UJ	31 UJ	31 UJ	31 UJ	34 UJ	29 UJ	31 UJ	29 UJ	32 UJ	32 UJ	32 UJ
Thallium	SEP Step 6	2.3 U	2.1 U	2.1 U	2 U	2.2 U	1.9 U	2.1 U	1.9 U	2.1 U	2.1 U	2.1 U
Thallium	SEP Step 7	0.48 J	2.1 U	0.62 J	0.56 J	1.1 J	3.9 U	2.1 U	1.9 U	0.97 J	0.74 J	1.3 J
Thallium	SEP SUM	0.48 J	1.8 U	0.62 J	0.56 J	1.4 J	1.8 U	1.8 U	1.8 U	0.97 J	0.74 J	1.3 J
Thallium	SEP TOTAL	0.87 J	4.2 U	0.58 J	0.47 J	0.9 J	3.9 U	4.2 U	1.9 U	0.88 J	0.85 J	1.3 J

Notes:
All results displayed in milligram per kilogram (mg/kg).
ft bgs = feet below ground surface
SEP: Sequential Extraction Procedure
Step 1 - Exchangeable Phase: This extraction includes trace elements that are reversibly adsorbed to soil minerals, amorphous solids, and organic material by electrostatic forces.
Step 2 - Carbonate Phase: This extraction targets trace elements that are adsorbed or otherwise bound to carbonate minerals.
Step 3 - Non-Crystalline Materials Phase: This extraction targets trace elements that are complexed by amorphous minerals (e.g. iron).
Step 4 - Metal Hydroxide Phase: This extraction targets trace elements bound to hydroxides of iron, manganese, and/or aluminum.
Step 5 - Organic Phase: This extraction targets trace elements strongly bound via chemisorption to organic material.
Step 6 - Acid/Sulfide Fraction: The extraction is used to identify trace elements precipitated as sulfide minerals.
Step 7 - Residual Fraction: Trace elements remaining in the soil after the previous extractions will be distributed between silicates, phosphates, and refractory oxides.
U= The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
UJ= The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit, the quantitation limit is considered estimated.
J= The analyte was positively identified. The associated numerical value is the approximate concentration.
J+= The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample and biased high.
Total Metal Results are the results of the 6010C analysis

Prepared by: DFSC
Checked by: KMC
Reviewed by: MAH

Table 9: Predicted Range of COI Concentrations in Assessment Wells Assuming Only Dilution and Dispersion
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

Constituent	Units	Site-Specific Groundwater Protection Standard[2]	Health-Based Standard	Maximimum concentration observed in Porewater	Maximimum concentration at side-gradient Assessment Wells:				Concentration at Assessment Wells assuming 32%[3] dilution of porewater with maximum concentration measured at:				Concentration at Assessment Wells assuming 63%[4] dilution of porewater with maximum concentration measured at:			
					GAMW-52	GAMW-52B	GAMW-56	GAMW-56B	GAMW-52	GAMW-52B	GAMW-56	GAMW-56B	GAMW-52	GAMW-52B	GAMW-56	GAMW-56B
Arsenic	mg/L	0.091	0.010	0.012	0.0025	0.0016	0.022	0.0025	0.0090	0.0087	0.015	0.0090	0.0060	0.0054	0.018	0.0060
Boron[1]	mg/L	-	4.0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Cobalt	mg/L	0.010	0.0060	0.0022	0.00058	0.00050	0.0084	0.00050	0.0017	0.0017	0.0042	0.0017	0.0012	0.0011	0.0061	0.0011
Lithium	mg/L	0.040	0.040	0.016	0.0062	0.0071	0.0053	0.0062	0.013	0.013	0.013	0.013	0.0098	0.010	0.0093	0.0098
Molybdenum	mg/L	0.10	0.10	0.81	0.0064	0.015	0.013	0.0064	0.55	0.56	0.55	0.55	0.30	0.31	0.31	0.30
Arsenic	Percentage relative to Groundwater Protection Standard	100%	-	13%	3%	2%	24%	3%	10%	10%	17%	10%	7%	6%	20%	7%
Boron		100%	-	345%	80%	33%	7%	80%	260%	245%	237%	260%	178%	148%	132%	178%
Cobalt		100%	-	22%	6%	5%	84%	5%	17%	17%	42%	17%	12%	11%	61%	11%
Lithium		100%	-	40%	16%	18%	13%	16%	32%	33%	31%	32%	25%	26%	23%	25%
Molybdenum		100%	-	810%	6%	15%	13%	6%	553%	556%	555%	553%	304%	309%	308%	304%

Notes:
(1) Boron does not have a groundwater protection standard, results are compated to the health-based standard
(2) The groundwater protection standard is equal to the higher of the background tolerance limit and the relevant health-based standard
(3) 32% dilution was minimum dilution predicted in Table 8
(4) 63% dilution was maximum dilution predicted in Table 8
ft = feet
mg/L = milligrams per liter

Prepared by: GOL
Checked by: PJN
Reviewed by: RV

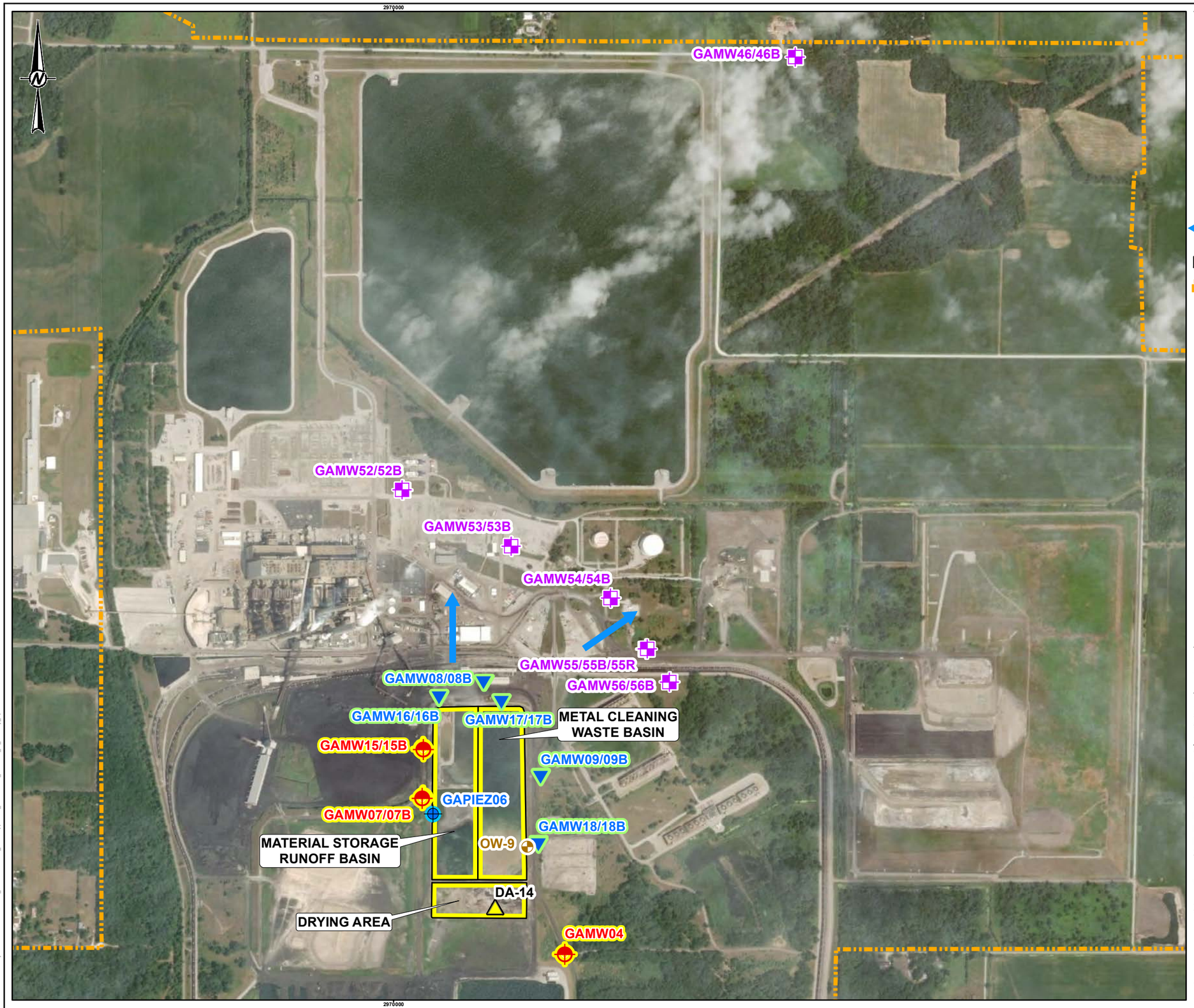
Table 10: Sorption Site and Surface Area Calculations
Monitored Natural Attenuation Evaluation
NIPSCO LLC R. M. Schahfer Generating Station

	Units	Minimum	Mean	Maximum
Ferrihydrite				
Amorphous Iron (Step 3 SEP) + Metal Hydroxide Iron (Step 4 SEP)	Sample Name	SB-18B-32/34	Mean of all samples	SB-53B-25-27
	ppm of Fe	1278	2006	3787
	millimoles of Fe	22.9	35.9	67.8
	moles of Fe	0.0229	0.0359	0.0678
Specific Surface Area	m^2/g	600		
Surface Site Concentration	moles weak sites/ mole of Fe	0.2		
Surface Sites	moles of weak sites	0.00458	0.00719	0.01356
Mass of Ferrihydrite	g	2.03	3.19	6.03
Gibbsite				
Amorphous Aluminum (Step 3 SEP) + Metal Hydroxide Aluminum (Step 4 SEP)	Sample Name	SB-53B-30-32	Mean of all samples	OW-9-10-12
	ppm of Al	130	221	408
	millimoles of Al	4.8	8.2	15.1
	moles of Al	0.0048	0.0082	0.0151
Specific Surface Area	m^2/g	32		
Surface Site Concentration	moles weak sites/ mole of Al	0.41		
Surface Sites	moles of weak sites	0.00198	0.00335	0.00619
Mass of Gibbsite	g	0.38	0.64	1.18

Notes:
ppm = parts per million
m^2/g = meters squared per gram
g = grams

Prepared by: GOL
Checked by: PJN
Reviewed by: RV

Figures



LEGEND

- Assessment Monitoring Well
- Background Monitoring Well
- Downgradient Monitoring Well
- Downgradient Boring Location
- Porewater Sample Location
- CCR Source Material Sample Location
- Generalized Groundwater Flow Direction
- CCR Units
- Approximate Property Line

0 850 1,700

1 " = 850 feet Feet

NOTE(S)

1. THIS FIGURE DEPICTS THE GENERALIZED GROUNDWATER FLOW DIRECTION WITHIN THE UPPER PORTION OF THE SURFICIAL AQUIFER.

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

MONITORED NATURAL ATTENUATION EVALUATION
MSRB, MCWB, AND DRYING AREA
NIPSCO LLC R. M. SCHAHFER GENERATING STATION

TITLE

SAMPLE LOCATION MAP

CONSULTANT

GOLDER

YYYY-MM-DD	6/16/2020
DESIGNED	DFS
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

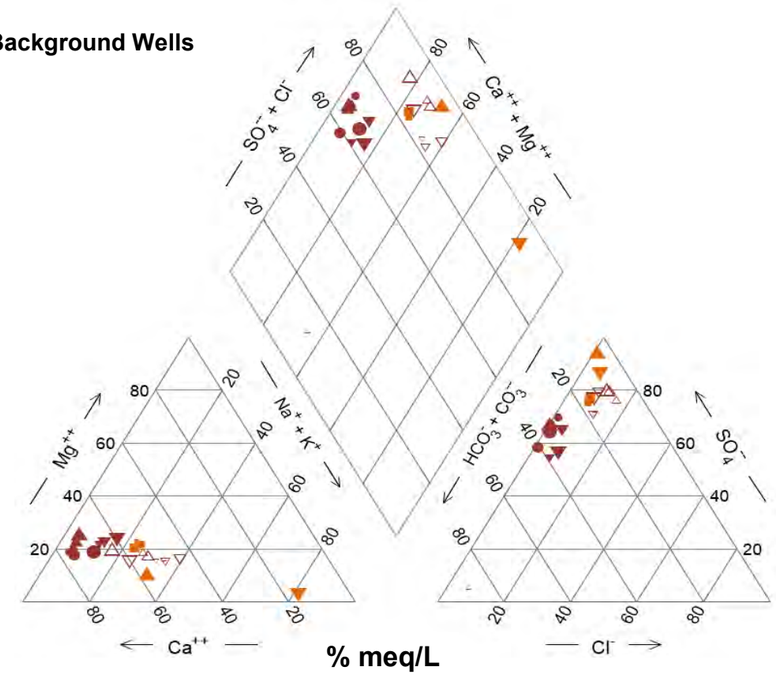
PROJECT NO.	CONTROL	REV.	FIGURE
19121567	A	0	1

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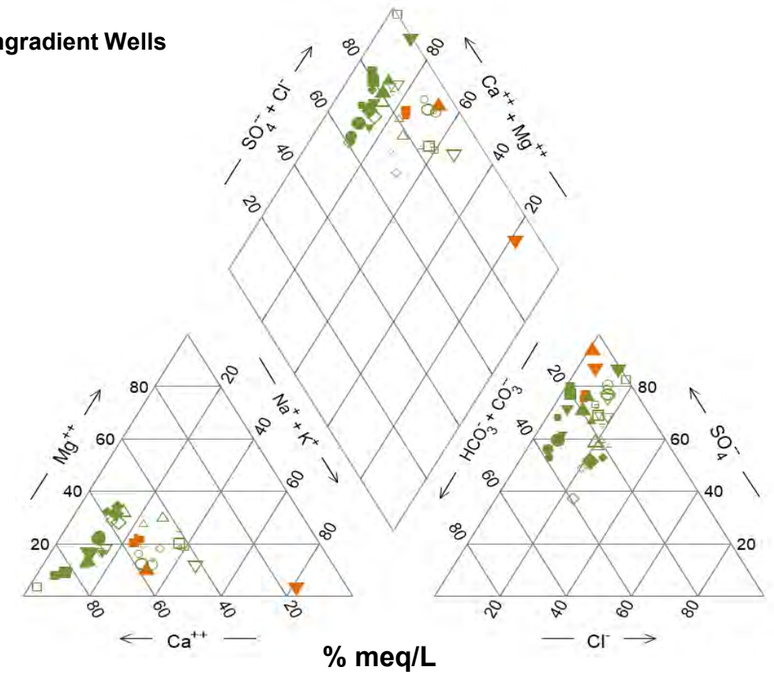
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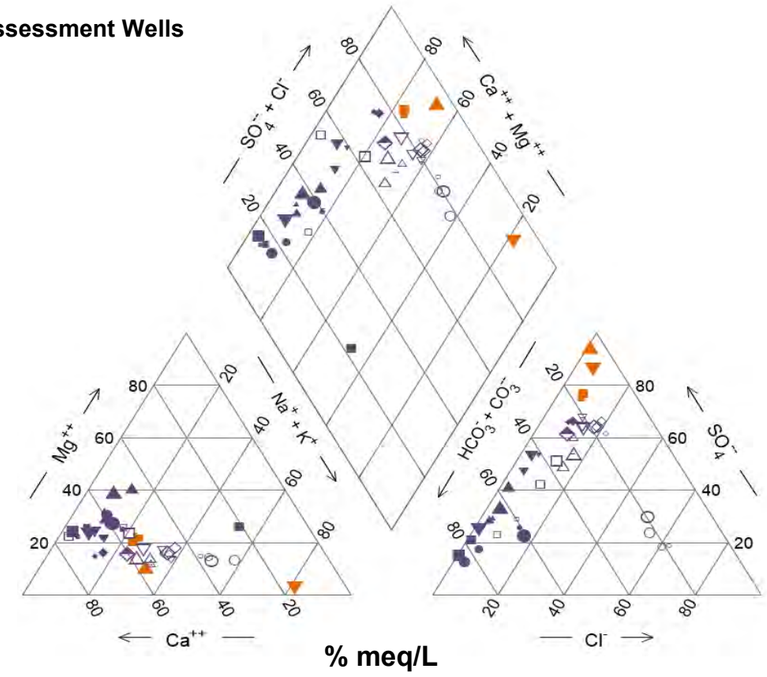
(a) **Background Wells**



(b) **Downgradient Wells**



(c) **Assessment Wells**



Porewater
- GAPIEZ–06
- DAPZ–02A
- DAPZ–02B

Upgradient Wells
- GAMW–04
- GAMW–07
- GAMW–07B
- GAMW–15
- GAMW–15B

Downgradient Wells
- GAMW–08
- GAMW–08B
- GAMW–09
- GAMW–09B
- GAMW–16
- GAMW–16B
- GAMW–17
- GAMW–17B
- GAMW–18
- GAMW–18B

Assessment Wells
- GAMW–52
- GAMW–52B
- GAMW–53
- GAMW–53B
- GAMW–54
- GAMW–54B
- GAMW–55
- GAMW–55R
- GAMW–55B
- GAMW–56
- GAMW–56B

Sample Collection Date

Least Recent → Most Recent

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

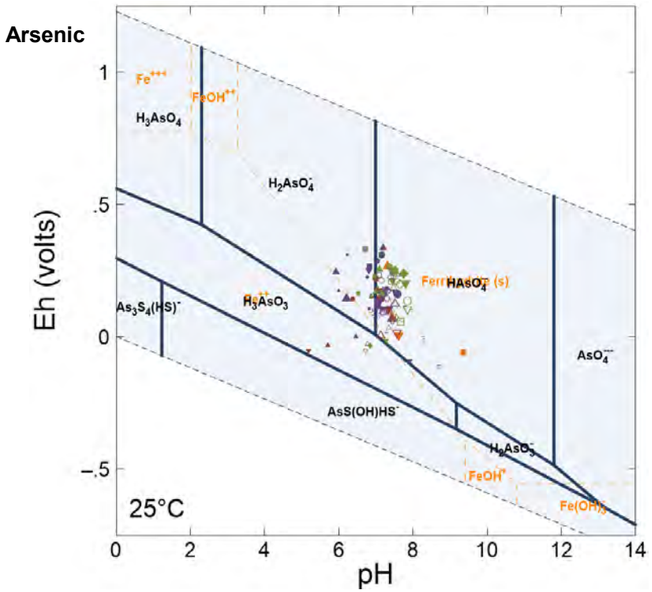
PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

TITLE
Piper Diagrams - Groundwater Characterization of Background, Monitoring, and Assessment Wells

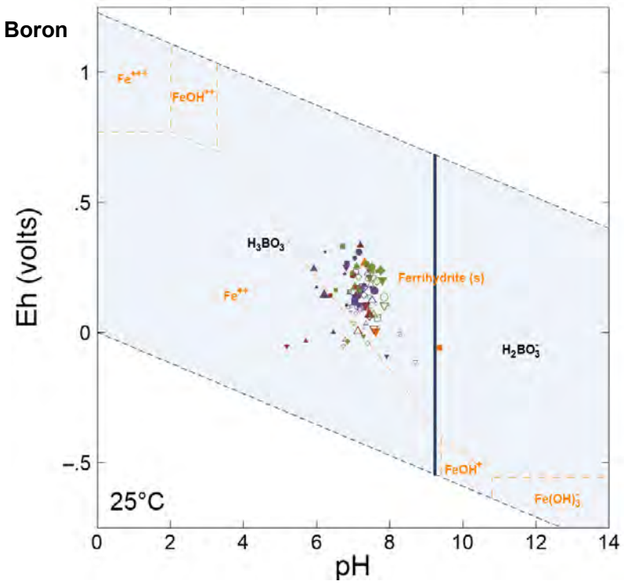
PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	2a-c

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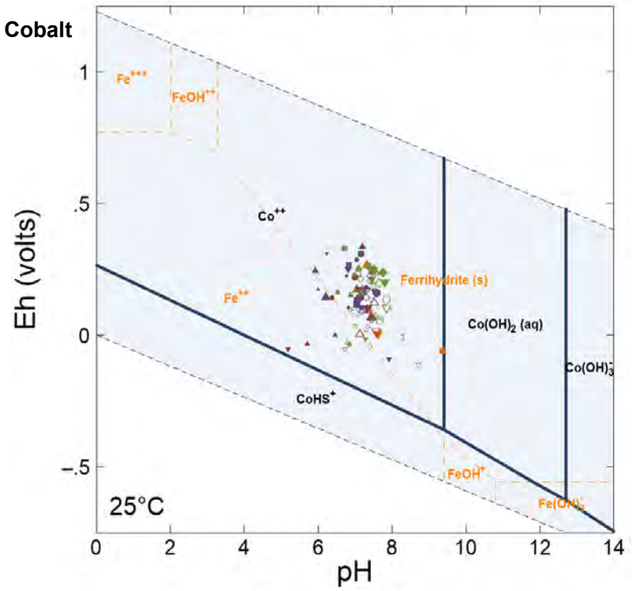
(a) Arsenic



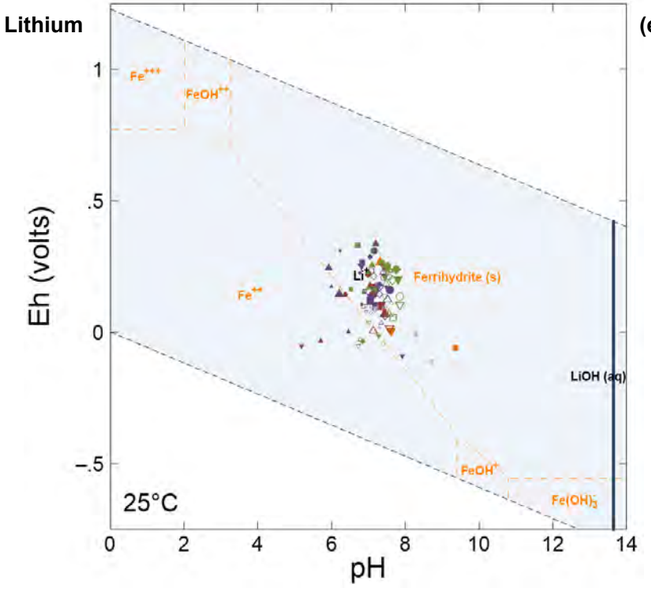
(b) Boron



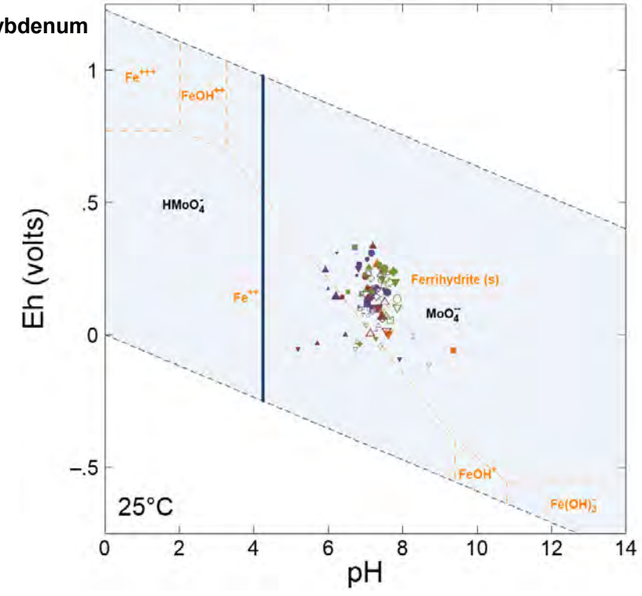
(c) Cobalt



(d) Lithium



(e) Molybdenum



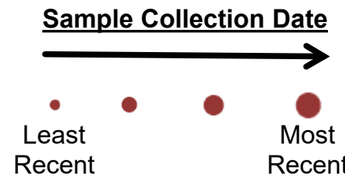
Porewater
- GAPIEZ–06
- DAPZ–02A
- DAPZ–02B

Upgradient Wells
- GAMW–04
- GAMW–07
- GAMW–07B
- GAMW–15
- GAMW–15B

Downgradient Wells
- GAMW–08
- GAMW–08B
- GAMW–09
- GAMW–09B
- GAMW–16
- GAMW–16B
- GAMW–17
- GAMW–17B
- GAMW–18
- GAMW–18B

Assessment Wells
- GAMW–52
- GAMW–52B
- GAMW–53
- GAMW–53B
- GAMW–54
- GAMW–54B
- GAMW–55
- GAMW–55R
- GAMW–55B
- GAMW–56
- GAMW–56B

Sample Collection Date



CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

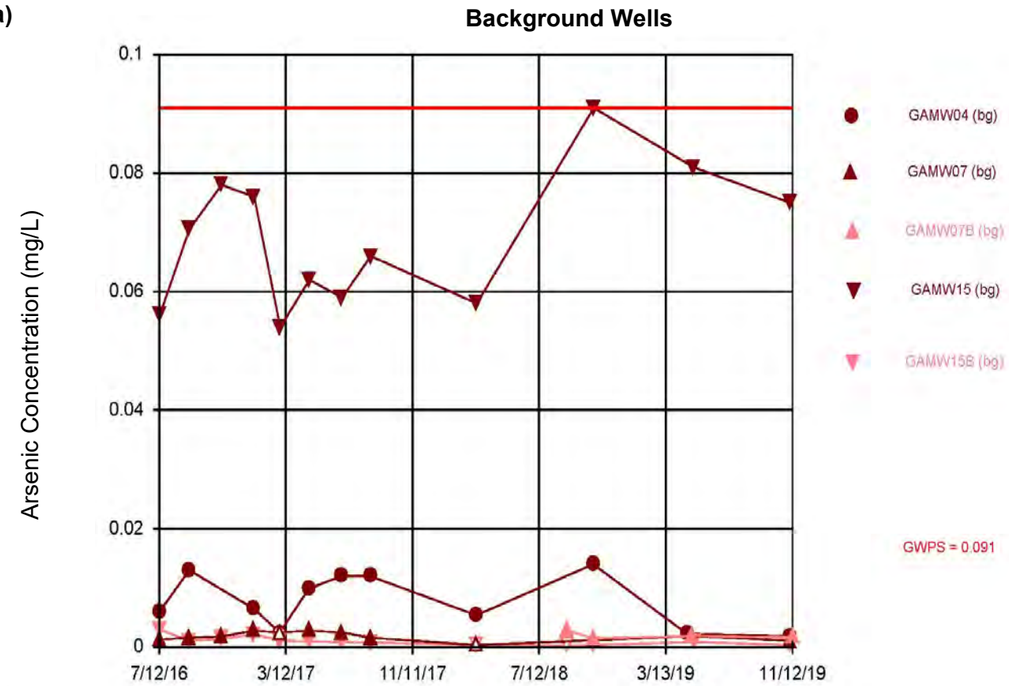
PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

TITLE
Pourbaix Diagrams For Arsenic, Boron, Cobalt, Lithium, and Molybdenum

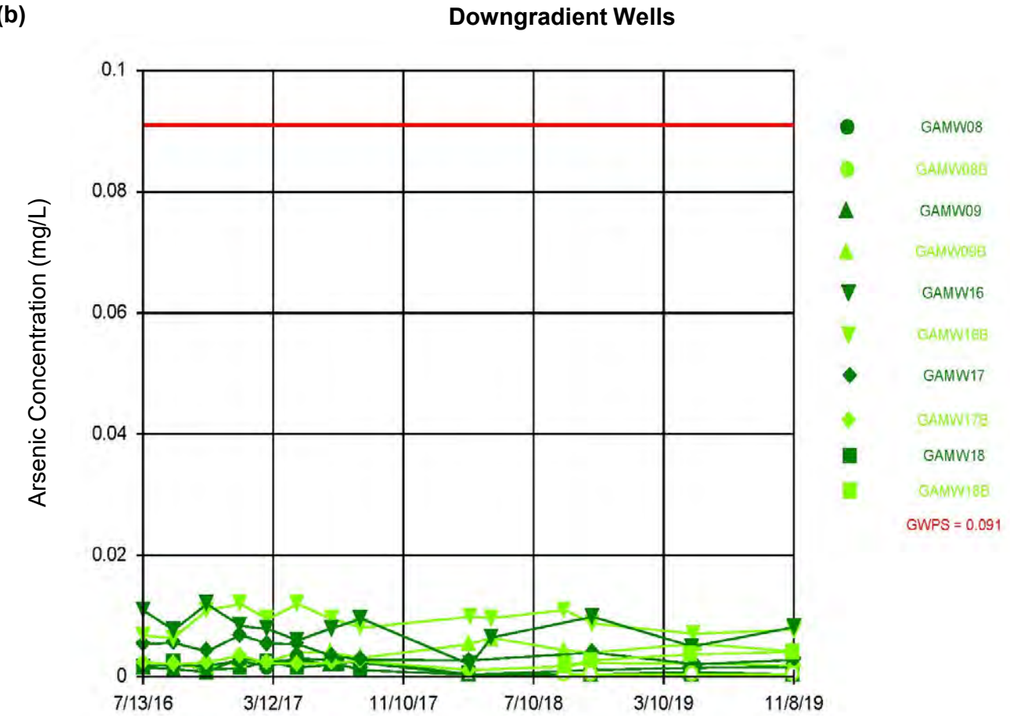
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19121567	192	A	3a-e

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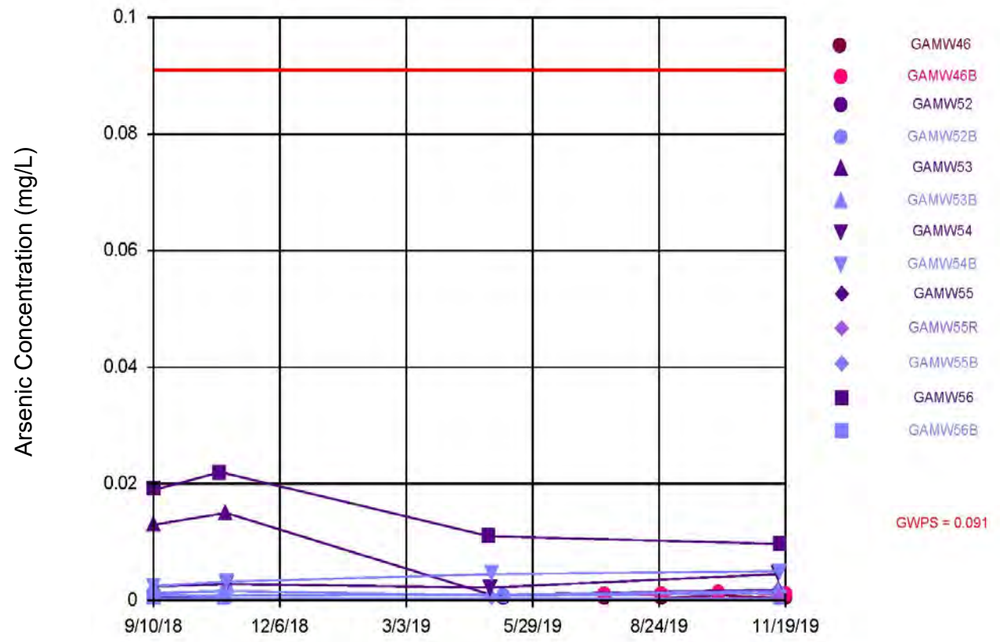
(a)



(b)



(c)



Note: Open symbols reflect sample measurements below the laboratory method detection limit.

CLIENT
NIPSCO LLC

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GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

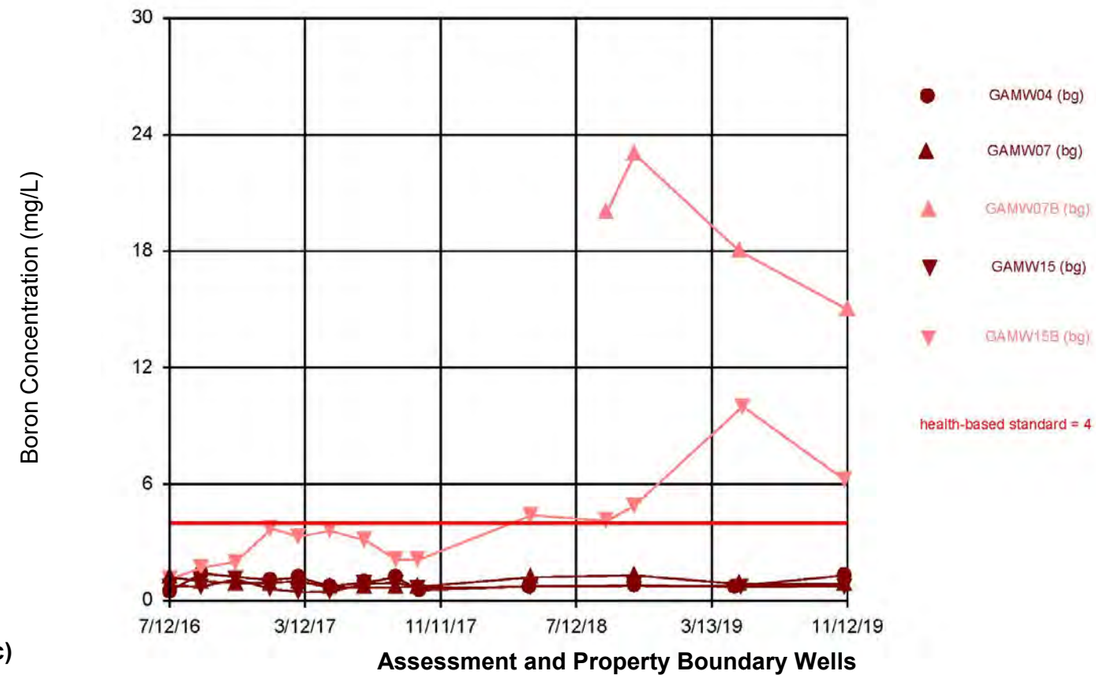
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PROJECT NO.	PHASE	REV.	FIGURE
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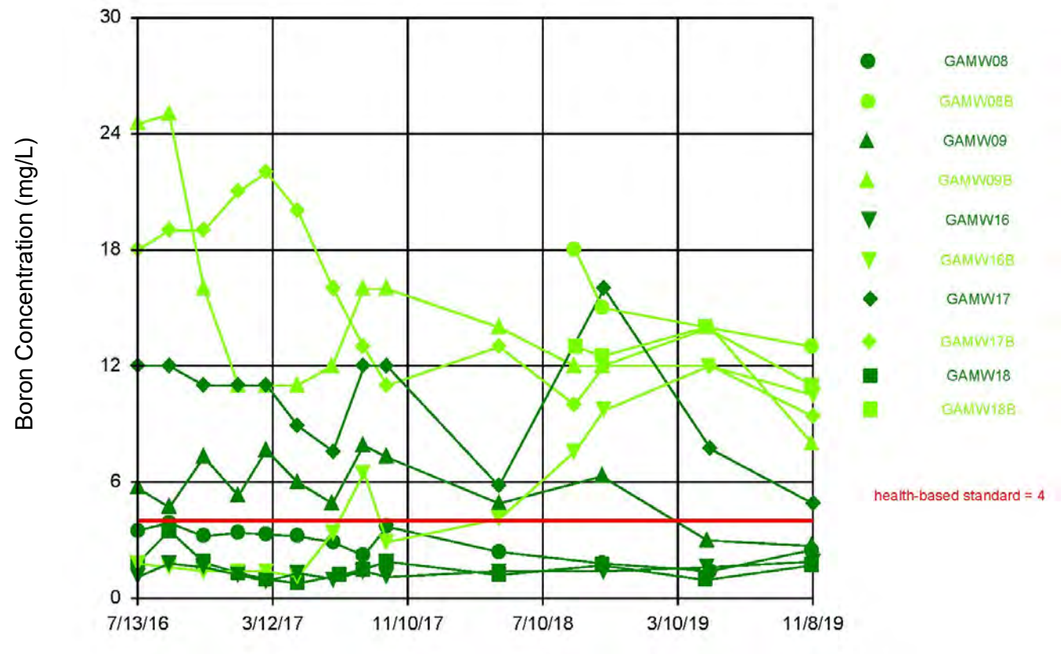
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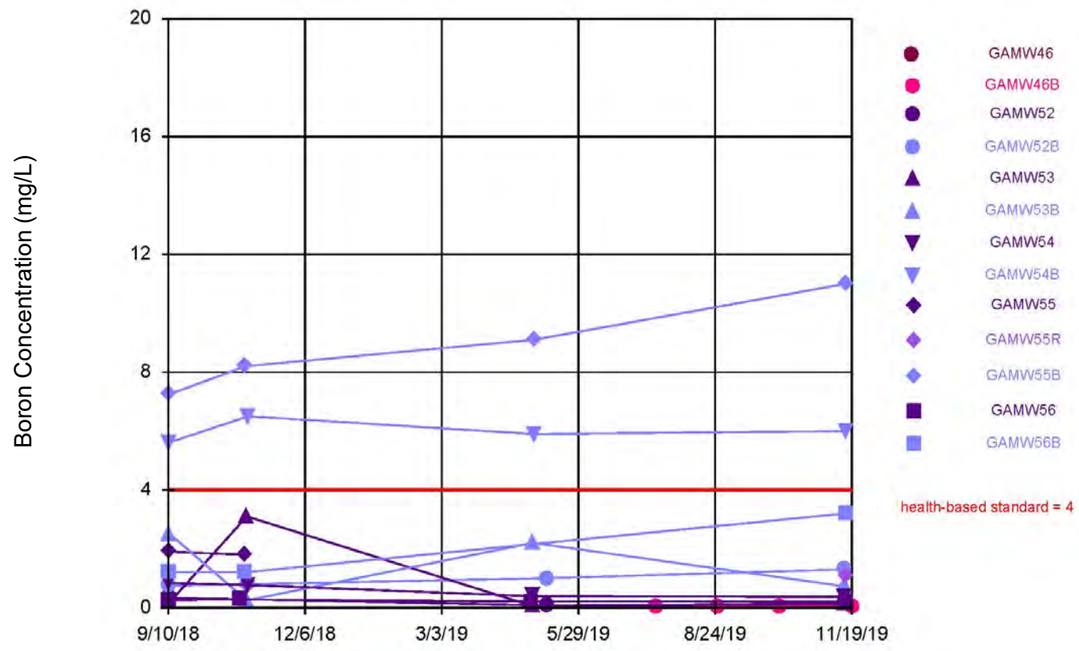
(a)



(b)



(c)



Note: Open symbols reflect sample measurements below the laboratory method detection limit

CLIENT
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GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

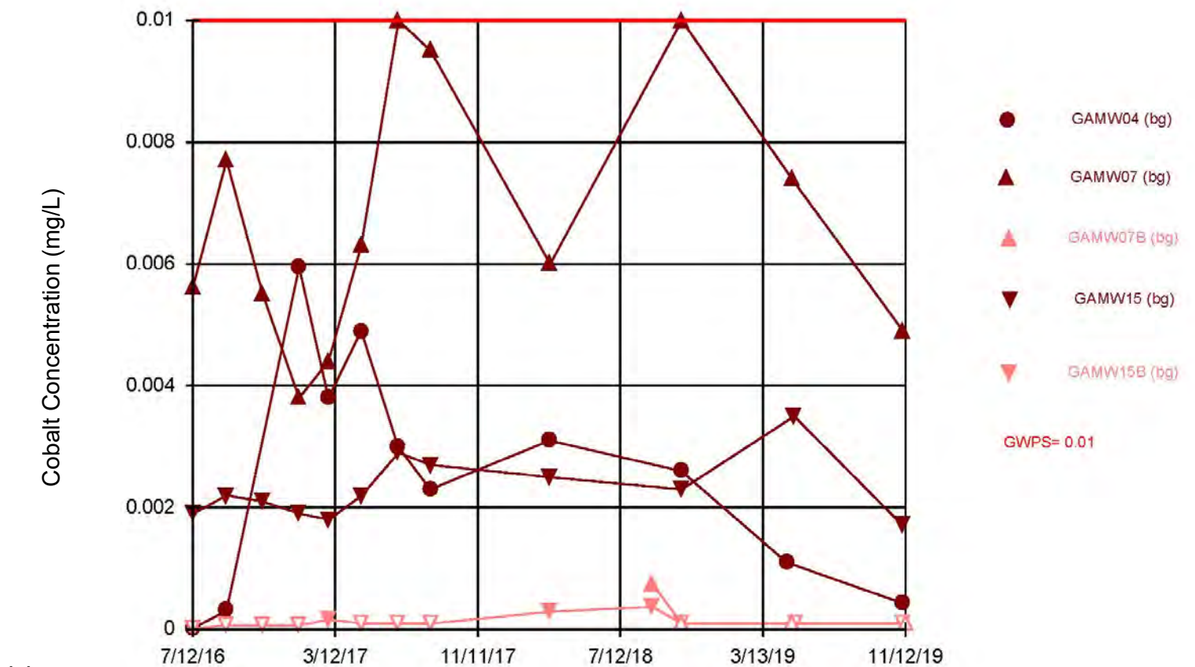
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Boron Time Series for Background, Monitoring, and Assessment and Property Boundary Wells

PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	5a-c

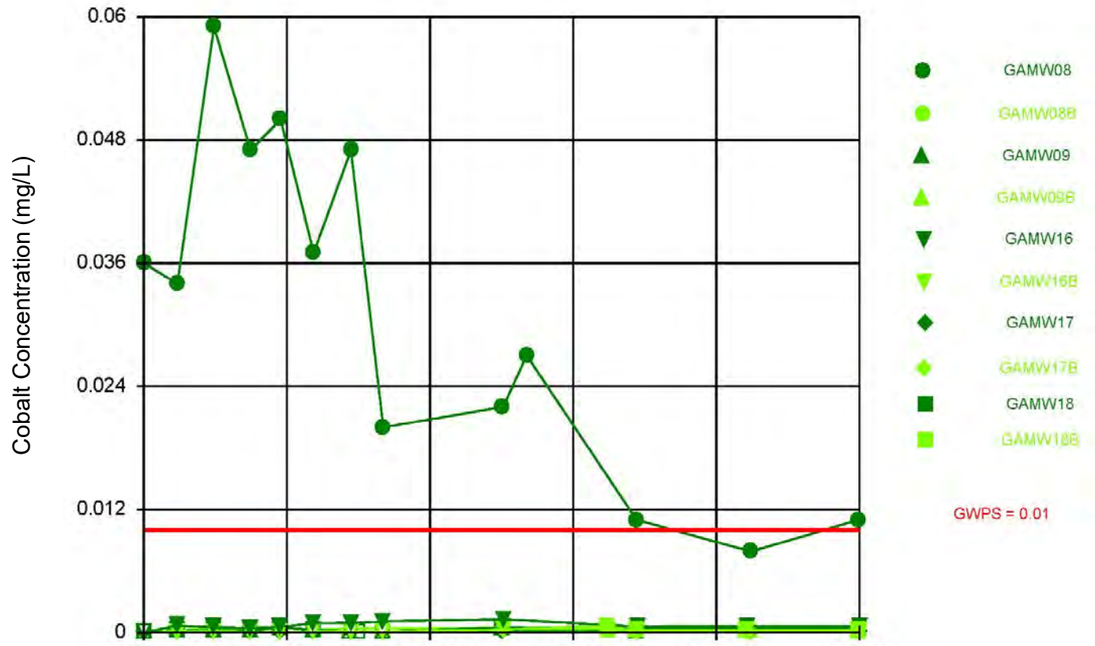
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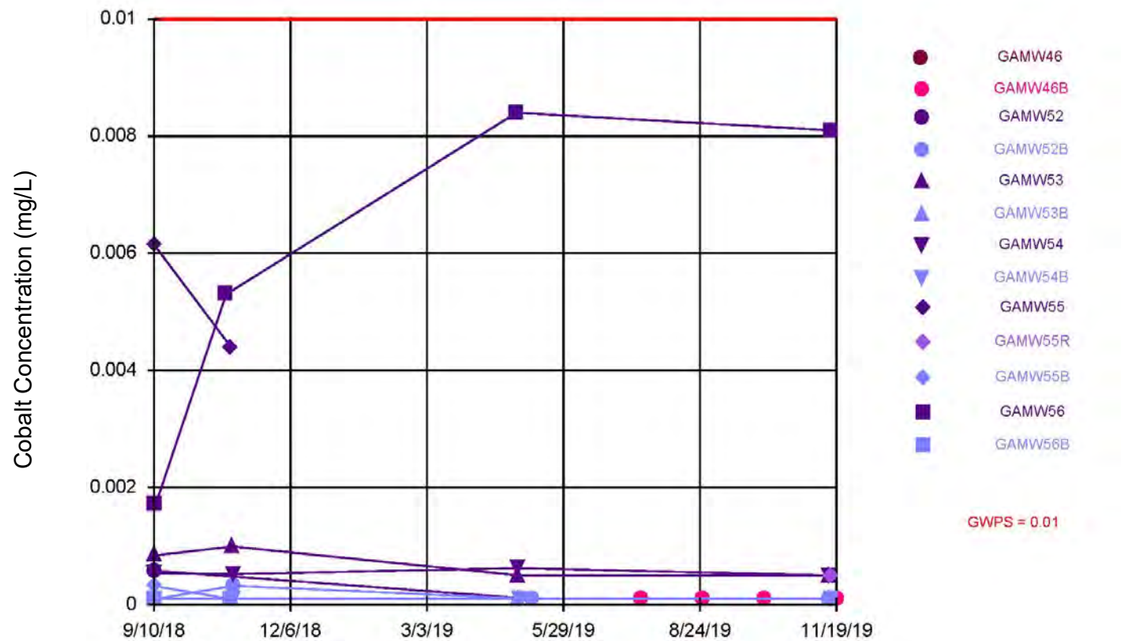
(a)



(b)



(c)



Note: Open symbols reflect sample measurements below the laboratory method detection limit

CLIENT
NIPSCO LLC

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GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

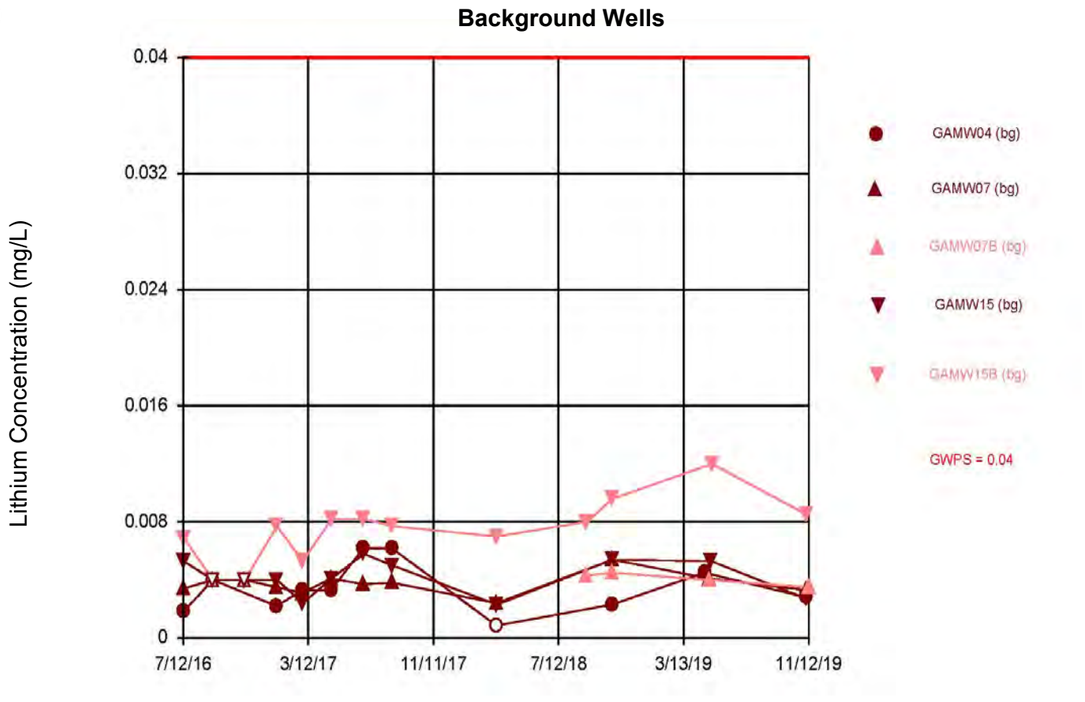
TITLE
Cobalt Time Series for Background, Monitoring, and Assessment and Property Boundary Wells

PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	6a-c

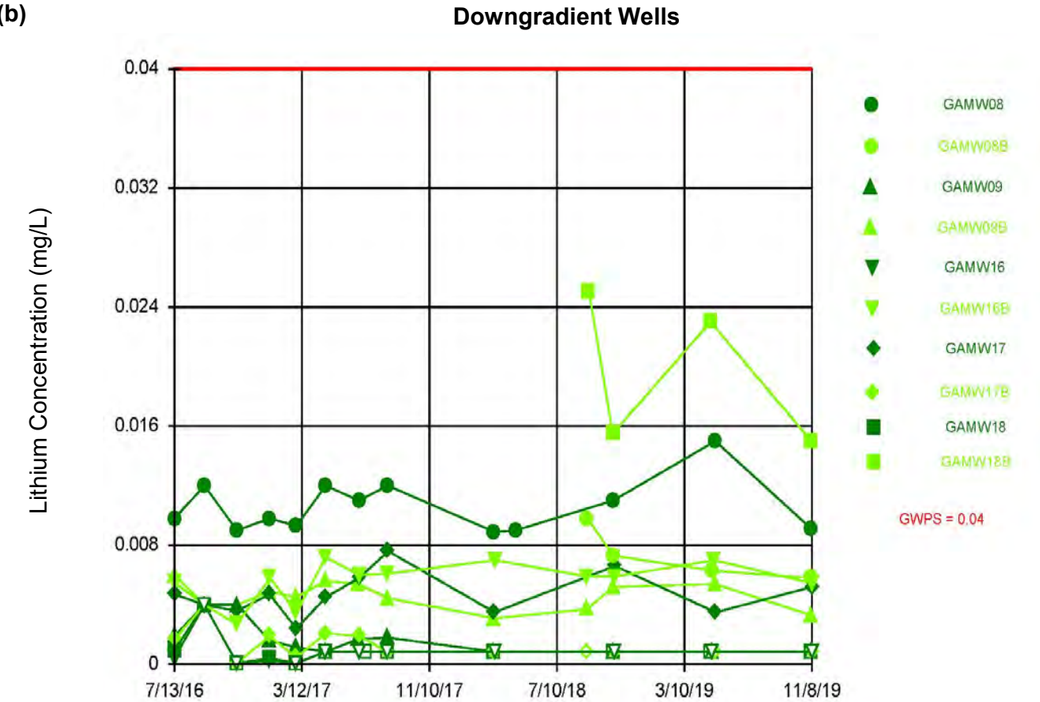
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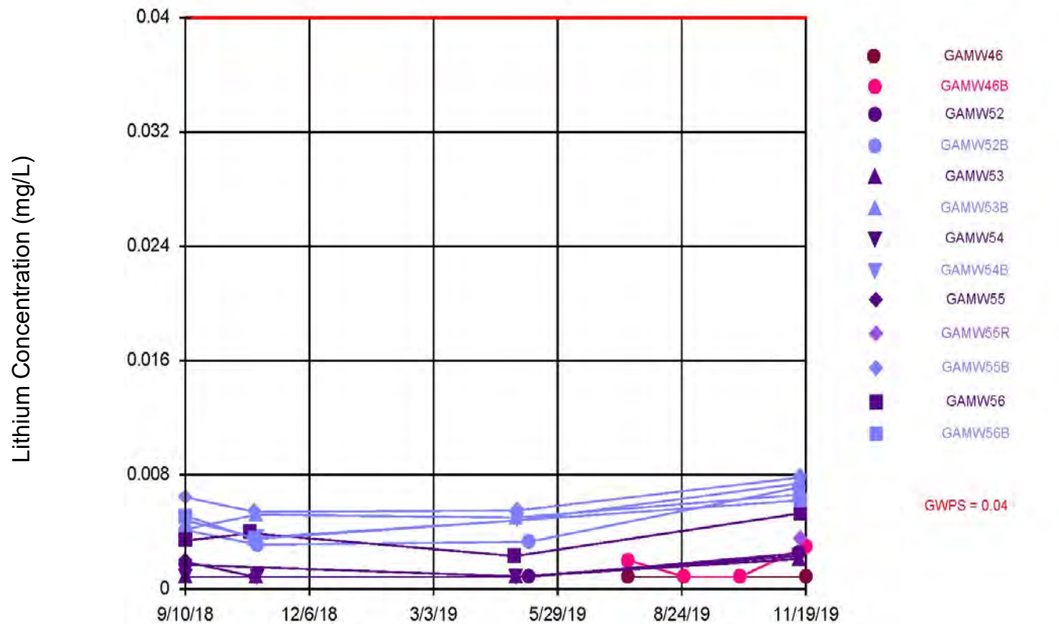
(a)



(b)



(c)



Note: Open symbols reflect sample measurements below the laboratory method detection limit

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

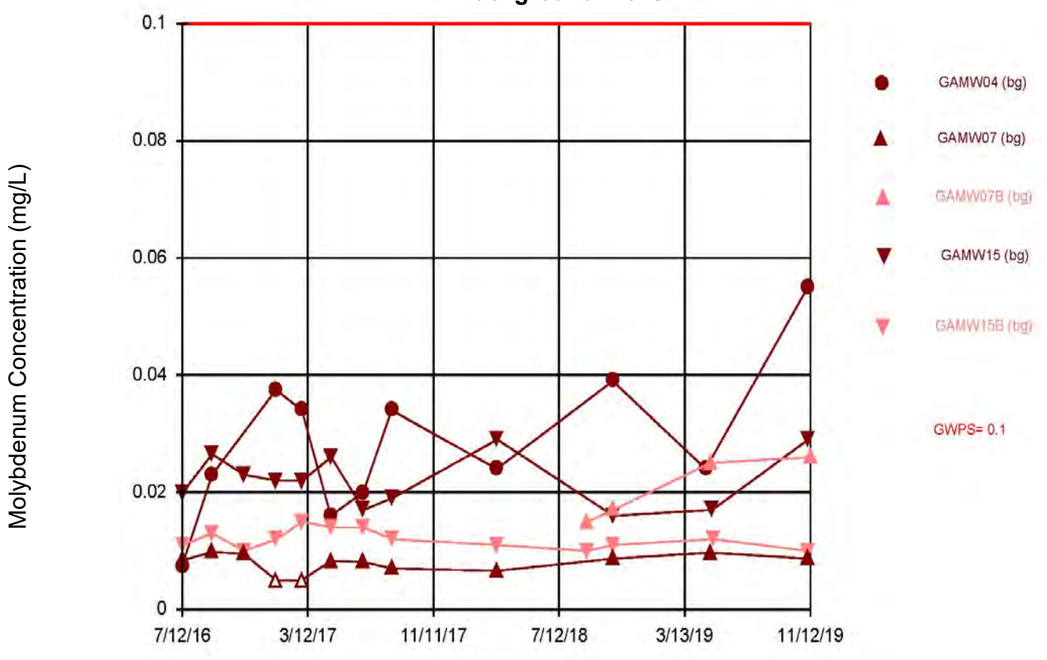
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Lithium Time Series for Background, Monitoring, and Assessment and Property Boundary Wells

PROJECT NO.	PHASE	REV.	FIGURE
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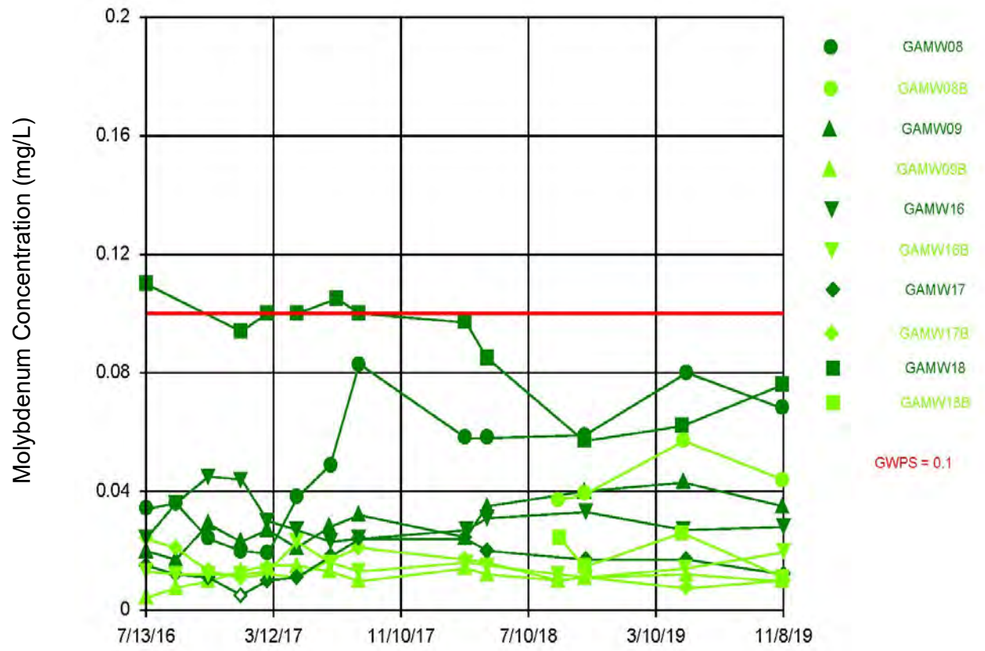
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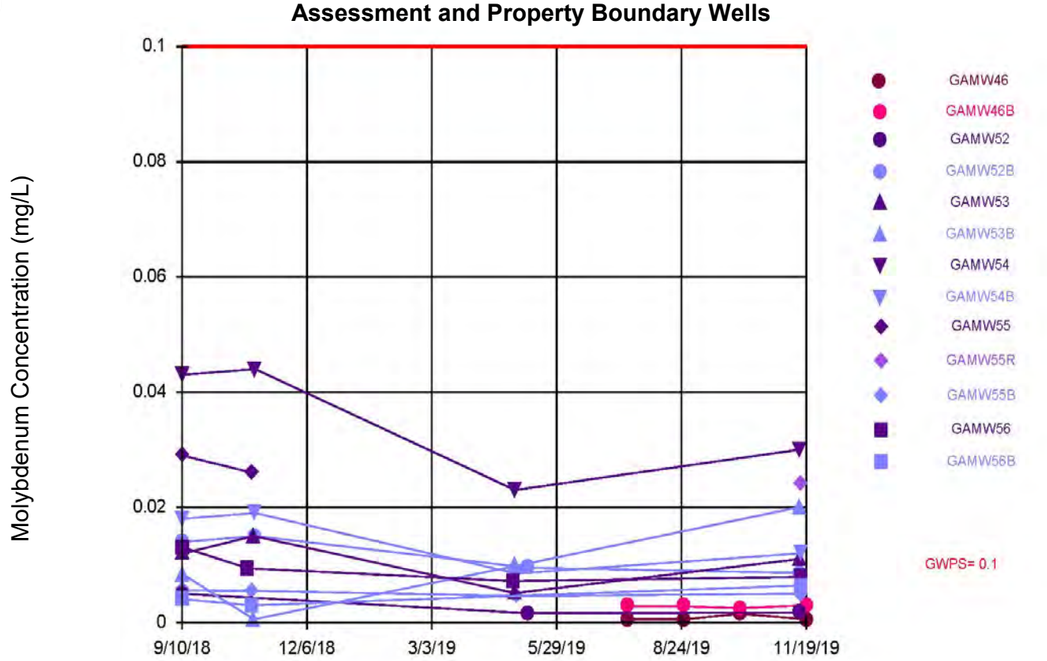
(a)



(b)



(c)



Note: Open symbols reflect sample measurements below the laboratory method detection limit

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

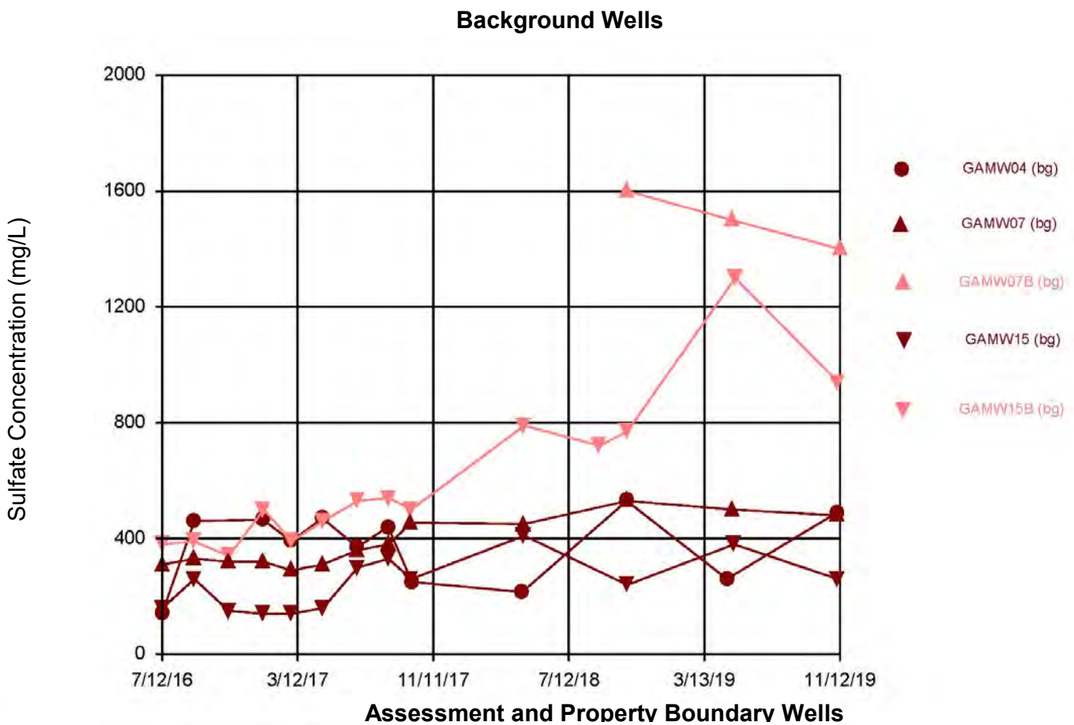
TITLE
Molybdenum Time Series for Background, Monitoring, and Assessment and Property Boundary Wells

PROJECT NO.	PHASE	REV.	FIGURE
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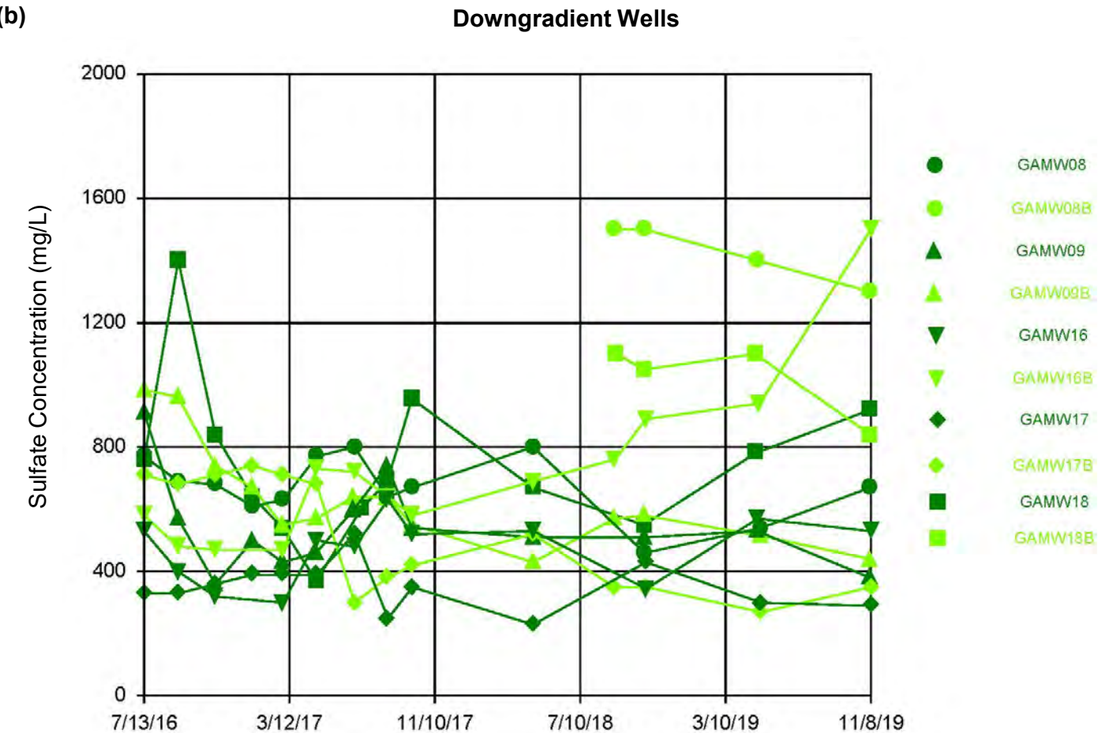
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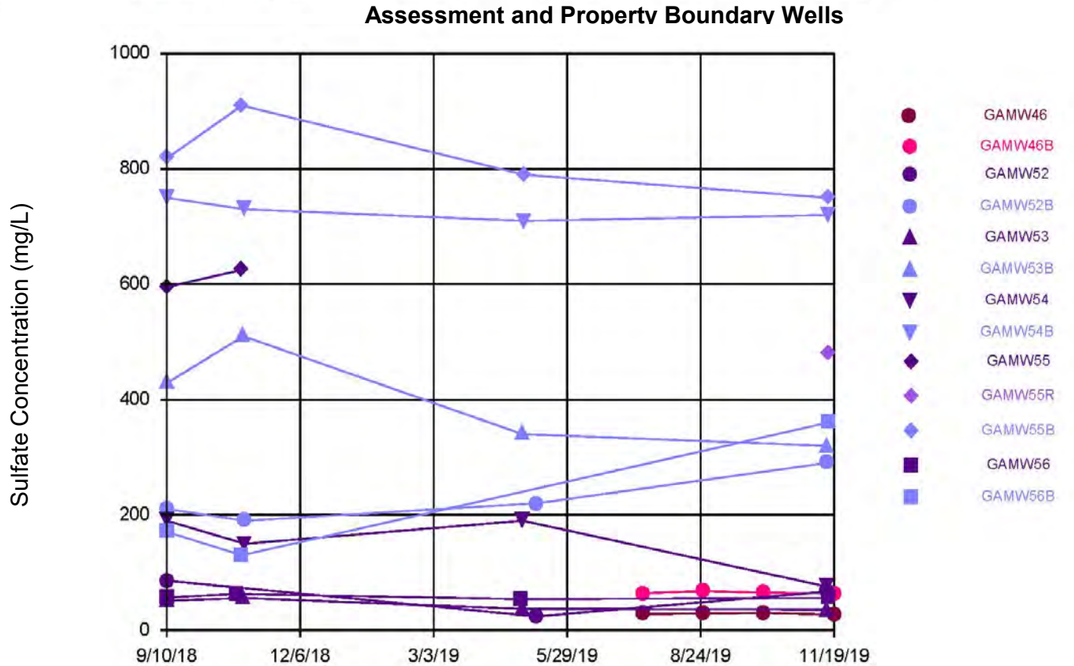
(a)



(b)



(c)



Note: Open symbols reflect sample measurements below the laboratory method detection limit

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

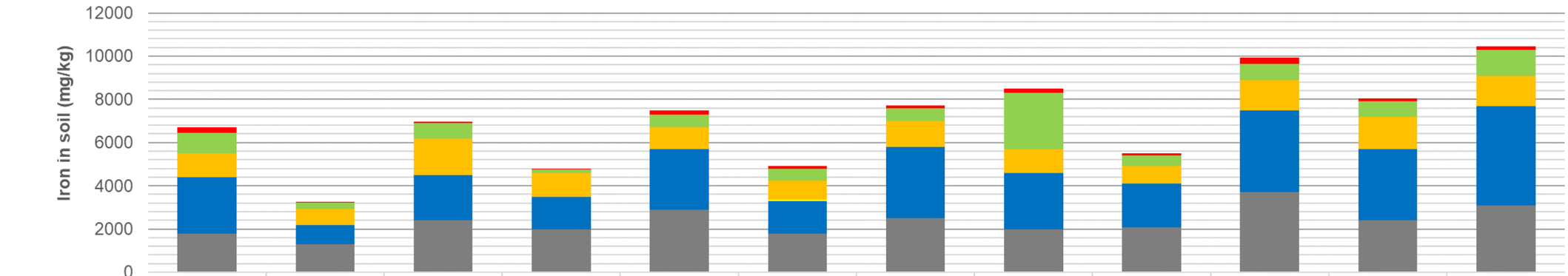
PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

TITLE
Sulfate Time Series for Background, Monitoring, and Assessment and Property Boundary Wells

PROJECT NO.	PHASE	REV.	FIGURE
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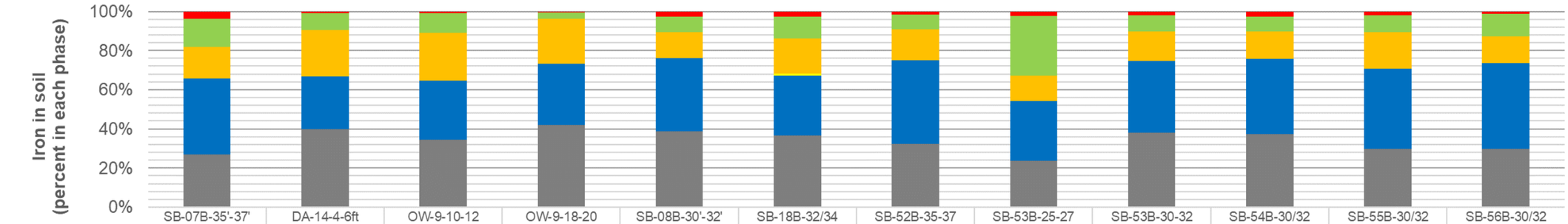
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	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0	0	0	0	0	0	0	0	0	0	0	0
Carbonate Phase	260	31	61	29	190	130	130	200	99	280	160	140
Amorphous Phase	950	280	710	150	600	550	590	2600	470	740	700	1200
Metal Hydroxide Phase	1100	770	1700	1100	1000	880	1200	1100	830	1400	1500	1400
Organic Phase	0	0	0	0	0	63	0	0	0	0	0	0
Acid/Sulfide Fraction	2600	870	2100	1500	2800	1500	3300	2600	2000	3800	3300	4600
Residual Fraction	1800	1300	2400	2000	2900	1800	2500	2000	2100	3700	2400	3100

Borehole and depth below ground surface (Iron in mg/kg soil)



	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Carbonate Phase	3.87%	0.95%	0.88%	0.61%	2.54%	2.64%	1.68%	2.35%	1.80%	2.82%	1.99%	1.34%
Amorphous Phase	14.16%	8.61%	10.19%	3.14%	8.01%	11.17%	7.64%	30.59%	8.55%	7.46%	8.68%	11.49%
Metal Hydroxide Phase	16.39%	23.69%	24.39%	23.02%	13.35%	17.88%	15.54%	12.94%	15.09%	14.11%	18.61%	13.41%
Organic Phase	0.00%	0.00%	0.00%	0.00%	0.00%	1.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acid/Sulfide Fraction	38.75%	26.76%	30.12%	31.39%	37.38%	30.47%	42.75%	30.59%	36.37%	38.31%	40.94%	44.06%
Residual Fraction	26.83%	39.99%	34.43%	41.85%	38.72%	36.56%	32.38%	23.53%	38.19%	37.30%	29.78%	29.69%

Borehole and depth below ground surface (Iron in percent of total)

CLIENT
NIPSCO LLC

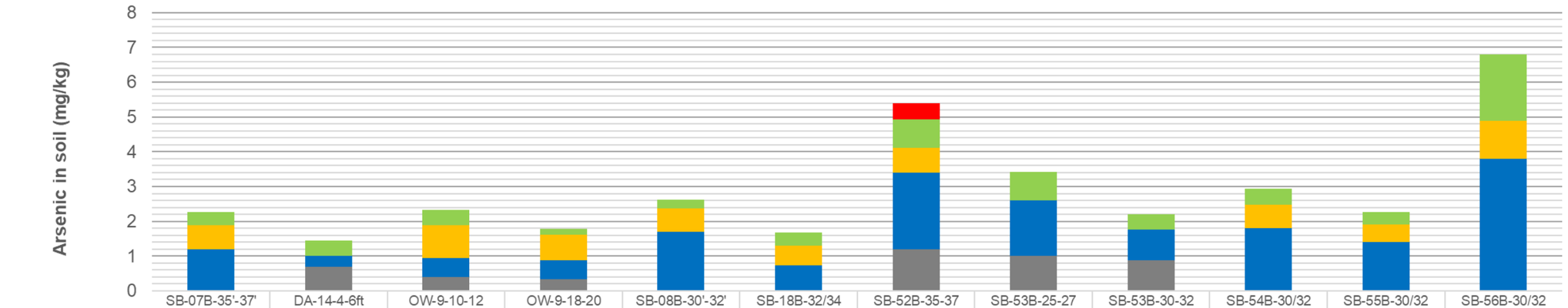
CONSULTANT
GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

TITLE
Iron Sequential Extraction Results

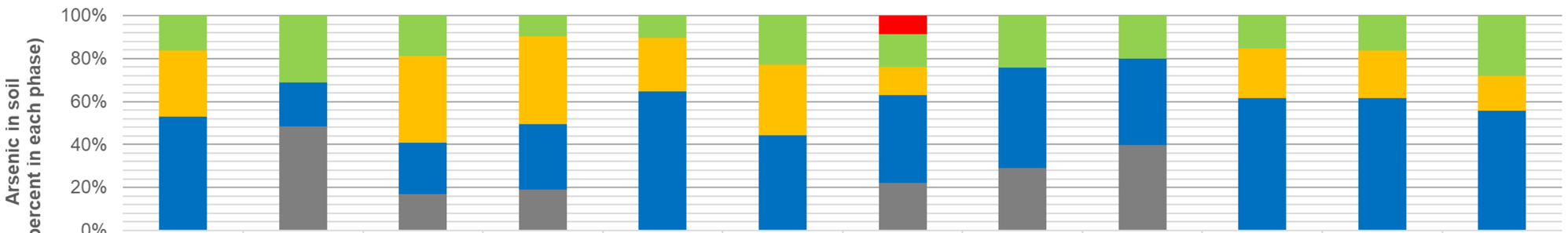
PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	10

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	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0	0	0	0	0	0	0	0	0	0	0	0
Carbonate Phase	0	0	0	0	0	0	0.46	0	0	0	0	0
Amorphous Phase	0.37	0.45	0.43	0.17	0.27	0.38	0.83	0.83	0.44	0.45	0.37	1.9
Metal Hydroxide Phase	0.69	0	0.94	0.73	0.66	0.55	0.71	0	0	0.68	0.5	1.1
Organic Phase	0	0	0	0	0	0	0	0	0	0	0	0
Acid/Sulfide Fraction	1.2	0.3	0.56	0.54	1.7	0.74	2.2	1.6	0.89	1.8	1.4	3.8
Residual Fraction	0	0.7	0.39	0.34	0	0	1.2	1	0.88	0	0	0

Borehole and depth below ground surface (Arsenic in mg/kg soil)



	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Carbonate Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.52%	0.00%	0.00%	0.00%	0.00%	0.00%
Amorphous Phase	16.37%	31.03%	18.53%	9.55%	10.27%	22.75%	15.37%	24.20%	19.91%	15.36%	16.30%	27.94%
Metal Hydroxide Phase	30.53%	0.00%	40.52%	41.01%	25.10%	32.93%	13.15%	0.00%	0.00%	23.21%	22.03%	16.18%
Organic Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acid/Sulfide Fraction	53.10%	20.69%	24.14%	30.34%	64.64%	44.31%	40.74%	46.65%	40.27%	61.43%	61.67%	55.88%
Residual Fraction	0.00%	48.28%	16.81%	19.10%	0.00%	0.00%	22.22%	29.15%	39.82%	0.00%	0.00%	0.00%

Borehole and depth below ground surface (Arsenic in percent of total)

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

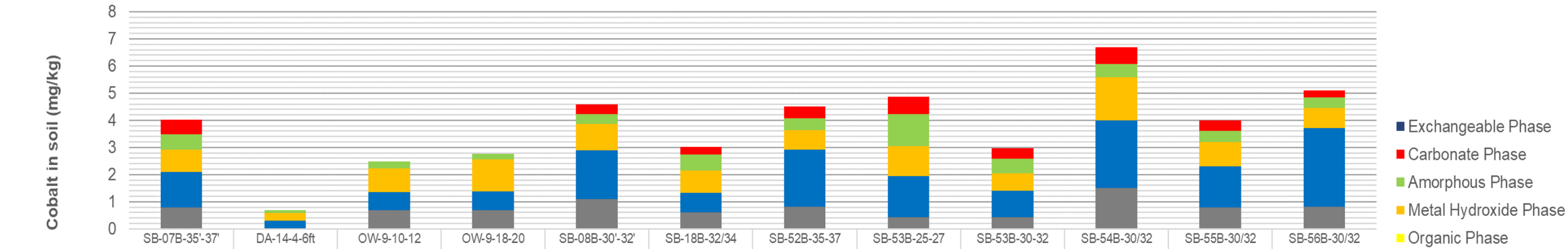
PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

TITLE
Arsenic Sequential Extraction Results

PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	11

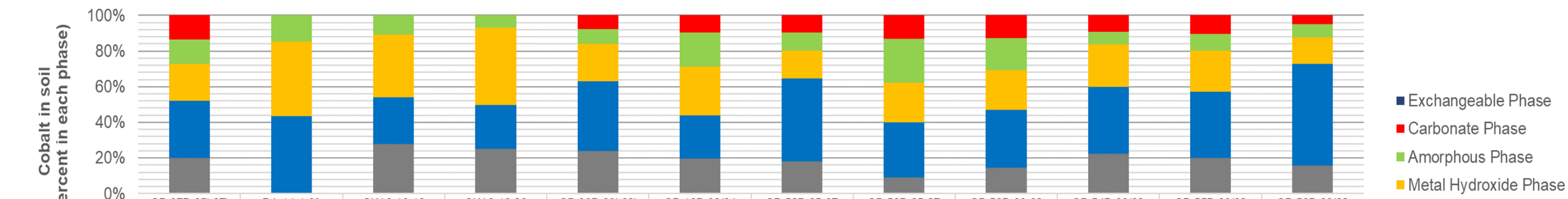
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	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0	0	0	0	0	0	0	0	0	0	0	0
Carbonate Phase	0.54	0	0	0	0.35	0.29	0.44	0.63	0.38	0.62	0.41	0.26
Amorphous Phase	0.55	0.1	0.27	0.19	0.37	0.58	0.45	1.2	0.53	0.47	0.39	0.37
Metal Hydroxide Phase	0.83	0.29	0.87	1.2	0.97	0.83	0.71	1.1	0.66	1.6	0.91	0.76
Organic Phase	0	0	0	0	0	0	0	0	0	0	0	0
Acid/Sulfide Fraction	1.3	0.3	0.66	0.68	1.8	0.73	2.1	1.5	0.97	2.5	1.5	2.9
Residual Fraction	0.8	0	0.69	0.69	1.1	0.6	0.82	0.44	0.43	1.5	0.8	0.81

Borehole and depth below ground surface (Cobalt in mg/kg soil)



	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Carbonate Phase	13.43%	0.00%	0.00%	0.00%	7.63%	9.57%	9.73%	12.94%	12.79%	9.27%	10.22%	5.10%
Amorphous Phase	13.68%	14.49%	10.84%	6.88%	8.06%	19.14%	9.96%	24.64%	17.85%	7.03%	9.73%	7.25%
Metal Hydroxide Phase	20.65%	42.03%	34.94%	43.48%	21.13%	27.39%	15.71%	22.59%	22.22%	23.92%	22.69%	14.90%
Organic Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acid/Sulfide Fraction	32.34%	43.48%	26.51%	24.64%	39.22%	24.09%	46.46%	30.80%	32.66%	37.37%	37.41%	56.86%
Residual Fraction	19.90%	0.00%	27.71%	25.00%	23.97%	19.80%	18.14%	9.03%	14.48%	22.42%	19.95%	15.88%

Borehole and depth below ground surface (Cobalt in percent of total)

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

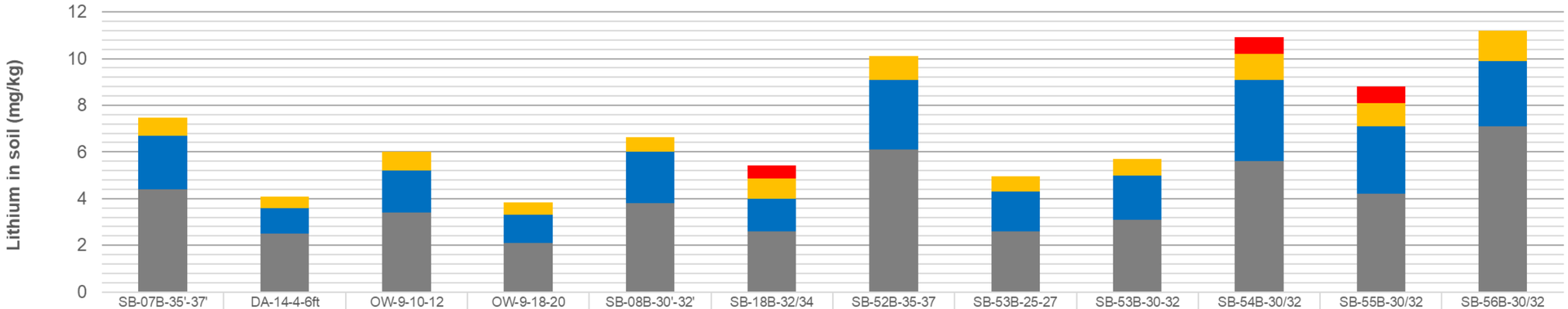
PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

TITLE
Cobalt Sequential Extraction Results

PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	12

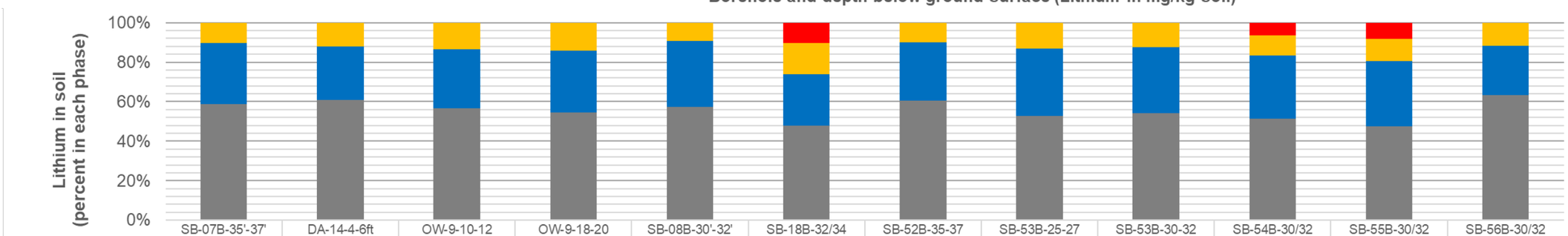
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	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0	0	0	0	0	0	0	0	0	0	0	0
Carbonate Phase	0	0	0	0	0	0.56	0	0	0	0.71	0.72	0
Amorphous Phase	0	0	0	0	0	0	0	0	0	0	0	0
Metal Hydroxide Phase	0.78	0.5	0.81	0.55	0.62	0.86	1	0.64	0.71	1.1	1	1.3
Organic Phase	0	0	0	0	0	0	0	0	0	0	0	0
Acid/Sulfide Fraction	2.3	1.1	1.8	1.2	2.2	1.4	3	1.7	1.9	3.5	2.9	2.8
Residual Fraction	4.4	2.5	3.4	2.1	3.8	2.6	6.1	2.6	3.1	5.6	4.2	7.1

Borehole and depth below ground surface (Lithium in mg/kg soil)



	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Carbonate Phase	0.00%	0.00%	0.00%	0.00%	0.00%	10.33%	0.00%	0.00%	0.00%	6.51%	8.16%	0.00%
Amorphous Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Metal Hydroxide Phase	10.43%	12.20%	13.48%	14.29%	9.37%	15.87%	9.90%	12.96%	12.43%	10.08%	11.34%	11.61%
Organic Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Acid/Sulfide Fraction	30.75%	26.83%	29.95%	31.17%	33.23%	25.83%	29.70%	34.41%	33.27%	32.08%	32.88%	25.00%
Residual Fraction	58.82%	60.98%	56.57%	54.55%	57.40%	47.97%	60.40%	52.63%	54.29%	51.33%	47.62%	63.39%

Borehole and depth below ground surface (Lithium in percent of total)

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

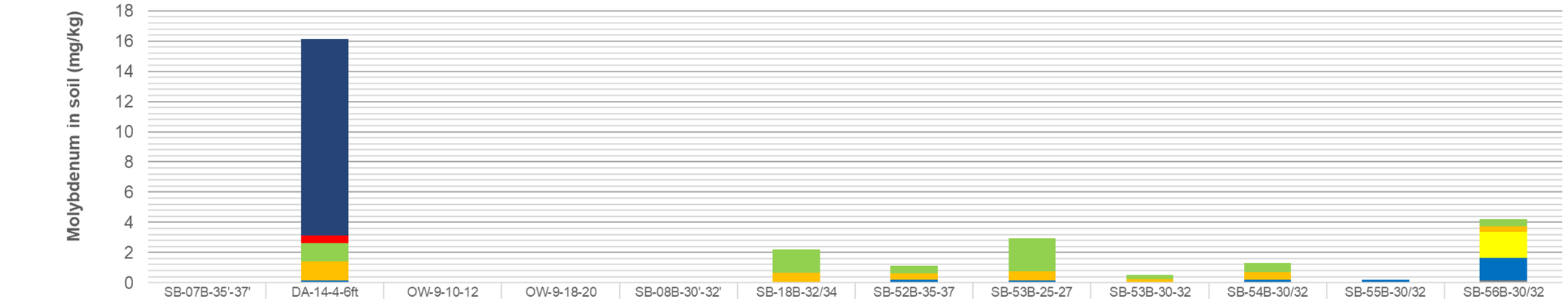
PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

TITLE
Lithium Sequential Extraction Results

PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	13

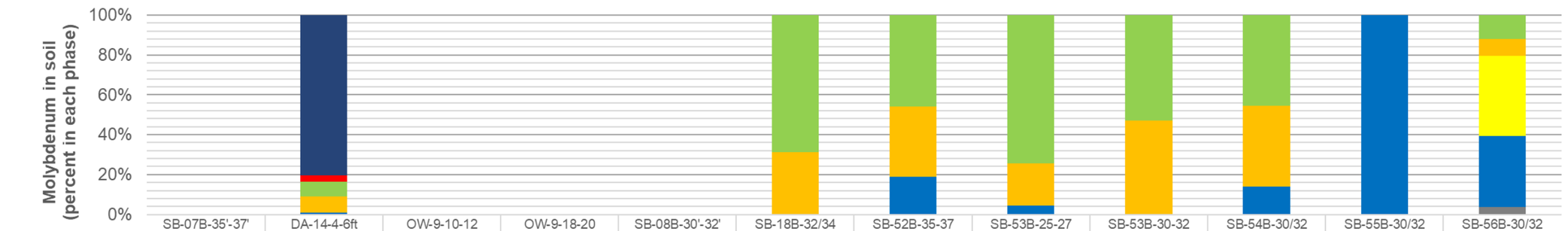
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	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0	13	0	0	0	0	0	0	0	0	0	0
Carbonate Phase	0	0.51	0	0	0	0	0	0	0	0	0	0
Amorphous Phase	0	1.2	0	0	0	1.5	0.51	2.2	0.27	0.59	0	0.5
Metal Hydroxide Phase	0	1.3	0	0	0	0.68	0.39	0.63	0.24	0.53	0	0.36
Organic Phase	0	0	0	0	0	0	0	0	0	0	0	1.7
Acid/Sulfide Fraction	0	0.13	0	0	0	0	0.21	0.13	0	0.18	0.2	1.5
Residual Fraction	0	0	0	0	0	0	0	0	0	0	0	0.16

Borehole and depth below ground surface (Molybdenum in mg/kg soil)



	SB-07B-35'-37'	DA-14-4-6ft	OW-9-10-12	OW-9-18-20	SB-08B-30'-32'	SB-18B-32/34	SB-52B-35-37	SB-53B-25-27	SB-53B-30-32	SB-54B-30/32	SB-55B-30/32	SB-56B-30/32
Exchangeable Phase	0.00%	80.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Carbonate Phase	0.00%	3.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Amorphous Phase	0.00%	7.43%	0.00%	0.00%	0.00%	68.81%	45.95%	74.32%	52.94%	45.38%	0.00%	11.85%
Metal Hydroxide Phase	0.00%	8.05%	0.00%	0.00%	0.00%	31.19%	35.14%	21.28%	47.06%	40.77%	0.00%	8.53%
Organic Phase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	40.28%
Acid/Sulfide Fraction	0.00%	0.81%	0.00%	0.00%	0.00%	0.00%	18.92%	4.39%	0.00%	13.85%	100.00%	35.55%
Residual Fraction	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.79%

Borehole and depth below ground surface (Molybdenum in percent of total)

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

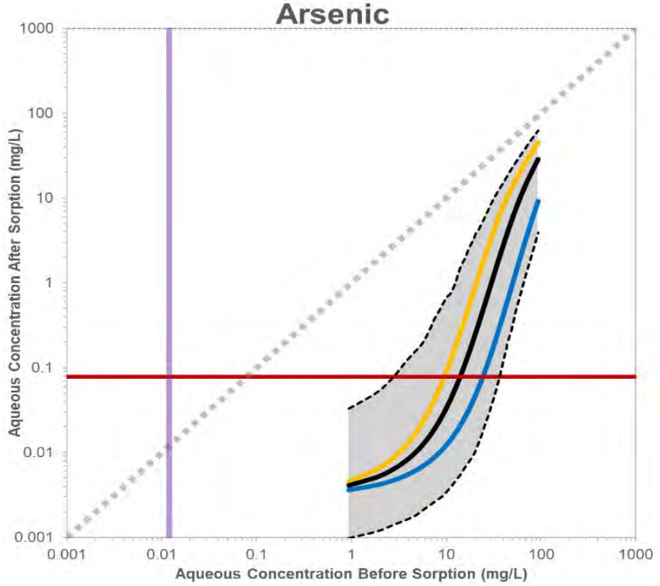
TITLE
Molybdenum Sequential Extraction Results

PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	14

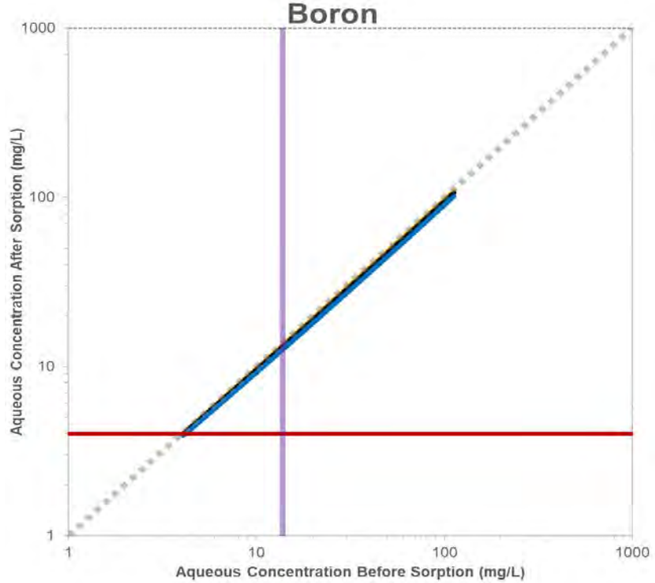
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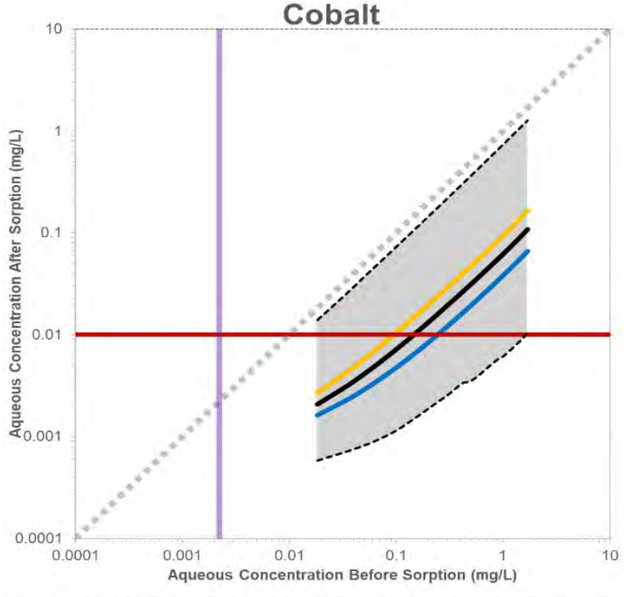
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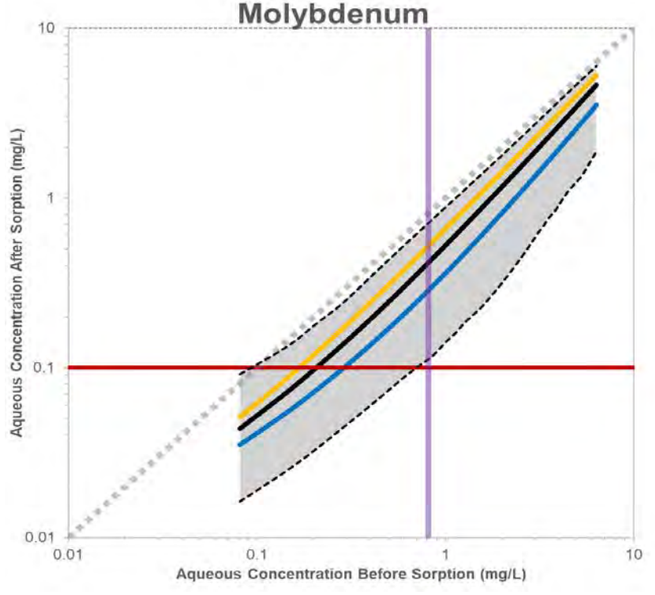
(b)



(c)



(d)



- Minimum Hfo and Hao Contents (Geometric mean of all simulations)
- Mean Hfo and Hao Contents (Geometric mean of all simulations)
- Maximum Hfo and Hao Contents (Geometric mean of all simulations)
- 5th to 95th Precentile of Min, Mean, and Max Simulations
- Groundwater Protection Standard
- Porewater
- 1:1 Line

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

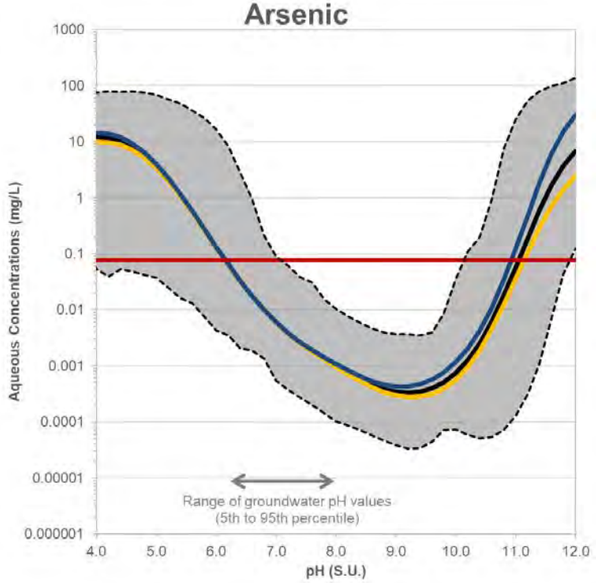
PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

TITLE
Capacity of Soils to Adsorb Constituents: Aqueous Concentrations Prior to Equilibrating with Hfo and Hao versus Aqueous Concentrations After Equilibrating

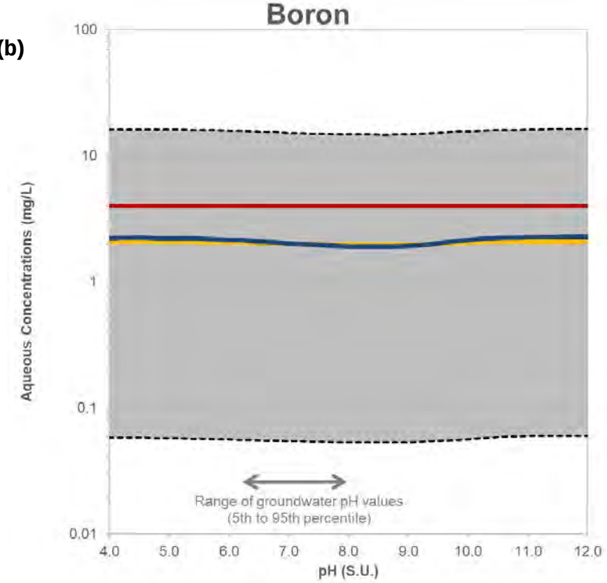
PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	15

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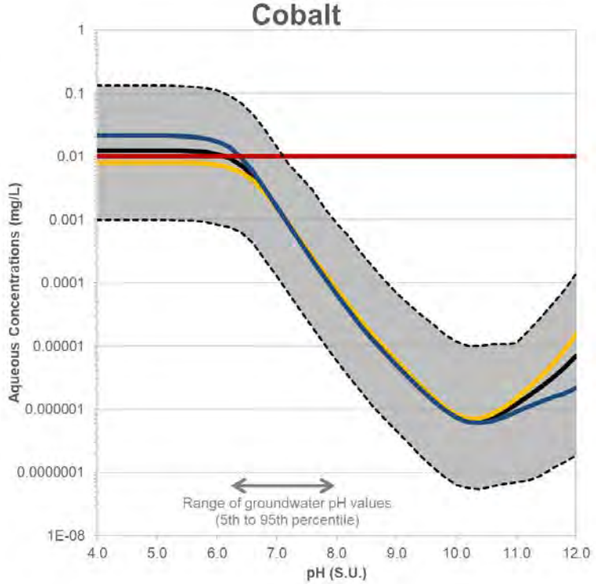
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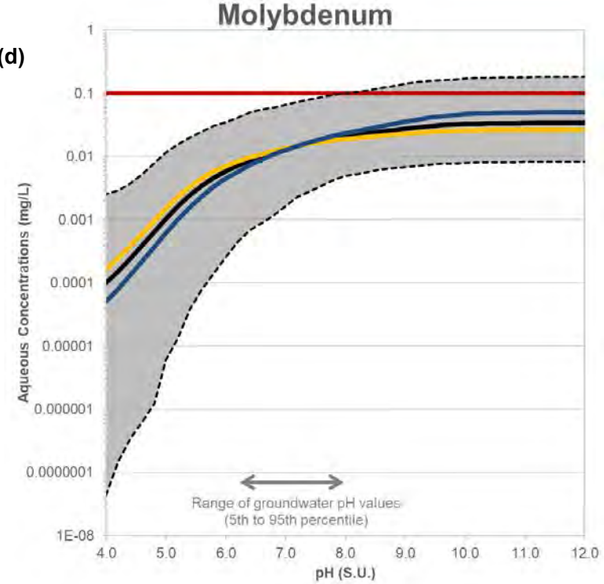
(b)



(c)



(d)



Minimum Hfo and Hao Contents (Geometric mean of all simulations)
Mean Hfo and Hao Contents (Geometric mean of all simulations)
Maximum Hfo and Hao Contents (Geometric mean of all simulations)
5th to 95th Precentile of Min, Mean, and Max Simulations
Groundwater Protection Standard

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

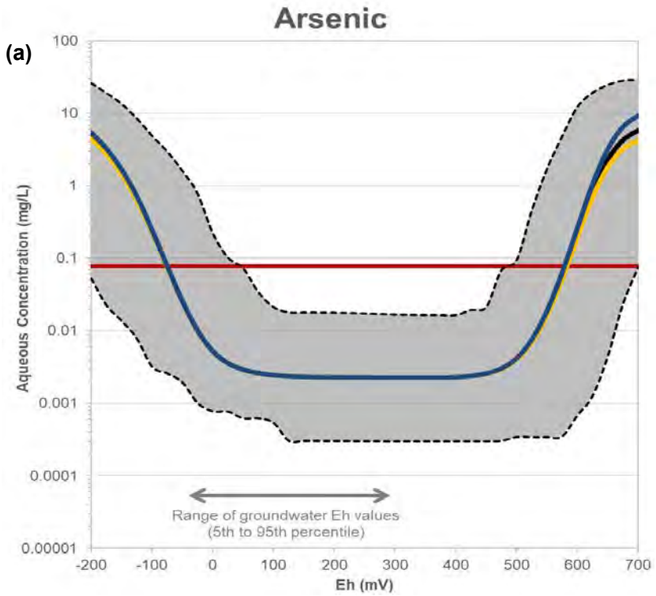
TITLE
Stability of Adsorbed Constituents Versus pH

PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	16

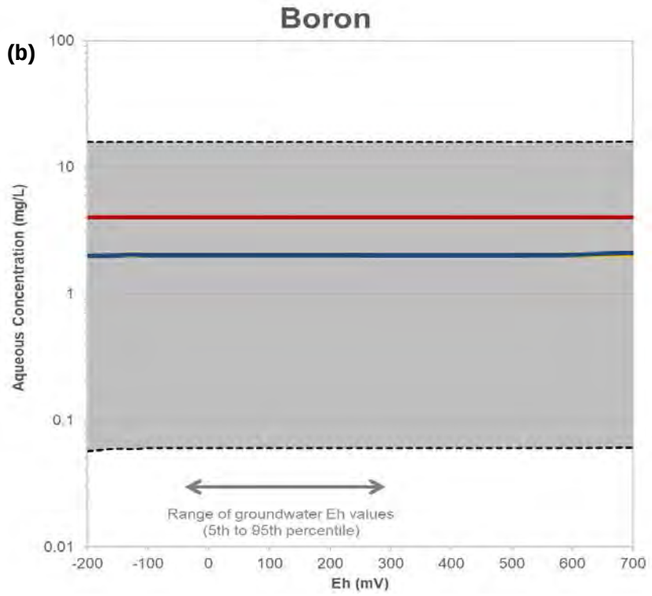
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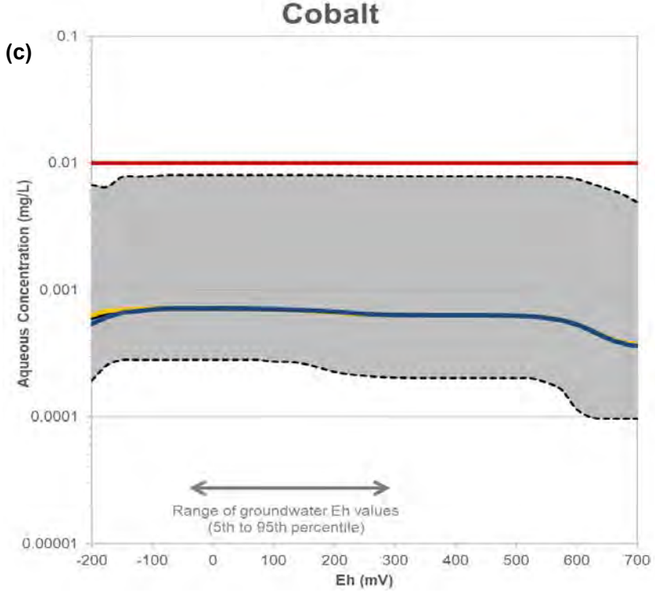
(a)



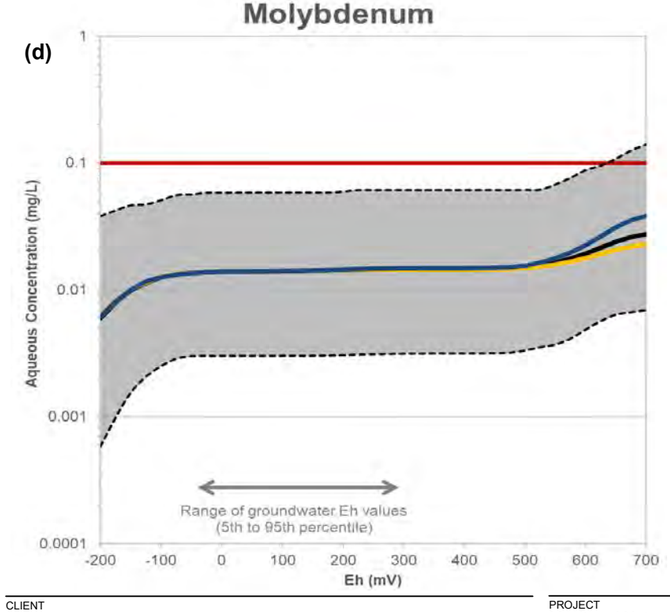
(b)



(c)



(d)



Minimum Hfo and Hao Contents (Geometric mean of all simulations)
Mean Hfo and Hao Contents (Geometric mean of all simulations)
Maximum Hfo and Hao Contents (Geometric mean of all simulations)
5th to 95th Precentile of Min, Mean, and Max Simulations
Groundwater Protection Standard

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

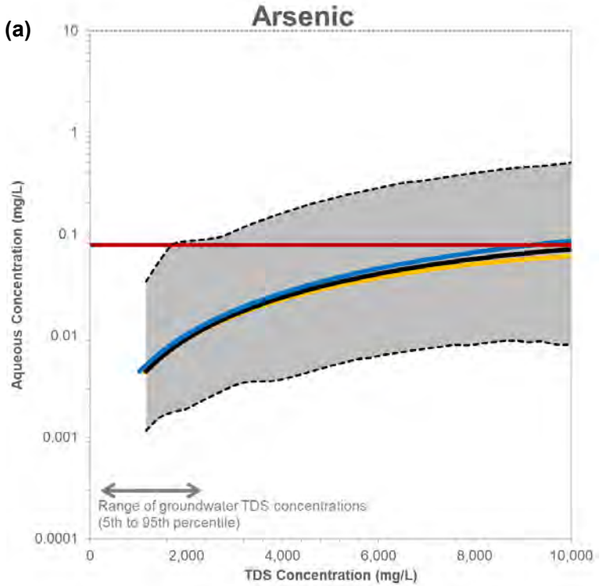
TITLE
Stability of Adsorbed Constituents Versus Eh

PROJECT NO.	PHASE	REV.	FIGURE
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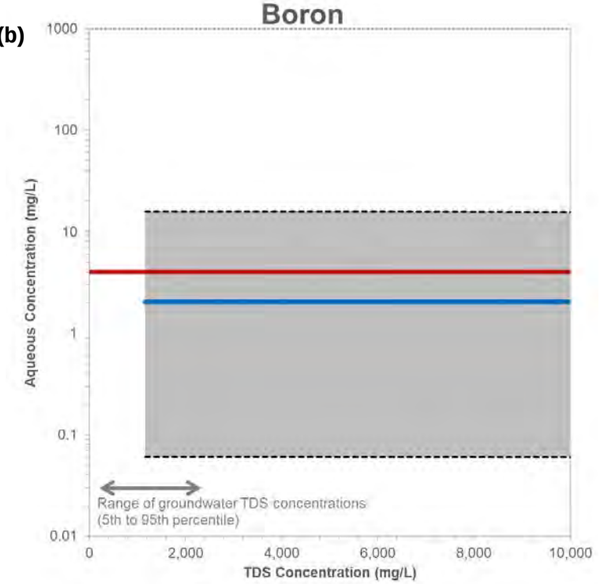
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
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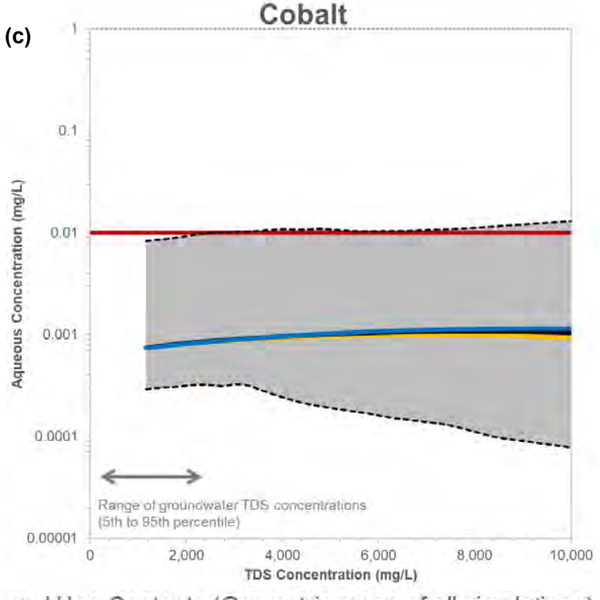
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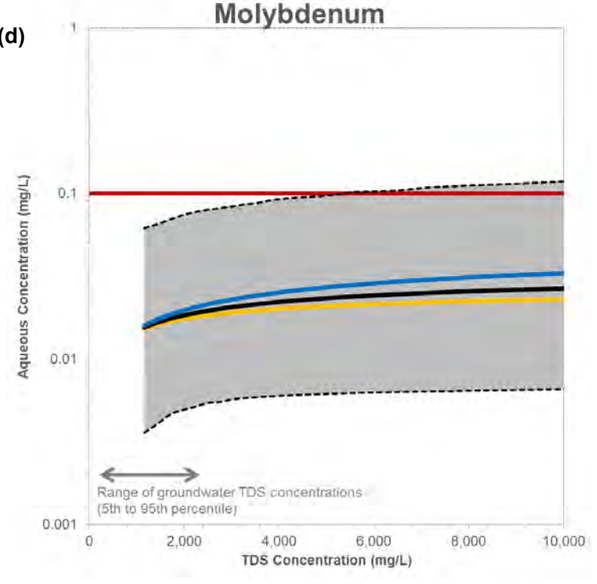
(b)



(c)



(d)



Minimum Hfo and Hao Contents (Geometric mean of all simulations)
Mean Hfo and Hao Contents (Geometric mean of all simulations)
Maximum Hfo and Hao Contents (Geometric mean of all simulations)
5th to 95th Precentile of Min, Mean, and Max Simulations
Groundwater Protection Standard

CLIENT
NIPSCO LLC

CONSULTANT
GOLDER

PROJECT
Monitored Natural Attenuation Evaluation
MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station

TITLE
Stability of Adsorbed Constituents Versus TDS

PROJECT NO.	PHASE	REV.	FIGURE
19121567	192	A	18

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
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APPENDIX A

Groundwater and Porewater Monitoring Data

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW04																
	Sample Date	2016-07-12	2016-09-08	2016-11-09	2017-01-10		2017-03-01	2017-04-26	2017-06-28	2017-08-22	2017-10-04	2018-03-13		2018-04-20		2018-10-25	2019-04-23	2019-11-07
	Sample Type	N	N	N	FD	N	N	N	N	N	N	FD	N	FD	N	N	N	N
Chemical Name	Unit																	
CCR Appendix III																		
Boron	mg/L	0.48	1.4	2.4	1.1	1	1.2	0.74	0.92	1.2	0.54			0.74	0.72	0.78	0.74	1.3
Calcium	mg/L	110	230	300	270	240	230	220	200	200	140			140	140	210	130	190
Chloride	mg/L	2.2	27	69	13	14	13	5.4	12	13	4.5			3.7 J	4.4	10	3.7	9.5
Fluoride	mg/L	0.92 J+	0.2 J	10 U	0.19 J	0.17 J	5 U	5 U	0.19 J	0.21 J	0.24 J	0.15 J	5 U	5 U	0.17 J-	0.26	0.16 J+	0.23
pH	SU	7.22	6.83	6.75		6.93	7.01	6.76	6.88	7.21	7.28		6.95		7.2	6.39	7	7.14
Sulfate	mg/L	140 J-	460	480	460	470	390	470	370	440	250			220	210	530	260	490
Total Dissolved Solids	mg/L	420	990	1400	1000	1000	890	870	880	920	610			580 J	580	980	600	900
CCR Appendix IV																		
Antimony	mg/L	0.002 U	0.002 U	0.00027 J	0.002 U	0.00057 J	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U			0.002 U	0.00065 J	0.00092 J
Arsenic	mg/L	0.0059	0.013	0.0052	0.0058	0.0072	0.005 U	0.0099	0.012	0.012		0.004 J	0.0054			0.014	0.0023 J	0.0018 J
Barium	mg/L	0.041	0.077	0.11	0.095	0.079	0.089	0.069	0.084	0.09		0.11	0.077			0.074	0.068	0.066
Beryllium	mg/L	0.00027 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.00048 J	0.00053 J	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.00036 J	0.00036 J	0.0052 J	0.002 U	0.002 U	0.002 U	0.002 U		0.0011 J	0.0012 J			0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.001 U	0.00031 J	0.00064 J	0.0061	0.0058	0.0038	0.0049	0.003	0.0023		0.0028	0.0031			0.0026	0.0011	0.00043 J
Fluoride	mg/L	0.92 J+	0.2 J	10 U	0.19 J	0.17 J	5 U	5 U	0.19 J	0.21 J	0.24 J	0.15 J	5 U	5 U	0.17 J-	0.26	0.16 J+	0.23
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0018 J	0.008 U	0.008 U	0.0021 J	0.0023 J	0.0033 J	0.0033 J	0.0062 J	0.0062 J		0.008 U	0.008 U			0.0023 J	0.0045 J	0.0028 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U	0.0002 U			0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.0075 J	0.023	0.073	0.037	0.038	0.034	0.016	0.02	0.034		0.0048 J	0.024			0.039	0.024	0.055
Radium, Total	pci/L	5 U	0.583	0.697	0.804	0.515 U	0.362 U	0.379 U	0.364 U	0.352 U		1.35 J+	0.778 J+			0.473	0.591	
Radium-226	pci/L	1 U	0.138 U	0.346 U	0.301 U	0.242 U	0.121 U	0.117 U	0.119 J+	0.118		0.177	0.0881			0.306	0.311 U	
Radium-228	pci/L	1 U	0.498 U	0.495 U	0.677 J+	0.515 U	0.362 U	0.379 U	0.364 U	0.352 U		1.17 J+	0.69 J+			0.462 U	0.405	
Selenium	mg/L	0.005 U	0.005 U	0.00064 J	0.0017 J	0.0021 J	0.005 U	0.005 U	0.005 U	0.005 U		0.001 J	0.001 J			0.005 U	0.0013 J	0.0052
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U
Supplemental Parameters																		
Alkalinity, Bicarbonate (HCO3)	mg/L																	
Alkalinity, Carbonate (CO3)	mg/L																	
Alkalinity, Hydroxide (OH)	mg/L																	
Alkalinity, Total	mg/L															230	190	270
Ferric Iron	mg/L															6.9		
Ferrous Iron	mg/L															3.1 J		
Iron	mg/L																2.3	0.083 J
Magnesium	mg/L															31	18	31
Manganese	mg/L																0.012 J-	0.0078 J
Nitrate as N	mg/L																0.1 U	0.1 U
Nitrite as N	mg/L																	
Nitrogen, Nitrate-Nitrite	mg/L															0.39		
Phosphorus (as phosphate)	mg/L															0.9	0.31 U	0.31 UJ
Potassium	mg/L															3.3 J	3.1 J	3.2 J
Sodium	mg/L															13	12	36
Sample Parameters																		
Dissolved Oxygen	mg/L	0.09	0.58	0.37		1.82	1.47	0.12	0.3	0.52	0.09		0.66		2.3	0.15	7.08	2.55
Oxidation Reduction Potential	mV	59.6	-24	-6.9		-31.7	14	-57.8	-45	-27	-105.8		-181.8		-81.2	-58.1	19	-60.7
Eh	mV	259.6	176.0	193.1		168.3	214.0	142.2	155.0	173.0	94.2		18.2		118.8	141.9	219.0	139.3
pH	SU	7.22	6.83	6.75		6.93	7.01	6.76	6.88	7.21	7.28		6.95		7.2	6.39	7	7.14
Specific Conductance	uS/cm	595	1345	1681		1109	910	1137	911	1153	813		562		770	1311	549	866
Temperature	deg C	13	17.3	16.3		10.5	8.05	10.2	13.1	15.9	16.1		7.55		3.5	15.5	4.2	13.2
Turbidity	NTU	4.04	1.48	2.21		2.28	4.26	4.04	4.88	1.65	0.51		4.92		3.12	1.92	4.48	1.38

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW07															GAMW07B			
	Sample Date	2016-07-12	2016-09-08	2016-11-09	2017-01-10	2017-03-01	2017-04-26	2017-06-29	2017-08-23	2017-10-03		2018-03-15	2018-04-23	2018-10-26	2019-05-02	2019-11-08	2018-09-06	2018-10-26	2019-05-02	2019-11-12
	Sample Type	N	N	N	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit																			
CCR Appendix III																				
Boron	mg/L	1.2	1	0.91	0.91	1	0.68	0.67	0.68	0.71	0.72		1.2	1.3	0.85	0.85	20	23	18	15
Calcium	mg/L	170	190	200	170	170	190	220	190	220	220		210	230	220	180	370	430	380	400
Chloride	mg/L	7.8	6.6	5.3	6	7.6	2.8	3 J	3.2 J	3 J	3.6 J		4.7 J	6.3	6.5	4.8	10 U	250	170	150
Fluoride	mg/L	0.72 J+	0.91 J	0.8 J	0.85 J	0.66 J	0.76 J	0.79 J	0.66 J	1.1 J	0.93 J	0.58 J	0.57 J	0.73	0.97	0.88	10 U	1.5	1.3	1.2
pH	SU	7.03	7.27	7.04	7.15	7.2	7.17	6.57	7.2		7.1	7.28	7.35	5.71	7.2	7.44	8.29	6.78	7.58	7.13
Sulfate	mg/L	310 J-	330	320	320	290	310	360	380	460	450		450	530	500	480	10 U	1600	1500	1400
Total Dissolved Solids	mg/L	770	830	840	750	710	810	970	910	970	1000		900	970	1100	940	2700	2600	920	2300
CCR Appendix IV																				
Antimony	mg/L	0.00035 J	0.00039 J	0.00035 J	0.00028 J	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.0013 J	0.0016 J	0.0018 J	0.0028 J	0.005 U	0.0028 J	0.0025 J	0.0016 J			0.005 U		0.0012 J	0.0019 J	0.0011 J	0.0028 J	0.0015 J	0.0019 J	0.0017 J
Barium	mg/L	0.052	0.055	0.056	0.042	0.05	0.05	0.059	0.059			0.056		0.064	0.053	0.043	0.072	0.063	0.053	0.043
Beryllium	mg/L	0.00011 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0003 J	0.00022 J			0.001 U		0.00047 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.00047 J	0.00046 J	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.0056	0.0077	0.0055	0.0038	0.0044	0.0063	0.01	0.0095			0.006		0.01	0.0074	0.0049	0.00074 J	0.001 U	0.001 U	0.001 U
Fluoride	mg/L	0.72 J+	0.91 J	0.8 J	0.85 J	0.66 J	0.76 J	0.79 J	0.66 J	1.1 J	0.93 J	0.58 J	0.57 J	0.73	0.97	0.88	10 U	1.5	1.3	1.2
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0007 J			0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0034 J	0.008 U	0.008 U	0.0035 J	0.0031 J	0.0041 J	0.0037 J	0.0038 J			0.0024 J		0.0054 J	0.0041 J	0.0033 J	0.0043 J	0.0045 J	0.004 J	0.0035 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ			0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.0084 J	0.0098 J	0.0095 J	0.01 U	0.01 U	0.0083 J	0.0081 J	0.007 J			0.0066 J		0.0087 J	0.0097 J	0.0087 J	0.015	0.017	0.025	0.026
Radium, Total	pci/L	1.59	0.696	0.548	0.412 U	0.42 U	0.371 U	0.45	0.588			0.749 J+		0.823 J+	0.37 U		2.63	2.6 J+	2.31	
Radium-226	pci/L	0.667 J+	0.289	0.374	0.237 U	0.186	0.155	0.232 J+	0.3			0.163		0.483 J+	0.305 U		1.16	1.56 J+	1.17	
Radium-228	pci/L	0.923	0.406	0.462 U	0.412 U	0.42 U	0.371 U	0.262 U	0.413 U			0.585 J+		0.365 U	0.37 U		1.47	1.04	1.14	
Selenium	mg/L	0.005 U	0.005 U	0.003 J	0.003 J	0.005 U	0.008	0.0054	0.005			0.0028 J		0.0016 J	0.0045 J	0.0019 J	0.0012 J	0.005 U	0.005 U	0.005 U
Thallium	mg/L	0.00011 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.00024 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Supplemental Parameters																				
Alkalinity, Bicarbonate (HCO3)	mg/L																180			
Alkalinity, Carbonate (CO3)	mg/L																5 U			
Alkalinity, Hydroxide (OH)	mg/L																5 U			
Alkalinity, Total	mg/L													260	270	250	180	180	170	170
Ferric Iron	mg/L													0.035 J			6.7 J	6.8		
Ferrous Iron	mg/L													0.05 UJ			0.1 R	1.1 J		
Iron	mg/L														0.067 J	0.09 J			5.3	5.5
Magnesium	mg/L													39	41	38	72	87	73	72
Manganese	mg/L														0.46	0.61			0.46	0.49
Nitrate as N	mg/L														3.3	1.6	0.05 R		0.1 U	0.1 U
Nitrite as N	mg/L																0.05 R			
Nitrogen, Nitrate-Nitrite	mg/L													0.53				0.049 J		
Phosphorus (as phosphate)	mg/L													0.31 U	0.31 U	0.31 U	0.031 U	0.31 U	0.31 U	0.31 U
Potassium	mg/L													6.6	5.5	6.5	12	13	13	13
Sodium	mg/L													14	14	9.9	290	240	230	120
Sample Parameters																				
Dissolved Oxygen	mg/L	0.6	1.81	0.59	0.52	0.51	1.96	1.02	0.84		0.48	0.8	3.52	2.64	0.81	0.38	0.13	0.67	0.19	0.2
Oxidation Reduction Potential	mV	111.2	64.2	-6.4	71.3	65.3	76.9	291.1	8.5		95.4	-55	-98.7	-233.3	135.1	-131.8	-197.6	-230.2	34.9	-196.7
Eh	mV	311.2	264.2	193.6	271.3	265.3	276.9	491.1	208.5		295.4	145.0	101.3	-33.3	335.1	68.2	2.4	-30.2	234.9	3.3
pH	SU	7.03	7.27	7.04	7.15	7.2	7.17	6.57	7.2		7.1	7.28	7.35	5.71	7.2	7.44	8.29	6.78	7.58	7.13
Specific Conductance	uS/cm	966	1072	1106	928	832	1121	1151	1157		1273	760	1060	1240	975	828	5178	3237	2357	1686
Temperature	deg C	14.4	19.2	16.7	12.9	10.63	11.8	14.6	16.5		18	10	10	16.95	10.3	15.3	15.03	13.86	12.4	12.9
Turbidity	NTU	4.6	4.51	1.26	3.2	4.76	2.17	2.87	0.9		0.49	1.3	1.75	1.08	2.72	4.58	4.48	3.01	2.86	1.11

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW08														GAMW08B					
Sample Date		2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-02	2017-04-27	2017-06-29	2017-08-23	2017-10-04	2018-03-14	2018-04-23	2018-10-26	2019-05-08	2019-11-07	2018-09-07		2018-10-26		2019-05-03	2019-11-07
Sample Type		N	N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	FD	N	N	N
Chemical Name	Unit																				
CCR Appendix III																					
Boron	mg/L	3.5	3.9	3.2	3.4	3.3	3.2	2.9	2.2	3.7		2.4	1.8	1.4	2.5		18		15	14	13
Calcium	mg/L	310	310	300	260	270	310	340	270	290		360	230	250	280		380		370	350	340
Chloride	mg/L	88	71	89	99	110	86	83	39	87		64	56	49	66		240		180	160	180
Fluoride	mg/L	1 J+	1.2 J	0.73 J	0.87 J	0.94 J	0.92 J	1.3 J	2 J	0.68 J	1.2 J	1.3 J-	1.6	2.2	1.9		1.6 J		1.5	1.9	1.7
pH	SU	6.92	7.03	6.85	7.02	7.09	6.93	7	7.27	6.89	7.41	7.41	6.99	7.37	7.5		7.7		7.45	7.57	7.85
Sulfate	mg/L	770 J-	690	680	610	630	770	800	640	670		800	460	540	670		1500		1500	1400	1300
Total Dissolved Solids	mg/L	1600	1500	1600	1300	1400	1700	2000	1400	1500		1700	1100	1300	1300		1900 J+		2300	2300	2200
CCR Appendix IV																					
Antimony	mg/L	0.00073 J	0.00069 J	0.0014 J	0.00041 J	0.00043 J	0.002 U	0.00059 J	0.00075 J		0.002 U		0.00082 J	0.00076 J	0.00077 J		0.002 U		0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.0018 J	0.0019 J	0.0018 J	0.0027 J	0.0016 J	0.0031 J	0.0027 J	0.0023 J		0.005 U		0.0011 J	0.0015 J	0.0016 J		0.005 U		0.005 U	0.005 U	0.005 U
Barium	mg/L	0.068	0.065	0.065	0.05	0.055	0.064	0.074	0.077		0.066	0.069	0.053	0.058	0.066		0.042		0.03	0.025	0.023
Beryllium	mg/L	0.00017 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.0004 J	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Cadmium	mg/L	7.4E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.00037 J	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.00029 J	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.036	0.034	0.059	0.047	0.05	0.037	0.047	0.02		0.022	0.027	0.011	0.0079	0.011		0.00066 J		0.001 U	0.001 U	0.001 U
Fluoride	mg/L	1 J+	1.2 J	0.73 J	0.87 J	0.94 J	0.92 J	1.3 J	2 J	0.68 J	1.2 J	1.3 J-	1.6	2.2	1.9		1.6 J		1.5	1.9	1.7
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0098	0.012	0.009	0.0098	0.0093	0.012	0.011	0.012		0.0089	0.009	0.011	0.015	0.0091		0.0098		0.0073 J	0.0063 J	0.0058 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U		0.0002 U		0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.034	0.036	0.024	0.02	0.019	0.038	0.049	0.083		0.058	0.058	0.059	0.08	0.068		0.037		0.039	0.057	0.044
Radium, Total	pci/L	1.07	1.08	1.09	0.581	0.777	0.632	1.11	0.762		1.13 J+	0.99	1 J+	0.473			1.67 J+		1.02 J+	0.704	
Radium-226	pci/L	0.501 J+	0.469	0.557	0.375	0.368	0.383	0.613 J+	0.591		0.267	0.437	0.582 J+	0.312 U			1.09 J+		0.596 J+	0.438	
Radium-228	pci/L	1 U	0.609	0.533	0.43 U	0.423 U	0.365 U	0.499	0.341 U		0.865 J+	0.552	0.423	0.456 U			0.579		0.454 U	0.518 U	
Selenium	mg/L	0.005 U	0.0065	0.0033 J	0.0014 J	0.0032 J	0.011	0.0088	0.0081		0.024	0.022	0.0021 J	0.016	0.0036 J		0.0014 J		0.005 U	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.00045 J	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Supplemental Parameters																					
Alkalinity, Bicarbonate (HCO3)	mg/L															160	160				
Alkalinity, Carbonate (CO3)	mg/L															5 U	5 U				
Alkalinity, Hydroxide (OH)	mg/L															5 U	5 U				
Alkalinity, Total	mg/L												350	380	380	160	160	160	160	130	160
Ferric Iron	mg/L												0.083 J			6.1 J	6.9 J	6.5	6.2		
Ferrous Iron	mg/L												0.05 UJ			0.1 R	0.1 R	0.79 J	0.98 J		
Iron	mg/L													0.2 U	0.2 U					5.6	5.1
Magnesium	mg/L												44	53	56	58	66	63	62	45	42
Manganese	mg/L													0.22	0.37					0.49	0.45
Nitrate as N	mg/L													7.7	0.25	0.05 R	0.05 R			0.075 J	0.43
Nitrite as N	mg/L															0.05 R	0.05 R				
Nitrogen, Nitrate-Nitrite	mg/L												0.06					0.05 U	0.05 U		
Phosphorus (as phosphate)	mg/L												0.31 U	0.15 J	0.11 J-	0.028 J	0.031 U	0.31 U	0.31 U	0.31 U	0.19 J-
Potassium	mg/L												12	13	12	5.6	6.4	5.5	5.5	5.6	5.3
Sodium	mg/L												45	45	51	260	300	200	200	240	200
Sample Parameters																					
Dissolved Oxygen	mg/L	1.9	0.38	1.62	1.27	0.96	0.63	1.96	0.93	0.21	0.97	5.09	0.21	0.44	4.2		0.42		0.12	0.13	2.61
Oxidation Reduction Potential	mV	159.7	64.6	-8	58.4	49.9	60.4	242.5	61.9	-15.9	110.1	-106.4	27.7	62.2	44.1		-185.5		-67	7.9	-67
Eh	mV	359.7	264.6	192.0	258.4	249.9	260.4	442.5	261.9	184.1	310.1	93.6	227.7	262.2	244.1		14.5	200.0	133.0	207.9	133.0
pH	SU	6.92	7.03	6.85	7.02	7.09	6.93	7	7.27	6.89	7.41	7.41	6.99	7.37	7.5		7.7		7.45	7.57	7.85
Specific Conductance	uS/cm	1925	1807	1664	1517	1494	2098	1834	1713	1840	1121	1732	1440	1102	1322		2538		2375	2190	1896
Temperature	deg C	15.5	18.78	17.75	12.2	10.06	11.1	15.8	18.5	18.3	9.6	10.2	17.2	11	10.84		14.6		14.5	12.8	8.05
Turbidity	NTU	2.3	3.22	0.58	1.26	1.56	1.1	2.41	0.68	4.38	1.11	1.54	1.4	1.81	0.31		3.4		1.63	1.72	2.89

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW09																
Sample Date		2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-01		2017-04-26		2017-06-28	2017-08-23	2017-10-03	2018-03-14	2018-04-23	2018-10-25	2019-05-02		2019-11-07
Sample Type		N	N	N	N	FD	N	FD	N	N	N	N	N	N	N	FD	N	N
Chemical Name	Unit																	
CCR Appendix III																		
Boron	mg/L	5.7	4.7	7.3	5.3	7.7	7.6	5.9	6.1	4.9	7.9	7.3		4.9	6.3	3	3	2.7
Calcium	mg/L	320	240	210	210	200	200	220	240	270	280	220		220	220	200	200	150
Chloride	mg/L	63	55	58	58	75	73	71	67	53	39	64		58	82	46	46	39
Fluoride	mg/L	0.15 J+	10 U	10 U	0.22 J	0.13 J	0.14 J	0.16 J	0.13 J	0.18 J	2 J	0.21 J	5 U	0.26 J-	0.28	0.27	0.27	0.33
pH	SU	7.27	7.25	7.12	6.68		7.44		7.15	7.25	7.31	7.3	7.28	6.87	6.88		7.1	7.06
Sulfate	mg/L	910 J-	570	360	500	440	420	460	460	600	740	540		510	510 J-	530	530	380
Total Dissolved Solids	mg/L	1500	1100	880	980	1000	990	1000	960	1300	1400	1100		930	1100	970	980	770
CCR Appendix IV																		
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.0015 J	0.0013 J	0.00076 J	0.0031 J	0.005 U	0.005 U	0.0028 J	0.0029 J	0.002 J	0.0027 J		0.005 U		0.005 U	0.005 U	0.005 U	0.005 U
Barium	mg/L	0.059	0.043	0.036	0.039	0.035	0.037	0.039	0.042	0.047	0.054		0.041	0.039	0.039	0.041	0.041	0.036
Beryllium	mg/L	0.00012 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00036 J	0.001 U	0.001 U	0.001 U		0.001 U		0.00092 J	0.00058 J	0.00052 J	0.00049 J
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.00033 J	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.0036	0.002 U	0.00062 J	0.0013 J	0.002 U	0.002 U	0.002 U	0.002 U	0.0011 J	0.0015 J		0.0016 J		0.002 U	0.0012 J	0.0012 J	0.002 U
Cobalt	mg/L	0.001 U	0.00018 J	0.0002 J	0.0002 J	0.001 U	0.001 U	0.00029 J	0.00025 J	0.001 U	0.001 U		0.001 U		0.00038 J	0.00049 J	0.00055 J	0.00035 J
Fluoride	mg/L	0.15 J+	10 U	10 U	0.22 J	0.13 J	0.14 J	0.16 J	0.13 J	0.18 J	2 J	0.21 J	5 U	0.26 J-	0.28	0.27	0.27	0.33
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0019 J	0.008 U	0.008 U	0.0016 J	0.0011 J	0.0012 J	0.008 U	0.008 U	0.0017 J	0.0018 J		0.008 U		0.008 U	0.008 U	0.008 U	0.008 U
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.02	0.017	0.029	0.023	0.027	0.027	0.021	0.021	0.028	0.032		0.025	0.035	0.04	0.043	0.043	0.035
Radium, Total	pci/L	1.5	0.568	0.477 U	0.467 U	0.55	0.469	0.593	0.414	0.707	0.803		1.45 J+	0.096	0.679	0.505	0.427 U	
Radium-226	pci/L	0.506 J+	0.231	0.397 U	0.257	0.134	0.166	0.194	0.205	0.255 J+	0.357		0.188	0.204	0.446	0.33	0.355 U	
Radium-228	pci/L	0.994	0.349 U	0.477 U	0.467 U	0.427 U	0.432 U	0.398	0.36 U	0.452	0.446		1.26 J+	-0.108	0.361 U	0.428 U	0.427 U	
Selenium	mg/L	0.014	0.0091	0.0049 J	0.011	0.014	0.014	0.019	0.02	0.013	0.027		0.0082	0.011	0.0098	0.012	0.012	0.0077
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U
Supplemental Parameters																		
Alkalinity, Bicarbonate (HCO3)	mg/L																	
Alkalinity, Carbonate (CO3)	mg/L																	
Alkalinity, Hydroxide (OH)	mg/L																	
Alkalinity, Total	mg/L														150	110	100	110
Ferric Iron	mg/L														0.042 J			
Ferrous Iron	mg/L														0.05 UJ			
Iron	mg/L															0.027 J	0.038 J	0.037 J
Magnesium	mg/L														21	21	19	16
Manganese	mg/L															0.011 J	0.013 J	0.0083 J
Nitrate as N	mg/L															5.6	5.6	7.1
Nitrite as N	mg/L																	
Nitrogen, Nitrate-Nitrite	mg/L														1.4			
Phosphorus (as phosphate)	mg/L														0.31 U	0.31 U	0.31 U	0.31 UJ
Potassium	mg/L														9	7.2	7.1	5.6
Sodium	mg/L														38	35	33	28
Sample Parameters																		
Dissolved Oxygen	mg/L	3.59	6.69	1.98	6.1		3.41		3.92	5.27	3.24	5.98	6.71	5.43	0.22		5.82	5.54
Oxidation Reduction Potential	mV	-1.4	75.7	27.6	236		90.5		152.6	280.8	58.9	139.5	-116.3	-90.8	-48.8		53.6	-25.7
Eh	mV	198.6	275.7	227.6	436.0		290.5		352.6	480.8	258.9	339.5	83.7	109.2	151.2		253.6	174.3
pH	SU	7.27	7.25	7.12	6.68		7.44		7.15	7.25	7.31	7.3	7.28	6.87	6.88		7.1	7.06
Specific Conductance	uS/cm	1671	736	1110	822		1041		1209	702	1542	1331	600	1156	1274		888	685
Temperature	deg C	14.4	18.4	16.9	11.9		10.75		11.9	14.7	17.2	18.2	10.2	10.6	17.9		11.4	15.9
Turbidity	NTU	1.59	3.92	1.15	1.34		3.12		1.88	1.91	0.91	0.39	0.82	2.44	2.41		3.41	1.55

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

		Location	GAMW09B																	
		Sample Date	2016-07-13		2016-09-08	2016-11-09	2017-01-10	2017-03-01	2017-04-26	2017-06-28	2017-08-23		2017-10-03	2018-03-14	2018-04-23	2018-09-06	2018-10-26	2019-05-08		2019-11-07
		Sample Type	FD	N	N	N	N	N	N	N	FD	N	N	N	N	N	N	FD	N	N
Chemical Name	Unit																			
CCR Appendix III																				
Boron	mg/L		24	25	25	16	11	11	11	12	16	16	16		14	12	12		14	8
Calcium	mg/L		260	280	270	190	200	170	170	180	180	180	160		160	150	180		150	150
Chloride	mg/L		210	180	190	130	110	120	130	150	170	160	140		150	180	150		140	110
Fluoride	mg/L		0.54 J+	0.55 J+	0.67 J	0.68 J	0.1 J	1.3 J	1.2 J	1.4 J	1.2 J	0.37 J	1.5 J	1.4 J	1.6 J	1.8 J	1.6		1.6	1.5
pH	SU			7.08	7.15	6.96	7.36	7.44	7.29	7.36		7.46	7.36	7.56	7.43	7.32	7.46		7.49	7.56
Sulfate	mg/L		970 J-	1000 J-	960	740	670 J+	550	570	640	630	650	550		430	570	580		520	440
Total Dissolved Solids	mg/L		2100	2000	2100	1700	1300	1200	1200	1500	1500	1500	1300		990	1300	1200		1200	990
CCR Appendix IV																				
Antimony	mg/L		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U		0.002 U	0.002 U
Arsenic	mg/L		0.0024 J	0.0026 J	0.002 J	0.0014 J	0.0027 J	0.005 U	0.004 J	0.004 J	0.0031 J	0.0031 J		0.0054	0.0064	0.0044 J	0.004 J		0.0057	0.0042 J
Barium	mg/L		0.069	0.071	0.076	0.062	0.048	0.04	0.046	0.055	0.062	0.058		0.045	0.04	0.049	0.047		0.041	0.029
Beryllium	mg/L		0.00012 J	9.1E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U		0.001 U	0.001 U
Cadmium	mg/L		0.00027 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U		0.001 U	0.001 U
Chromium	mg/L		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U		0.002 U	0.002 U
Cobalt	mg/L		0.001 U	0.001 U	0.00069 J	0.00028 J	0.00045 J	0.001 U	0.00028 J	0.00045 J	0.00041 J	0.00041 J		0.001 U		0.00058 J	0.00028 J		0.00025 J	0.001 U
Fluoride	mg/L		0.54 J+	0.55 J+	0.67 J	0.68 J	0.1 J	1.3 J	1.2 J	1.4 J	1.2 J	0.37 J	1.5 J	1.4 J	1.6 J	1.8 J	1.6		1.6	1.5
Lead	mg/L		0.001 U	0.001 U	0.001 U	0.00017 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U		0.001 U	0.001 U
Lithium	mg/L		0.0055 J	0.0065 J	0.008 U	0.008 U	0.0049 J	0.0045 J	0.0056 J	0.0054 J	0.0047 J	0.0042 J		0.0031 J		0.0037 J	0.0052 J		0.0055 J	0.0033 J
Mercury	mg/L		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U		0.0002 U	0.0002 U
Molybdenum	mg/L		0.01 U	0.0079 J	0.0075 J	0.0097 J	0.013	0.015	0.015	0.013	0.0094 J	0.01		0.014	0.012	0.01	0.011		0.012	0.0096 J
Radium, Total	pci/L		1.12	1.86	1.65	1.14	0.453	1.09	0.774	1.85	1.01	1.27		1.18 J+	0.868	1.04	1.24 J+		1.01	
Radium-226	pci/L		0.809 J+	0.947 J+	0.907	0.579	0.476	0.585	0.316	0.781 J+	0.585	0.709		0.482	0.301	0.653	0.69 J+		0.449	
Radium-228	pci/L		1 U	0.913	0.743	0.559	0.41 U	0.508	0.458	1.07	0.422	0.563		0.699 J+	0.567	0.386	0.546		0.564	
Selenium	mg/L		0.005 U	0.005 U	0.005 U	0.005 U	0.002 J	0.005 U	0.0014 J	0.001 J	0.0015 J	0.0016 J		0.005 U		0.002 J	0.0019 J		0.005 U	0.0011 J
Thallium	mg/L		0.0003 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U		0.0002 J	0.001 U
Supplemental Parameters																				
Alkalinity, Bicarbonate (HCO3)	mg/L															190				
Alkalinity, Carbonate (CO3)	mg/L															5 U				
Alkalinity, Hydroxide (OH)	mg/L															5 U				
Alkalinity, Total	mg/L															190	200	200	200	170
Ferric Iron	mg/L															2.5 J	2.1			
Ferrous Iron	mg/L															0.1 R	0.55 J			
Iron	mg/L																	3.2	3.2	3
Magnesium	mg/L															57	60	64	63	54
Manganese	mg/L																	1.2	1.2	1.2
Nitrate as N	mg/L															0.05 R		0.1 U	0.1 U	0.12
Nitrite as N	mg/L															0.05 R				
Nitrogen, Nitrate-Nitrite	mg/L																0.077			
Phosphorus (as phosphate)	mg/L															0.09	0.31 U	0.31 U	0.31 U	0.31 UJ
Potassium	mg/L															4 J	3.8 J	4 J	4 J	2.4 J
Sodium	mg/L															150	94	110	110	46
Sample Parameters																				
Dissolved Oxygen	mg/L			0.44	1.06	0.43	0.38	0.44	0.61	0.71		0.57	0.45	0.1	0.04	0.61	0.28		0.04	0.35
Oxidation Reduction Potential	mV			-57.7	67.3	-76.4	-100.1	-80.6	-102.6	68.2		19.7	-46.8	-121.6	-130.5	-100.5	-101.1		-16.8	-131.8
Eh	mV			142.3	267.3	123.6	99.9	119.4	97.4	268.2		219.7	153.2	78.4	69.5	99.5	98.9		183.2	68.2
pH	SU			7.08	7.15	6.96	7.36	7.44	7.29	7.36		7.46	7.36	7.56	7.43	7.32	7.46		7.49	7.56
Specific Conductance	uS/cm			2356	2435	2088	1559	1352	1592	1561		1922	1722	1053	1301	1556	1693		1165	9.24
Temperature	deg C			14.1	14.7	15.1	13.6	13.45	14.5	14.8		15.5	16	14	14.4	16.1	16		14.2	14.4
Turbidity	NTU			3.48	4.29	2.17	0.99	2.58	1.88	1.69		2.54	1.96	4.18	4.11	2.96	1.39		4.7	3.36

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW15														
Sample Date		2016-07-13	2016-09-08		2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-23	2017-10-03	2018-03-15	2018-04-24	2018-10-26	2019-05-06	2019-11-08
Sample Type		N	FD	N	N	N	N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit															
CCR Appendix III																
Boron	mg/L	0.75	0.45 J	1 J	1.1	0.6	0.44	0.45	0.87	0.91	0.66		0.72	0.76	0.71	0.73
Calcium	mg/L	100	130	120	100	82	81	95	160	150	77		170	120	140	100
Chloride	mg/L	28	31	31	27	28	27	27	27	25	19		24	21	22	28
Fluoride	mg/L	1.2 J+	0.85 J	0.85 J	0.74 J	0.8 J	0.77 J	0.74 J	0.82 J	0.82 J	0.93 J	0.67 J	0.76 J	0.69	0.52	0.73
pH	SU	6.88		6.98	6.83	6.96	6.99	6.76	6.61	6.96	6.88	6.95	6.89	5.2	7.1	7.34
Sulfate	mg/L	160 J-	260	260	150	140	140	160	300	330	260		410	240	380	260
Total Dissolved Solids	mg/L	570	660	630	520	400	400	420	780	750	660		790	5900	740	640
CCR Appendix IV																
Antimony	mg/L	0.002 U	0.00041 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.056	0.072	0.069	0.078	0.076	0.054	0.062	0.059	0.066		0.058		0.091	0.081	0.075
Barium	mg/L	0.044	0.053	0.053	0.039	0.032	0.031	0.034	0.054	0.058		0.047		0.046	0.047	0.037
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.00027 J	0.00028 J	0.00029 J	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.0019	0.0022	0.0022	0.0021	0.0019	0.0018	0.0022	0.0029	0.0027		0.0025		0.0023	0.0035	0.0017
Fluoride	mg/L	1.2 J+	0.85 J	0.85 J	0.74 J	0.8 J	0.77 J	0.74 J	0.82 J	0.82 J	0.93 J	0.67 J	0.76 J	0.69	0.52	0.73
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0053 J	0.008 U	0.008 U	0.008 U	0.004 J	0.0024 J	0.0041 J	0.0058 J	0.005 J		0.0023 J		0.0054 J	0.0053 J	0.0027 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.02	0.027	0.026	0.023	0.022	0.022	0.026	0.017	0.019		0.029		0.016	0.017	0.029
Radium, Total	pci/L	5 U	0.479	0.513	0.646 U	0.555 J+	0.339 U	0.463 U	0.335	0.342 U		0.657 J+		0.858 J+	0.476 U	
Radium-226	pci/L	1 U	0.202	0.145	0.337 U	0.38	0.127 U	0.1	0.0965 J+	0.104		0.0817		0.527 J+	0.28 U	
Radium-228	pci/L	1 U	0.397 U	0.382 U	0.646 U	0.401 U	0.339 U	0.463 U	0.278 U	0.342 U		0.576 J+		0.407 U	0.476 U	
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U		0.005 U	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U
Supplemental Parameters																
Alkalinity, Bicarbonate (HCO3)	mg/L															
Alkalinity, Carbonate (CO3)	mg/L															
Alkalinity, Hydroxide (OH)	mg/L															
Alkalinity, Total	mg/L													180	180	170
Ferric Iron	mg/L													4.3		
Ferrous Iron	mg/L													5.2 J		
Iron	mg/L														11	5.4
Magnesium	mg/L													24	30	24
Manganese	mg/L														0.089	0.055
Nitrate as N	mg/L														0.1 U	0.1 U
Nitrite as N	mg/L															
Nitrogen, Nitrate-Nitrite	mg/L													0.05 U		
Phosphorus (as phosphate)	mg/L													4	1.4	1.3
Potassium	mg/L													2.6 J	3.2 J	3.3 J
Sodium	mg/L													24	32	30
Sample Parameters																
Dissolved Oxygen	mg/L	0.48		0.48	0.14	0.25	0.16	0.19	1	0.32	0.29	0.06	0.02	1.97	0.15	0.12
Oxidation Reduction Potential	mV	-79.2		-60.1	-111	-114.3	-104.1	-104.4	-46.9	-43.7	-13.8	-56.8	-99.1	-254.7	-27.5	-100
Eh	mV	120.8		139.9	89.0	85.7	95.9	95.6	153.1	156.3	186.2	143.2	100.9	-54.7	172.5	100.0
pH	SU	6.88		6.98	6.83	6.96	6.99	6.76	6.61	6.96	6.88	6.95	6.89	5.2	7.1	7.34
Specific Conductance	uS/cm	779		909	733	594	584	674	9.32	1004	901	581	933	855	730	598
Temperature	deg C	15.3		20.3	19.9	14.6	12.1	11.6	14.6	16.6	18.1	10.8	10.6	17.1	8.3	15.8
Turbidity	NTU	4.48		2.96	3.41	3.98	4.4	4.92	4.2	3.1	4.11	3.98	4.29	3.1	4.9	6.9

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW15B																
Sample Date		2016-07-13	2016-09-08	2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-03	2018-03-15	2018-04-24	2018-09-06		2018-10-26	2019-05-08	2019-11-08	
Sample Type		N	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	FD	N
Chemical Name	Unit																	
CCR Appendix III																		
Boron	mg/L	1.1	1.7	2	3.7	3.3	3.6	3.1	2.1	2.1		4.4		4.1	4.9	10		6.2
Calcium	mg/L	160	160	160	180	160	170	190	170	73		230		200	210	280		280
Chloride	mg/L	52	58	62	81	64	65	71	64	64		87		89	93	110		80
Fluoride	mg/L	0.65 J+	0.62 J	0.46 J	0.74 J	0.77 J	0.75 J	0.72 J	0.61 J	0.5 J	0.69 J	0.79 J		0.6 J	0.6	0.84 J+		0.89
pH	SU	7.81	7.49	7.04	7.52	7.48	7.11	7.26	7.37	7.42	7.45	7.36		7.8	6.74	7.43		7.57
Sulfate	mg/L	380 J-	390	340	500	390	460	530	540	500		790		720	770	1300		940
Total Dissolved Solids	mg/L	830	800	840	1000	890	980	1200	1100	1100		1400		1400	1400	2100		1600
CCR Appendix IV																		
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U			0.002 U	0.002 U	0.002 U		0.002 U
Arsenic	mg/L	0.003 J	0.0011 J	0.0014 J	0.0022 J	0.0011 J	0.00098 J	0.00084 J	0.00081 J		0.005 U			0.005 U	0.005 U	0.00088 J		0.005 U
Barium	mg/L	0.054	0.053	0.056	0.056	0.051	0.052	0.064	0.069		0.068			0.07	0.064	0.081		0.054
Beryllium	mg/L	7.8E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U			0.001 U	0.001 U	0.001 U		0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U			0.001 U	0.001 U	0.001 U		0.001 U
Chromium	mg/L	0.00062 J	0.002 U	0.002 U	0.00033 J	0.00034 J	0.002 U	0.002 U	0.002 U		0.002 U			0.002 U	0.002 U	0.002 U		0.002 U
Cobalt	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.00016 J	0.001 U	0.001 U	0.001 U		0.00029 J			0.00037 J	0.001 U	0.001 U		0.001 U
Fluoride	mg/L	0.65 J+	0.62 J	0.46 J	0.74 J	0.77 J	0.75 J	0.72 J	0.61 J	0.5 J	0.69 J	0.79 J		0.6 J	0.6	0.84 J+		0.89
Lead	mg/L	0.001 U	0.001 U	0.00023 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U			0.001 U	0.001 U	0.001 U		0.001 U
Lithium	mg/L	0.0069 J	0.008 U	0.008 U	0.0077 J	0.0053 J	0.0082	0.0082	0.0077 J		0.007 J			0.008	0.0096	0.012		0.0085
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U			0.0002 U	0.0002 U	0.0002 U		0.0002 U
Molybdenum	mg/L	0.011	0.013	0.01	0.012	0.015	0.014	0.014	0.012		0.011			0.01	0.011	0.012		0.01
Radium, Total	pci/L	1.26	0.594	0.61	1.14 J+	0.876	0.687	0.789	0.872		1.69 J+			1.31	1.51 J+	1.61		
Radium-226	pci/L	0.607 J+	0.442	0.361 U	0.785	0.441	0.442	0.537 J+	0.547		0.752			0.711	0.837 J+	1.07		
Radium-228	pci/L	1 U	0.389 U	0.498 U	0.502 U	0.435	0.378 U	0.329 U	0.363 U		0.94 J+			0.603	0.676	0.544		
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U			0.0017 J	0.005 U	0.005 U		0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U			0.001 U	0.001 U	0.0003 J		0.001 U
Supplemental Parameters																		
Alkalinity, Bicarbonate (HCO3)	mg/L												180	180				
Alkalinity, Carbonate (CO3)	mg/L												5 U	5 U				
Alkalinity, Hydroxide (OH)	mg/L												5 U	5 U				
Alkalinity, Total	mg/L												180	180	200	200	180	180
Ferric Iron	mg/L												2 J	2.1 J	1.8			
Ferrous Iron	mg/L												0.1 R	0.1 R	0.38 J			
Iron	mg/L															4.6	3	3.1
Magnesium	mg/L												36	39	39	62	43	45
Manganese	mg/L															0.59	0.54	0.57
Nitrate as N	mg/L												0.05 R	0.05 R		0.1 U	0.1 U	0.1 U
Nitrite as N	mg/L												0.05 R	0.05 R				
Nitrogen, Nitrate-Nitrite	mg/L														0.05 U			
Phosphorus (as phosphate)	mg/L												0.031 U	0.031 U	0.31 U	0.14 J	0.31 U	0.31 U
Potassium	mg/L												4.5 J	5	4.7 J	7.2	5.1	5.3
Sodium	mg/L												140	150	170	280	130	130
Sample Parameters																		
Dissolved Oxygen	mg/L	0.22	0.91	0.56	0.22	0.46	0.3	0.43	0.64	0.23	0.08	0.04		0.29	2.06	0.23		0.16
Oxidation Reduction Potential	mV	-129.7	-21.6	-94.6	-132.6	-81.7	-79.6	-21.3	-36.5	-42.6	-64	-102.4		-91.2	-256.1	46.3		-189.2
Eh	mV	70.3	178.4	105.4	67.4	118.3	120.4	178.7	163.5	157.4	136.0	97.6		108.8	-56.1	246.3		10.8
pH	SU	7.81	7.49	7.04	7.52	7.48	7.11	7.26	7.37	7.42	7.45	7.36		7.8	6.74	7.43		7.57
Specific Conductance	uS/cm	834	1049	1060	1237	940	1096	1099	1110	1294	1255	1612		2757	1889	1798		1384
Temperature	deg C	12.71	15.9	16.1	13.9	13.6	13	13.8	14.2	14.5	13.3	13		14.13	13.6	8.1		13.8
Turbidity	NTU	4.72	1.56	1.48	3.8	2.23	3.65	3.16	1.78	0.4	4.59	4.88		3.59	1.35	3.56		1.49

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW16															
Sample Date		2016-07-13	2016-09-08	2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-04	2018-03-15	2018-04-24	2018-10-29		2019-05-03	2019-11-08	
Sample Type		N	N	N	N	N	N	N	N	N	N	N	FD	N	N	FD	N
Chemical Name	Unit																
CCR Appendix III																	
Boron	mg/L	1.1	1.8	1.6	1.2	0.89	1.3	1	1.4	1.1		1.4	1.4	1.4	1.6		1.9
Calcium	mg/L	230	180	170	120	160	210	220	240	57		220	160	160	210		210
Chloride	mg/L	53	37	30	28	24	25	28	31	42		58	36	36	28		59
Fluoride	mg/L	1.4 J+	1.6 J	1.3 J	1.5	1.3 J	1.3 J	1.2 J	1.3 J	1.5 J	1 J	1.2 J	1.1	1.1	0.99		1.1
pH	SU	7.92	7.18	7.48	7.5	7.58	7.17	7.36	7.06	7.62	7.41	7.67		7.28	7.46		7.8
Sulfate	mg/L	530 J-	400	320	47	300	500	480	630	520		530	340	350	570		530
Total Dissolved Solids	mg/L	1100	810	790	570	670	930	1000	1100	980		1100	740	730	1100		1100
CCR Appendix IV																	
Antimony	mg/L	0.002 U	0.002 U	0.00028 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U		0.002 U
Arsenic	mg/L	0.011	0.0077	0.012	0.0084	0.0079	0.006	0.008	0.0096		0.002 J	0.0065	0.01	0.0098	0.005		0.0082
Barium	mg/L	0.049	0.042	0.035	0.024	0.029	0.043	0.044	0.054		0.057	0.045	0.035	0.035	0.034		0.034
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U		0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U		0.001 U
Chromium	mg/L	0.00062 J	0.002 U	0.002 U	0.0031	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U		0.002 U
Cobalt	mg/L	0.001 U	0.00068 J	0.00051 J	0.00046 J	0.00055 J	0.00092 J	0.00094 J	0.0011		0.0013		0.00059 J	0.00061 J	0.00066 J		0.00061 J
Fluoride	mg/L	1.4 J+	1.6 J	1.3 J	1.5	1.3 J	1.3 J	1.2 J	1.3 J	1.5 J	1 J	1.2 J	1.1	1.1	0.99		1.1
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U		0.001 U
Lithium	mg/L	0.00043 J	0.008 U	0.008 U	0.00023 J	0.008 U	0.008 U	0.008 U	0.008 U		0.008 U		0.008 U	0.008 U	0.008 U		0.008 U
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U		0.0002 U
Molybdenum	mg/L	0.024	0.036	0.045	0.044	0.03	0.027	0.023	0.024		0.027	0.031	0.033	0.033	0.027		0.028
Radium, Total	pci/L	1.68	0.543	0.527 U	0.629 U	0.648	0.392 U	0.339 U	0.429		0.862 J+	0.29	0.862 J+	1.32 J+	0.685 U		
Radium-226	pci/L	0.537 J+	0.249	0.363 U	0.256 U	0.129 U	0.094	0.106 J+	0.246		0.1	0.0822	0.214 J+	0.278 J+	0.277 U		
Radium-228	pci/L	1.14	0.395 U	0.527 U	0.629 U	0.528	0.392 U	0.339 U	0.322 U		0.762 J+	0.208	0.648 J+	1.04 J+	0.685 U		
Selenium	mg/L	0.005 U	0.005 U	0.0005 J	0.0005 J	0.005 U	0.0012 J	0.005 U	0.005 U		0.0015 J		0.005 U	0.005 U	0.005 U		0.0015 J
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U		0.001 U
Supplemental Parameters																	
Alkalinity, Bicarbonate (HCO3)	mg/L																
Alkalinity, Carbonate (CO3)	mg/L																
Alkalinity, Hydroxide (OH)	mg/L																
Alkalinity, Total	mg/L													180	200	5 U	210
Ferric Iron	mg/L													1.8			
Ferrous Iron	mg/L													0.19 J			
Iron	mg/L														1.4	1.6	1.7
Magnesium	mg/L													23	29	29	31
Manganese	mg/L														0.35	0.29	0.31
Nitrate as N	mg/L														0.042 J	0.1 U	0.1 U
Nitrite as N	mg/L																
Nitrogen, Nitrate-Nitrite	mg/L													0.056			
Phosphorus (as phosphate)	mg/L													1.2	0.55	0.47	0.42
Potassium	mg/L													4.3 J	4.2 J	4.9 J	5.2
Sodium	mg/L													41	41	36	38
Sample Parameters																	
Dissolved Oxygen	mg/L	0.16	0.27	0.48	0.31	0.36	0.14	0.5	0.14	0.06	0.22	0.22		1.27	0.29		4.02
Oxidation Reduction Potential	mV	-18.06	711.6	-124.8	-78.8	-136.9	-73.6	-114.2	9.6	-158.4	-55.9	-106.5		-216.8	8		-2
Eh	mV	181.9	911.6	75.2	121.2	63.1	126.4	85.8	209.6	41.6	144.1	93.5		-16.8	208.0		198.0
pH	SU	7.92	7.18	7.48	7.5	7.58	7.17	7.36	7.06	7.62	7.41	7.67		7.28	7.46		7.8
Specific Conductance	uS/cm	1331	1112	927	751	821	1257	1123	1406	1254	1029	1239		1046	1001		1014
Temperature	deg C	15.02	18.8	18.15	12.1	9.72	10.6	15.41	18	17.8	8.71	9.2		17.81	10.5		17.52
Turbidity	NTU	3.89	2.16	1.93	3.16	4.14	3.25	4.33	2.45	4.95	4.62	12.81		3.64	4.65		3.98

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW16B																
	Sample Date	2016-07-13	2016-09-08	2016-11-09		2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-04	2018-03-15	2018-04-24	2018-09-07	2018-10-29	2019-05-06	2019-11-08	
	Sample Type	N	N	FD	N	N	N	N	N	N	N	N	N	N	N	N	FD	N
Chemical Name	Unit																	
CCR Appendix III																		
Boron	mg/L	1.8	1.6	1.4	1.4	1.4	1.4	1.1	3.4	6.5	2.9		4.1	7.6	9.7	12	11	10
Calcium	mg/L	230	190	180	180	210	210	270	220	260	100		250	310	350	350	300	280
Chloride	mg/L	63	56	57	55	57	47	71	71	120	78		140	160	150	190	220	210
Fluoride	mg/L	1.1 J+	1.1 J	0.84 J	0.73 J	0.99 J	0.87 J	0.83 J	0.76 J	0.78 J	1 J	0.8 J	0.76 J	0.73 J	0.64	0.76	1	1
pH	SU	7.76	7.47		7.41	7.57	7.55	7.3	7.51	7.28	7.54	7.6	7.65	7.97	7.02	7.49		7.85
Sulfate	mg/L	580 J-	480	500	440	50	470	730	720	640	580		690	760	890	940	1500	1500
Total Dissolved Solids	mg/L	1100	1000	1000	1000	1000	1000	1300	1200	1400	1200		1400	20 U	1600	1800	2400	2400
CCR Appendix IV																		
Antimony	mg/L	0.002 U	0.002 U	0.00057 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.00095 J		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.0068	0.0064	0.011	0.011	0.012	0.0095	0.012	0.0096	0.0081		0.0099	0.0097	0.011	0.0088	0.0071	0.0079	0.0076
Barium	mg/L	0.072	0.04	0.036	0.035	0.038	0.039	0.055	0.043	0.046		0.053	0.058	0.068	0.071	0.079	0.055	0.054
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.00022 J		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.00029 J	0.002 U	0.00026 J	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.001 U	0.00016 J	0.00019 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.0003 J		0.00054 J	0.001 U	0.001 U	0.001 U	0.001 U
Fluoride	mg/L	1.1 J+	1.1 J	0.84 J	0.73 J	0.99 J	0.87 J	0.83 J	0.76 J	0.78 J	1 J	0.8 J	0.76 J	0.73 J	0.64	0.76	1	1
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0055 J	0.008 U	0.0032 J	0.0022 J	0.0058 J	0.0035 J	0.0072 J	0.006 J	0.0061 J		0.007 J		0.0059 J	0.0059 J	0.007 J	0.0054 J	0.0055 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.013	0.012	0.012	0.012	0.012	0.013	0.023	0.016	0.013		0.016	0.015	0.012	0.011	0.014	0.02	0.019
Radium, Total	pci/L	1.31	1.05	0.866	0.794	0.998 J+	0.577	1.23	0.795	1.21		1.11 J+	0.99	1.17 J+	1.64 J+	0.984		
Radium-226	pci/L	0.651 J+	0.458	0.427	0.412 U	0.507	0.348	0.635	0.54 J+	0.559		0.443	0.535	0.724 J+	0.719 J+	0.753		
Radium-228	pci/L	0.66	0.59	0.467 U	0.435 U	0.491 J+	0.399 U	0.597	0.287 U	0.647		0.671 J+	0.455	0.522 U	0.919 J+	0.459 U		
Selenium	mg/L	0.005 U	0.005 U	0.00061 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Supplemental Parameters																		
Alkalinity, Bicarbonate (HCO3)	mg/L													200				
Alkalinity, Carbonate (CO3)	mg/L													5 U				
Alkalinity, Hydroxide (OH)	mg/L													5 U				
Alkalinity, Total	mg/L													200	210	190		200
Ferric Iron	mg/L													6 J	5.1			
Ferrous Iron	mg/L													0.1 R	1.8 J			
Iron	mg/L															9.2		7.5
Magnesium	mg/L													46	53	58		49
Manganese	mg/L															0.49		0.39
Nitrate as N	mg/L													0.05 R		0.018 J		0.1 U
Nitrite as N	mg/L													0.05 R				
Nitrogen, Nitrate-Nitrite	mg/L														0.063			
Phosphorus (as phosphate)	mg/L													0.19	0.28 J	0.22 J		0.17 J
Potassium	mg/L													4.9 J	5.2	5.5		6.3
Sodium	mg/L													84	84	97		380
Sample Parameters																		
Dissolved Oxygen	mg/L	1.23	1.63		0.39	0.3	0.21	0.12	0.32	0.16	0.15	0.28	0.25	1.02	4.23	0.33		3.41
Oxidation Reduction Potential	mV	-122.6	-89		-126.3	-148.5	-132.2	-130.2	-123.1	-32.7	-135.8	-75.5	-117.8	-101.5	-166.8	21.2		-99.5
Eh	mV	77.4	111.0	200.0	73.7	51.5	67.8	69.8	76.9	167.3	64.2	124.5	82.2	98.5	33.2	221.2		100.5
pH	SU	7.76	7.47		7.41	7.57	7.55	7.3	7.51	7.28	7.54	7.6	7.65	7.97	7.02	7.49		7.85
Specific Conductance	uS/cm	1147	1297		1158	1230	1192	1645	1333	1665	1461	1142	1653	3104	2098	1692		2340
Temperature	deg C	13.04	14.44		15.27	14.3	13.37	12.3	13.48	14.3	15	12.6	12.3	15	17.7	11.2		14.65
Turbidity	NTU	4.1	3.99		1.8	2.76	4.21	4.58	3.27	2.48	3.9	4.08	4.2	4.99	3.49	3.72		2.81

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
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"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW17																
	Sample Date	2016-07-14	2016-09-08	2016-11-09	2017-01-10	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-04	2018-03-14		2018-04-23		2018-10-29	2019-05-09	2019-11-08
	Sample Type	N	N	N	N	N	N	N	N	N	FD	N	FD	N	N	N	N
Chemical Name	Unit																
CCR Appendix III																	
Boron	mg/L	12	12	11	11	11	8.9	7.6	12	12			5.8	5.8	16	7.7	4.9
Calcium	mg/L	150	160	170	180	200	180	120	150	64			110	110	200	130	120
Chloride	mg/L	110	100	130	150	140	81	170	130	160			40	38	150	90	92
Fluoride	mg/L	1.8 J+	2.2 J	2 J	1.9 J	1.6 J	1.6 J	0.79 J	1.9 J	2.4 J	5 U	1.7 J	1.9 J	1.9 J-	1.7	1.6	1.7
pH	SU	7.56	7.27	7.21	7.33	7.54	7.23	7.4	7.16	7.22		7.62		7.82	6.85	7.53	7.75
Sulfate	mg/L	330 J-	330	360	390	390	390	520	250	350			240	220	430	300	290
Total Dissolved Solids	mg/L	940	920	940	1000	1100	950	1400	890	1000			630	620	1100	800	860
CCR Appendix IV																	
Antimony	mg/L	0.00034 J	0.00032 J	0.00032 J	0.002 U	0.00028 J	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U			0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.0054	0.0056	0.0042 J	0.0069	0.0055	0.0054	0.0035 J	0.0028 J		0.005 U	0.0027 J			0.004 J	0.0021 J	0.0028 J
Barium	mg/L	0.047	0.056	0.054	0.05	0.054	0.048	0.044	0.06		0.041	0.058		0.029	0.073	0.041	0.052
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.00076 J	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.0015 J	0.002 U	0.0011 J	0.0011 J	0.0012 J	0.0012 J	0.002 U	0.002 U		0.0017 J	0.0014 J			0.002 U	0.002 U	0.002 U
Cobalt	mg/L	6.3E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U
Fluoride	mg/L	1.8 J+	2.2 J	2 J	1.9 J	1.6 J	1.6 J	0.79 J	1.9 J	2.4 J	5 U	1.7 J	1.9 J	1.9 J-	1.7	1.6	1.7
Lead	mg/L	0.00018 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0047 J	0.008 U	0.0036 J	0.0047 J	0.0024 J	0.0045 J	0.0058 J	0.0076 J		0.008 U	0.0035 J			0.0066 J	0.0035 J	0.0052 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U	0.0002 U			0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.015	0.012	0.011	0.01 U	0.01	0.011	0.018	0.024		0.024	0.024		0.02	0.017	0.017	0.012
Radium, Total	pci/L	0.569	0.451 U	0.447 U	0.553 U	0.428	0.477	0.403 U	0.71		0.816 J+	0.384 U		0.205	1.1 J+	0.518 U	
Radium-226	pci/L	1 U	0.331	0.415 U	0.246 U	0.222	0.23	0.191 J+	0.215		0.202	0.112		0.0399	0.315 J+	0.26 U	
Radium-228	pci/L	1 U	0.451 U	0.447 U	0.553 U	0.402 U	0.406 U	0.403 U	0.495		0.614 J+	0.384 U		0.166	0.783 J+	0.518 U	
Selenium	mg/L	0.019	0.03	0.018	0.023	0.028	0.026	0.0081	0.0032 J		0.0074	0.021		0.015	0.022	0.004 J	0.011
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.00063 J	0.001 U
Supplemental Parameters																	
Alkalinity, Bicarbonate (HCO3)	mg/L																
Alkalinity, Carbonate (CO3)	mg/L																
Alkalinity, Hydroxide (OH)	mg/L																
Alkalinity, Total	mg/L														190	160	160
Ferric Iron	mg/L														0.1 U		
Ferrous Iron	mg/L														0.05 UJ		
Iron	mg/L															0.2 U	0.2 U
Magnesium	mg/L														67	49	40
Manganese	mg/L															0.015 U	0.015 U
Nitrate as N	mg/L															0.97	2
Nitrite as N	mg/L																
Nitrogen, Nitrate-Nitrite	mg/L														2.8		
Phosphorus (as phosphate)	mg/L														0.47	0.28 J	0.3 J
Potassium	mg/L														5.3	3.5 J	5
Sodium	mg/L														34	31	28
Sample Parameters																	
Dissolved Oxygen	mg/L	5.78	1.7	1.8	1.01	2.35	7.33	3.18	4.33	3.3		4.99		9	1.78	5.75	6.47
Oxidation Reduction Potential	mV	45.8	825.9	6.1	82.3	6.6	67.9	23.3	8	57.9		-90.2		-90.2	-237	53.1	35
Eh	mV	245.8	1025.9	206.1	282.3	206.6	267.9	223.3	208.0	257.9	200.0	109.8		109.8	-37.0	253.1	235.0
pH	SU	7.56	7.27	7.21	7.33	7.54	7.23	7.4	7.16	7.22		7.62		7.82	6.85	7.53	7.75
Specific Conductance	uS/cm	1059	1287	1141	1272	1541	1290	902	1151	1357		832		675	1513	894	798
Temperature	deg C	17.23	20.6	18.63	13.6	10.95	11.8	17.71	24.4	22.3		10.9		11.4	20	12.1	17.23
Turbidity	NTU	1.56	1.09	0.58	2.58	0.44	2.21	1.02	1.5	2.51		0.54		1.19	0.45	0.44	0.86

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
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Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

	Location	GAMW17B														
	Sample Date	2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-02	2017-04-27	2017-06-29	2017-08-23	2017-10-04	2018-03-14	2018-04-23	2018-09-06	2018-10-29	2019-05-09	2019-11-08
	Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit															
CCR Appendix III																
Boron	mg/L	18	19	19	21	22	20	16	13	11		13	10	12	12	9.4
Calcium	mg/L	230	250	240	250	270	250	240	160	57		180	150	150	180	150
Chloride	mg/L	180	170	180	190	200	200	71	99	130		140	120	110	130	110
Fluoride	mg/L	0.9 J+	0.98 J	0.68 J	0.58 J	0.6 J	0.6 J	2.1 J	1.3 J	1.1 J	0.55 J	0.58 J	0.84 J	0.71	0.62	0.67
pH	SU	7.43	7.37	7.1	7.24	7.44	7.02	7.25	7.19	7.38	7.48	7.39	7.63	7.4	7.15	7.66
Sulfate	mg/L	710 J-	680	710	740	710	680	300	380	420		520	350	350	270	350
Total Dissolved Solids	mg/L	1500	1400	1400	1500	1700	1500	660	1000	960		1100	940	950	980	990
CCR Appendix IV																
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.0024 J	0.0021 J	0.0024 J	0.0035 J	0.0023 J	0.0022 J	0.0023 J	0.0026 J		0.0011 J		0.0017 J	0.0023 J	0.0022 J	0.0019 J
Barium	mg/L	0.078	0.079	0.086	0.092	0.1	0.089	0.065	0.06		0.085	0.069	0.066	0.073	0.11	0.074
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.00033 J	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.0003 J	0.001 U	0.001 U	0.001 U
Fluoride	mg/L	0.9 J+	0.98 J	0.68 J	0.58 J	0.6 J	0.6 J	2.1 J	1.3 J	1.1 J	0.55 J	0.58 J	0.84 J	0.71	0.62	0.67
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0017 J	0.008 U	0.008 U	0.0019 J	0.00046 J	0.0021 J	0.0019 J	0.008 U		0.008 U		0.008 U	0.008 U	0.008 U	0.008 U
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.024	0.021	0.013	0.011	0.012	0.011	0.017	0.021		0.017	0.016	0.01	0.011	0.0073 J	0.01
Radium, Total	pci/L	1.79	1.84	2.53	2.58	1.25	1.94	1.03	2.4			1.21	1.47	2.48 J+	1.71	
Radium-226	pci/L	0.882 J+	0.864	1.28	1.4	1.01	1.09	0.639 J+	0.867			0.518	0.945	1.15 J+	0.964	
Radium-228	pci/L	0.913	0.98	1.25	1.17	0.423 U	0.846	0.395	1.53			0.696	0.524	1.33 J+	0.748	
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.00053 J	0.00051 J	0.005 U	0.005 U	0.005 U		0.005 U		0.0011 J	0.005 U	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.00022 J	0.001 U
Supplemental Parameters																
Alkalinity, Bicarbonate (HCO3)	mg/L												210			
Alkalinity, Carbonate (CO3)	mg/L												5 U			
Alkalinity, Hydroxide (OH)	mg/L												5 U			
Alkalinity, Total	mg/L												210	230	300	190
Ferric Iron	mg/L												4.1 J	3		
Ferrous Iron	mg/L												0.1 R	1.5 J		
Iron	mg/L														6.8	5.1
Magnesium	mg/L												32	33	53	44
Manganese	mg/L														1	0.76
Nitrate as N	mg/L												0.05 R		0.1 U	0.1 U
Nitrite as N	mg/L												0.05 R			
Nitrogen, Nitrate-Nitrite	mg/L													0.23		
Phosphorus (as phosphate)	mg/L												0.46	0.17 J	0.31 U	0.31 U
Potassium	mg/L												5.7	6.2	9.5	6.1
Sodium	mg/L												83	110	39	42
Sample Parameters																
Dissolved Oxygen	mg/L	0.33	0.24	0.67	0.36	0.13	0.13	0.18	0.14	0.09	0.16	0.11	0.2	0.88	0.23	4.2
Oxidation Reduction Potential	mV	-115	654	-100.8	-119.6	-91.8	102.3	-98.6	-51.1	-129.4	-95.2	-131.9	-91.9	-244.5	11.8	-3.6
Eh	mV	85.0	854.0	99.2	80.4	108.2	302.3	101.4	148.9	70.6	104.8	68.1	108.1	-44.5	211.8	196.4
pH	SU	7.43	7.37	7.1	7.24	7.44	7.02	7.25	7.19	7.38	7.48	7.39	7.63	7.4	7.15	7.66
Specific Conductance	uS/cm	1525	1734	1568	171.9	2251	1950	1488	1244	1337	1235	1463	2077	1380	1060	890
Temperature	deg C	15.29	16.16	15.77	15	14.8	14.4	15.62	16.5	16.6	15.2	15.2	16.55	16.1	13.6	15.05
Turbidity	NTU	4.09	2.48	0.62	0.92	0.58	2.11	2.35	1.86	3.45	3.76	3.88	3.55	4.86	3.61	2.68

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW18																	GAMW18B				
Sample Date		2016-07-13	2016-09-08	2016-11-09		2017-01-10	2017-03-01	2017-04-26	2017-07-12		2017-08-23	2017-10-03		2018-03-14	2018-04-23	2018-10-25	2019-04-29	2019-11-07	2018-09-10	2018-10-25		2019-04-29	2019-11-07
Sample Type		N	N	FD	N	N	N	N	FD	N	N	FD	N	N	N	N	N	N	N	FD	N	N	N
Chemical Name	Unit																						
CCR Appendix III																							
Boron	mg/L	1.8	3.5	1.9	1.8	1.3	1	0.77	1.2	1.2	1.5	1.9	1.9		1.2	1.7	0.95	1.7	13	12	13	14	11
Calcium	mg/L	320	610	370	360	330	280	210	280	290	300	380 J	64 J		320	230	320	360	260	200	220	240	180
Chloride	mg/L	17	39	17	17	9.3	5	4.3	10	10	11	23	23		7.3	22	12	27	150	140	140	170	140
Fluoride	mg/L	0.047 J+	0.036 J	10 U	10 U	5 U	5 U	2 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.057	0.074	0.15	0.77 J	0.74	0.73	0.88	0.99
pH	SU	6.95	6.83		6.7	6.88	7.11	6.6		6.96	7.02		6.91	7.2	7.21	6.54	6.71	7.18	7.73		6.86	7.15	7.68
Sulfate	mg/L	760 J-	1400	850	830	640	540	370	600	610	690	960	950		670	550	780	920	1100	1000	1100	1100	840
Total Dissolved Solids	mg/L	1300	2200	1500	1500	1200	1000	730	1100	1100	1300	1600	1500		2400	1100	1400	1500	2100	2000	2000	2100	1500
CCR Appendix IV																							
Antimony	mg/L	0.002 U	0.002 U	0.00096 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.0014 J	0.0023 J	0.0014 J	0.00091 J	0.0014 J	0.005 U	0.0015 J	0.0021 J	0.0021 J	0.0011 J			0.005 U		0.005 U	0.00079 J	0.005 U	0.0018 J	0.0026 J	0.0028 J	0.0037 J	0.0041 J
Barium	mg/L	0.038	0.047	0.041	0.039	0.037	0.024	0.021	0.051	0.052	0.055			0.048	0.035	0.037	0.039	0.05	0.048	0.035	0.039	0.039	0.024
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.00094 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00053 U	0.001 U
Cadmium	mg/L	8.1E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.00067 J	0.00046 J	0.0005 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.001 U	0.00023 J	0.00047 J	0.0002 J	0.00024 J	0.001 U	0.00023 J	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.00028 J	0.001 U	0.00027 J	0.00026 J	0.00028 J	0.00024 J	0.00024 J
Fluoride	mg/L	0.047 J+	0.036 J	10 U	10 U	5 U	5 U	2 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.057	0.074	0.15	0.77 J	0.74	0.73	0.88	0.99
Lead	mg/L	0.001 U	0.001 U	0.00051 J	0.00025 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.00067 J		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.00096 J	0.008 U	0.008 U	0.008 U	0.00042 J	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U			0.008 U		0.008 U	0.008 U	0.008 U	0.025	0.015	0.016	0.023	0.015
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ			0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.11	0.18	0.14	0.13	0.094	0.1	0.1	0.1	0.11	0.1			0.097	0.085	0.057	0.062	0.076	0.024	0.014	0.015	0.026	0.011
Radium, Total	pci/L	5 U	0.803	0.474	0.449	0.581 U	0.398 U	0.384 U	0.493	0.337 U	0.629			0.373 U	0.259	0.477	0.365 U		1.7	1.28	1.46		
Radium-226	pci/L	1 U	0.348	0.334 U	0.33 U	0.325	0.13	0.131 U	0.166 J+	0.179 J+	0.332			0.111	0.0715	0.291	0.325 U		0.773 J+	0.717	0.748	0.41	
Radium-228	pci/L	1 U	0.49 U	0.455 U	0.413 U	0.581 U	0.398 U	0.384 U	0.381 U	0.337 U	0.369 U			0.373 U	0.187	0.357 U	0.365 U		0.928	0.562	0.708	0.941	
Selenium	mg/L	0.01	0.018	0.0065	0.0052	0.0099	0.011	0.0053	0.012	0.012	0.006			0.009	0.0084	0.015	0.015	0.012	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Supplemental Parameters																							
Alkalinity, Bicarbonate (HCO3)	mg/L																		230				
Alkalinity, Carbonate (CO3)	mg/L																		5 U				
Alkalinity, Hydroxide (OH)	mg/L																		5 U				
Alkalinity, Total	mg/L															240	190	250	230		230	210	200
Ferric Iron	mg/L															0.032 J			6.8 J		2.9		
Ferrous Iron	mg/L															0.05 UJ			0.1 R		1.3 J		
Iron	mg/L																0.16 J	0.083 J				3.6	3
Magnesium	mg/L															16	17	23	66		58	67	51
Manganese	mg/L																0.0047 J	0.014 J				0.69	0.66
Nitrate as N	mg/L																0.19	0.51	0.05 UJ			0.1 U	0.1 U
Nitrite as N	mg/L																		0.05 UJ				
Nitrogen, Nitrate-Nitrite	mg/L															0.55					0.05 U		
Phosphorus (as phosphate)	mg/L															0.31 U	0.14 J	0.31 UJ	0.031 U		0.31 U	0.31 U	0.31 UJ
Potassium	mg/L															3.4 J	2 J	3.7 J	7.3		5.7	7.8	4.4 J
Sodium	mg/L															28	24	39	260		240	260	180
Sample Parameters																							
Dissolved Oxygen	mg/L	4.83	4.77		5.93	7.52	8.86	7.79		6.04	4.52		5.32	6.5	8.49	3.78	7.01	2.95	0.24		0.29	0.92	0.36
Oxidation Reduction Potential	mV	98.9	76.8		28.7	106.8	97.9	209.2		203.2	24.7		121.9	-129.6	-51.6	-36.6	129.2	-41.1	-140.7		-103.4	109.2	-144.8
Eh	mV	298.9	276.8		228.7	306.8	297.9	409.2	200.0	403.2	224.7		321.9	70.4	148.4	163.4	329.2	158.9	59.3		96.6	309.2	55.2
pH	SU	6.95	6.83		6.7	6.88	7.11	6.6		6.96	7.02		6.91	7.2	7.21	6.54	6.71	7.18	7.73		6.86	7.15	7.68
Specific Conductance	uS/cm	1474	2362		1740	1255	986	970		1299	1414		1760	905	1170	1230	1060	1338	3311		2147	1902	1475
Temperature	deg C	16.3	20.1		16.6	9.65	8.47	11.2		17.9	19.8		19.3	8.1	8.9	17.4	8.8	14.2	15.39		14.9	11.8	13.7
Turbidity	NTU	3.32	1.63		2.38	3.05	4.44	2.48		1.71	1.03		4.16	4.59	0.71	1.29	4.55	2.04	2.78		3.58	3.21	3.14

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW46								GAMW46B								GAMW52					
Sample Date		2018-06-13	2019-03-01	2019-04-17	2019-06-06	2019-07-18	2019-08-26	2019-10-04	2019-11-19	2018-06-13	2019-03-04	2019-04-17	2019-06-07	2019-07-18	2019-08-26	2019-10-04	2019-11-19	2018-09-10	2018-10-31		2019-05-09	2019-11-14	
Sample Type		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	N	FD	N
Chemical Name	Unit																						
CCR Appendix III																							
Boron	mg/L	0.055 J	0.1 U	0.033 J	0.1 U	0.032 J	0.053 J	0.043 J	0.049 J	0.05 J	0.05 J	0.037 J	0.047 J	0.03 J	0.05 J	0.047 J	0.046 J	0.34		0.17	0.077 J		0.13
Calcium	mg/L	56	14	28	25 J-	25	25	23	27	25	58	58	56	52	58	49	56	75		59	52		72
Chloride	mg/L	8.4	2.4	1.9		1.8	1.6	1.6	1.6	3	7.9	7.9		7.2	8	7.1	6.9	34		9.1	5.5		37
Fluoride	mg/L	0.052 J	0.068	0.063		0.065	0.06	0.079 J+	0.062	0.048 J	0.066	0.076		0.072	0.069	0.073 J+	0.072	0.36 J		0.3	0.25 J+		0.3
pH	SU	7.93	8.17	8.23	7.52	8.15	7.9	7.81	7.77	8.2	7.11	7.99	7.58	8.18	7.62	7.44	7.47	7.5		7.06	7.17		7.59
Sulfate	mg/L	55	34	30		28	29	30	27	29	64	64		64	68	65	64	86		39	24		67
Total Dissolved Solids	mg/L	260	160	150		130	150	140 J+	140	150	260	290		240	220 J	250	240	400		250	240		350
CCR Appendix IV																							
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U		0.002 U
Arsenic	mg/L	0.0014 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00086 J	0.005 U	0.0015 J	0.0012 J	0.00076 J	0.005 U	0.00091 J	0.00095 J	0.0013 J	0.001 J	0.005 U		0.005 U	0.005 U		0.005 U
Barium	mg/L	0.027	0.0028 J	0.0059	0.0065	0.0054	0.0054	0.0049 J	0.0059	0.0086	0.027	0.026	0.025	0.023	0.024	0.021	0.025	0.039		0.019	0.015		0.02
Beryllium	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00054 J	0.001 U	0.001 U	0.0011	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0011	0.001 U		0.001 U	0.001 U		0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.00024 J	0.001 U		0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.0014 J	0.002 U	0.002 U	0.0021	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U		0.002 U
Cobalt	mg/L	0.0002 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00034 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00058 J		0.00031 J	0.001 U		0.001 U
Fluoride	mg/L	0.052 J	0.068	0.063		0.065	0.06	0.079 J+	0.062	0.048 J	0.066	0.076		0.072	0.069	0.073 J+	0.072	0.36 J		0.3	0.25 J+		0.3
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U		0.001 U
Lithium	mg/L	0.008 U	0.04 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.0017 J	0.008 U	0.008 U	0.002 J	0.008 U	0.008 U	0.003 J	0.0017 J		0.008 U	0.008 U		0.0025 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U		0.0002 U	0.0002 U		0.0002 U
Molybdenum	mg/L	0.0031 J	0.01	0.01 U	0.01 U	0.01 U	0.01 U	0.0015 J	0.01 U	0.0018 J	0.0024 J	0.0022 J	0.0025 J	0.0028 J	0.0028 J	0.0025 J	0.003 J	0.005 J		0.0035 J	0.0016 J		0.0017 J
Radium, Total	pci/L	0.384 U	0.486 U	0.33 U		0.427 U	0.505 U	0.566		0.392 U	0.402 U	0.308 U		0.427 U	0.609 U	0.408 U		0.796		1 J+	0.53 U		
Radium-226	pci/L	0.244 U	0.103 U	0.0708 U		0.214 U	0.0925 UJ	0.179 J+		0.223 U	0.286	0.108		0.232 U	0.105 UJ	0.192 J+		0.46 J+		0.299 J+	0.436		
Radium-228	pci/L	0.384 U	0.486 U	0.33 U		0.427 U	0.505 UJ	0.481 U		0.392 U	0.402 U	0.308 U		0.427 U	0.609 UJ	0.408 U		0.392 U		0.706 J+	0.53 U		
Selenium	mg/L	0.001 J	0.025 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0017 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0014 J		0.0017 J	0.0014 J		0.0011 J
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00059 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00068 J	0.001 U		0.001 U	0.001 U		0.001 U
Supplemental Parameters																							
Alkalinity, Bicarbonate (HCO3)	mg/L																	210					
Alkalinity, Carbonate (CO3)	mg/L																	5 U					
Alkalinity, Hydroxide (OH)	mg/L																	5 U					
Alkalinity, Total	mg/L			82					73			140					130	210	180	190	170	190	190
Ferric Iron	mg/L																	0.2 J	0.1 U	0.1 U			
Ferrous Iron	mg/L																	0.1 R	0.05 J	0.05 UJ			
Iron	mg/L			0.054 J					0.2 U			1.5					1.6				0.2 U	0.2 U	0.2 U
Magnesium	mg/L			9.7					7.8			15					14	20	16	15	16	20	21
Manganese	mg/L			0.0066 J					0.015 U			0.26					0.23				0.0022 J	0.017	0.02
Nitrate as N	mg/L			0.58					0.48			0.1 U					0.1 U	1 J			1.9	1.1	1.1
Nitrite as N	mg/L																	0.089 J					
Nitrogen, Nitrate-Nitrite	mg/L																		1.3	1.3			
Phosphorus (as phosphate)	mg/L			0.16 J					0.31 U			0.15 J					0.31 U	0.031 U	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U
Potassium	mg/L			0.97 J					1 J			0.83 J					0.82 J	4.7	3 J	2.9 J	2.1 J	3.1 J	3.3 J
Sodium	mg/L			4.6 J					2.4 J			5.4					4.6 J	25	13	13	9.8	18	21
Sample Parameters																							
Dissolved Oxygen	mg/L	0.12	1.85	4.18	6.44	6.58	4.03	2.44	3.36	3.59	0.08	1.9	0.3	1.4	1.25	0.31	0.3	0.48		0.21	6.42		2.2
Oxidation Reduction Potential	mV	-171.4	1.9	7.7	157.6	25.5	40.6	9.16	-141.1	-29.4	111.9	-111.1	-133.1	-93.9	-119.9	33.7	-229.6	-30.3		85.1	108.2		-43.2
Eh	mV	28.6	201.9	207.7	357.6	225.5	240.6	209.2	58.9	170.6	311.9	88.9	66.9	106.1	80.1	233.7	-29.6	169.7		285.1	308.2	200.0	156.8
pH	SU	7.93	8.17	8.23	7.52	8.15	7.9	7.81	7.77	8.2	7.11	7.99	7.58	8.18	7.62	7.44	7.47	7.5		7.06	7.17		7.59
Specific Conductance	uS/cm	367	155	161	179	153	153	152	132	211	268	294	282	274	284	260	242	0.896		448	308		320
Temperature	deg C	11.4	8	9.1	11.1	13.2	14.2	14.8	11.7	11.3	9.6	10.8	11	11.9	12.3	12.3	11.3	19.97		17.6	14.2		15.3
Turbidity	NTU	3.96	1.91	1.33	0.51	0.82	0.69	0.89	0.66	3.45	3.26	4.3	3.25	3.11	1.15	4.16	2.84	0.45		0.83	0.42		0.74

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW52B				GAMW53				GAMW53B					GAMW54				GAMW54B				
Sample Date		2018-09-11	2018-10-31	2019-05-09	2019-11-14	2018-09-11	2018-10-30	2019-04-30	2019-11-14	2018-09-11	2018-10-30		2019-04-30	2019-11-14	2018-09-10	2018-10-31	2019-04-30	2019-11-14	2018-09-10	2018-10-31		2019-05-01	2019-11-15
Sample Type		N	N	N	N	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	FD	N	N	N
Chemical Name	Unit																						
CCR Appendix III																							
Boron	mg/L	0.75	0.8	1	1.3	0.19	0.25	0.056 J	0.13	2.5		3.1	2.2	0.73	0.84	0.77	0.39	0.37	5.6		6.5	5.9	6
Calcium	mg/L	160	160	110	130	45	53	17	25	180		190	150	140	93	88	93	81	210		220	200	240
Chloride	mg/L	530	470	380	370	4.9	4.6	1.9	3.6	90		85	81	74	15	10	10	4	100		95	110	120
Fluoride	mg/L	10 U	0.18	0.21 J+	0.23	0.17 J	0.17	0.05 U	0.05 U	0.52 J		0.46	0.51	0.7	0.18 J	0.17	0.14	0.28	0.41 J		0.52	0.59	0.58
pH	SU	8.3	7.1	7.42	7.34	6	6.47	5.93	6.21	7.3		7.35	7.41	7.52	6.24	7.92	6.82	7.08	6.95		8.71	7.27	7.2
Sulfate	mg/L	210	190	220	290	51	56	37	36	430		510	340	320	190	150	190	76	750		730	710	720
Total Dissolved Solids	mg/L	1500	1300	1100	1100	240	250	130	160	1100		1100	900	770	500	400	470	350	1600		1400	1500	1400
CCR Appendix IV																							
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00061 J	0.002 U		0.002 U	0.002 U	0.002 U	0.0011 J	0.00074 J	0.00078 J	0.001 J	0.002 U		0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.0013 J	0.0016 J	0.00083 J	0.0012 J	0.013	0.015	0.00097 J	0.0018 J	0.00079 J		0.00083 J	0.001 J	0.0016 J	0.0024 J	0.0028 J	0.0022 J	0.0045 J	0.0025 J		0.0032 J	0.0045 J	0.005
Barium	mg/L	0.32	0.31	0.25	0.28	0.027	0.028	0.019	0.026	0.052		0.054	0.044	0.072	0.043	0.039	0.031	0.031	0.098		0.093	0.08	0.084
Beryllium	mg/L	0.001 U	0.00042 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.00059 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U	0.001 U
Cadmium	mg/L	0.001 U	0.00029 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.0019 J	0.0018 J	0.0012 J	0.002 U	0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.001 U	0.00032 J	0.001 U	0.001 U	0.00084 J	0.00099 J	0.0005 J	0.001 U	0.001 U		0.001 U	0.001 U	0.001 U	0.00053 J	0.00052 J	0.00062 J	0.001 U	0.001 U		0.001 U	0.001 U	0.001 U
Fluoride	mg/L	10 U	0.18	0.21 J+	0.23	0.17 J	0.17	0.05 U	0.05 U	0.52 J		0.46	0.51	0.7	0.18 J	0.17	0.14	0.28	0.41 J		0.52	0.59	0.58
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.0014	0.00089 J	0.00057 J	0.00063 J	0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0041 J	0.0031 J	0.0033 J	0.0071 J	0.008 U	0.008 U	0.008 U	0.0021 J	0.0042 J		0.0052 J	0.005 J	0.0066 J	0.008 U	0.008 U	0.008 U	0.0023 J	0.0048 J		0.0036 J	0.0048 J	0.0074 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U		0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.014	0.015	0.0095 J	0.0086 J	0.012	0.015	0.0051 J	0.011	0.0083 J		0.0075 J	0.0098 J	0.02	0.043	0.044	0.023	0.03	0.018		0.019	0.0085 J	0.012
Radium, Total	pci/L	3.52	5.55 J+	2.63		0.547 U	1.45 J+	0.344 U		1.69		0.48 J+	1.26		0.5	1.08 J+	0.393 U		2.03		2.7 J+	1.82	
Radium-226	pci/L	2.11	2.76 J+	1.2		0.257	0.795 J+	0.316 U		0.789		0.238 J+	0.544		0.385 J+	0.237 J+	0.337 U		1.18 J+		1.35 J+	0.956	
Radium-228	pci/L	1.41	2.79 J+	1.44		0.547 U	0.658 J+	0.344 U		0.897		0.347 U	0.719		0.385 U	0.843 J+	0.393 U		0.849		1.35 J+	0.865	
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U	0.005 U	0.005 U	0.0017 J	0.0012 J	0.0043 J	0.0035 J	0.005 U		0.005 U	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.00049 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U	0.001 U
Supplemental Parameters																							
Alkalinity, Bicarbonate (HCO3)	mg/L	220				120				250					150				240				
Alkalinity, Carbonate (CO3)	mg/L	5 U				5 U				5 U					5 U				5 U				
Alkalinity, Hydroxide (OH)	mg/L	5 U				5 U				5 U					5 U				5 U				
Alkalinity, Total	mg/L	220	230	220	200	120	140	53	73	250	240	250	260	190	150	160	160	230	240	230	230	250	260
Ferric Iron	mg/L	5 J	3.4			2 J	1			3.2 J	2.3	2.7			0.13 J	0.14			5.9 J	4.5	3.4		
Ferrous Iron	mg/L	0.1 R	0.32 J			0.1 R	0.5 J			0.1 R	0.56 J	1 J			0.1 R	0.029 J			0.1 R	0.94 J	1.6 J		
Iron	mg/L			2.7	2.5			0.25	0.28				3.1	2.4			0.14 J	0.31				5.4	5.4
Magnesium	mg/L	37	38	30	28	15	15	8.9	11	23	24	25	23	19	19	18	21	17	38	38	36	42	46
Manganese	mg/L			0.21	0.25			0.0079 J	0.015 U				0.4	0.32			0.0097 J	0.015 U				0.48	0.51
Nitrate as N	mg/L	0.05 UJ		0.1 U	0.1 U	1.3 J		1.4	0.4	0.05 UJ			0.1 U	0.1 U	0.028 J		0.49	0.15	0.05 UJ			0.1 U	0.1 U
Nitrite as N	mg/L	0.05 UJ				0.03 J				0.05 UJ					0.05 UJ				0.05 UJ				
Nitrogen, Nitrate-Nitrite	mg/L		0.052				0.05 U				0.099	0.74 J-				0.21				0.15	0.091		
Phosphorus (as phosphate)	mg/L	0.056	0.21 J	0.31 U	0.11 J	0.32	0.31 U	0.31 U	0.31 U	0.031 U	0.14 J	0.52	0.31 U	0.31 U	0.031 U	0.31 U	0.11 J	0.31 U	0.079	0.31 U	0.39	0.38	0.3 J
Potassium	mg/L	6	6.4	7	6.5	2.2	5 U	1.3 J	1.6 J	4.6	5.2	5.4	4.9 J	4.5 J	1.9	1.8 J	1.2 J	1.6 J	6.8	6.8	6.2	6.3	5.6
Sodium	mg/L	220	250	250	210	6.5	7.8	4.9 J	3.9 J	120	130	130	99	75	21	21	15	11	200	200	180	160	140
Sample Parameters																							
Dissolved Oxygen	mg/L	0.44	0.1	0.15	0.19	0.53	0.86	3.11	0.84	0.26		0.8	0.36	0.09	0.61	1.41	0.72	0.26	0.42		2.12	0.42	0.31
Oxidation Reduction Potential	mV	-214.9	-103.5	6.31	-102.9	-24.6	-199.5	43.7	-54.8	-183.2		-168	27.7	-75.3	107.8	-294.7	48.4	-69.5	-123.4		-315.7	-23.1	-43.3
Eh	mV	-14.9	96.5	206.3	97.1	175.4	0.5	243.7	145.2	16.8		32.0	227.7	124.7	307.8	-94.7	248.4	130.5	76.6	200.0	-115.7	176.9	156.7
pH	SU	8.3	7.1	7.42	7.34	6	6.47	5.93	6.21	7.3		7.35	7.41	7.52	6.24	7.92	6.82	7.08	6.95		8.71	7.27	7.2
Specific Conductance	uS/cm	1934	2005	1652	1353	307	400	125	155	1354		1620	1160	870	675	630	493	374	1816		1983	1636	1310
Temperature	deg C	17.26	16.6	15.3	16.1	21.3	20.1	11.4	17.5	20.89		20.4	18.7	19.7	21.2	18.53	10.5	15.3	17.6		17.29	15.5	15.8
Turbidity	NTU	1.6	0.88	2.35	1.01	9.93	5.17	4.76	4.8	2.43		3	3.45	2.5	2.03	1	3.24	2.31	4.2		1.64	4.49	1.67

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Appendix A-1: Groundwater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW55				GAMW55R	GAMW55B					GAMW56				GAMW56B			
Sample Date		2018-09-10		2018-10-29		2019-11-15	2018-09-11		2018-10-29	2019-05-01	2019-11-15	2018-09-11	2018-10-26	2019-04-29	2019-11-15	2018-09-11	2018-10-29	2019-04-29	2019-11-15
Sample Type		FD	N	FD	N	N	FD	N	N	N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit																		
CCR Appendix III																			
Boron	mg/L	1.9	1.9	1.8	1.8	1.1	7.1	7.4	8.2	9.1	11	0.26	0.28	0.21	0.2	1.2	1.2	2.3	3.2
Calcium	mg/L	260	250	270	260	180	250	250	260	210	210	130	110	91	120	140	140	150	150
Chloride	mg/L	58	59	69	70	61	220	220	190	170	150	3.1	2.4	3.2	2.1	50	36	55	64
Fluoride	mg/L	0.51 J	0.52 J	0.47	0.47	0.62	0.29 J	10 U	0.25	0.31	0.31	1.2 J	0.99	0.53	0.71	0.41 J	0.33	0.4	0.44
pH	SU		6.77		7.04	7.46	7.31		7.07	7.19	7.31	6.82	7.17	6.83	7.06	6.95	6.91	7.08	7.21
Sulfate	mg/L	590	600	630	620	480	820	820	910	790	750	57	63	54	56	170	130	260	360
Total Dissolved Solids	mg/L	1200	1300	1300	1300	950	1800	1900	1800	1700	1400	470	480	420	440	740	690	830	860
CCR Appendix IV																			
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002	0.002 U
Arsenic	mg/L	0.00083 J	0.005 U	0.005 U	0.005 U	0.005 U	0.0014 J	0.0011 J	0.005 U	0.005 U	0.005 U	0.019	0.022	0.011	0.0097	0.005 U	0.005 U	0.005	0.005 U
Barium	mg/L	0.099	0.097	0.068	0.069	0.035	0.14	0.14	0.12	0.074	0.067	0.068	0.049	0.044	0.04	0.076	0.072	0.082	0.076
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002	0.002 U
Cobalt	mg/L	0.0065	0.0058	0.0044	0.0044	0.001 U	0.00034 J	0.00028 J	0.001 U	0.001 U	0.001 U	0.0017	0.0053	0.0084	0.0081	0.001 U	0.001 U	0.001	0.001 U
Fluoride	mg/L	0.51 J	0.52 J	0.47	0.47	0.62	0.29 J	10 U	0.25	0.31	0.31	1.2 J	0.99	0.53	0.71	0.41 J	0.33	0.4	0.44
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001	0.001 U
Lithium	mg/L	0.0021 J	0.0017 J	0.008 U	0.008 U	0.0035 J	0.0064 J	0.0064 J	0.0054 J	0.0055 J	0.0078 J	0.0034 J	0.0039 J	0.0023 J	0.0053 J	0.0051 J	0.0035 J	0.0044	0.0062 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002	0.0002 U
Molybdenum	mg/L	0.03	0.028	0.026	0.026	0.024	0.0057 J	0.0055 J	0.0055 J	0.0046 J	0.005 J	0.013	0.0094 J	0.0072 J	0.0079 J	0.004 J	0.003 J	0.0031	0.0064 J
Radium, Total	pci/L	1.4	0.802	0.922 J+	1.24 J+		3.35	3.18	3.66 J+	2.08		0.728	0.698 J+			1.26	1.28 J+		
Radium-226	pci/L	0.574 J+	0.474 J+	0.363 J+	0.447 J+		1.72	1.75	1.86 J+	1.15		0.504	0.357 J+	0.334 U		0.763	0.578 J+	0.506	
Radium-228	pci/L	0.824	0.403 U	0.559 J+	0.796 J+		1.63	1.43	1.79 J+	0.926		0.371 U	0.429 U	0.373 U		0.493	0.698 J+	0.571	
Selenium	mg/L	0.0037 J	0.0031 J	0.0027 J	0.0027 J	0.0046 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005	0.005 U
Thallium	mg/L	0.00021 J	0.001 U	0.00023 J	0.00022 J	0.00022 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001	0.001 U
Supplemental Parameters																			
Alkalinity, Bicarbonate (HCO3)	mg/L		240					230				370				370			
Alkalinity, Carbonate (CO3)	mg/L		5 U					5 U				5 U				5 U			
Alkalinity, Hydroxide (OH)	mg/L		5 U					5 U				5 U				5 U			
Alkalinity, Total	mg/L		240		240	230		230	220	230	230	370	370	300	330	370	410	330	270
Ferric Iron	mg/L		0.65 J		0.19			5.2 J	2.5			13 J	5.5			6.4 J	3.5		
Ferrous Iron	mg/L		0.1 R		0.058 J			0.1 R	2.8 J			0.1 R	6.5 J			0.1 R	1.7 J		
Iron	mg/L					0.044 J				4.2	4.1			10	3.9			5.7	4.3
Magnesium	mg/L		32		39	28		46	51	50	42	24	25	27	24	37	38	40	38
Manganese	mg/L					0.22				0.58	0.46			0.25	0.45			0.33	0.29
Nitrate as N	mg/L		0.68 J			1.4		0.05 UJ		0.1 U	0.1 U	0.05 UJ		1.5	0.13	0.05 UJ		0.1 U	0.1 U
Nitrite as N	mg/L		0.058 J					0.05 UJ				0.05 UJ				0.05 UJ			
Nitrogen, Nitrate-Nitrite	mg/L				0.44				0.05 U				0.062				0.05 U		
Phosphorus (as phosphate)	mg/L		0.031 U		0.31 U	0.31 U		2.1	0.7	0.31 U	0.16 J	0.031 U	0.31 U	0.12 J	0.31 U	0.045	0.15 J	0.14 J	0.31 U
Potassium	mg/L		8.3		9.5	7.2		6	6.6	6.2	4.8 J	2.6	2.4 J	1.6 J	1.9 J	3.3	3.6 J	3.7 J	3.6 J
Sodium	mg/L		58		72	79		200	230	200	180	11	12	6.3	5.5	50	49	58	62
Sample Parameters																			
Dissolved Oxygen	mg/L		1.73		0.33	0.17	0.72		0.37	0.17	0.11	0.99	0.28	1.3	0.34	0.29	0.26	0.79	0.18
Oxidation Reduction Potential	mV		21.6		-69.4	-137.9	-28.9		-129.5	-115.9	-57.5	-97.4	-95.4	64	-86.6	-102.8	-44.4	31.8	-105.7
Eh	mV		221.6	200.0	130.6	62.1	171.1		70.5	84.1	142.5	102.6	104.6	264.0	113.4	97.2	155.6	231.8	94.3
pH	SU		6.77		7.04	7.46	7.31		7.07	7.19	7.31	6.82	7.17	6.83	7.06	6.95	6.91	7.08	7.21
Specific Conductance	uS/cm		1493		1574	1491	1017		2109	2201	1967	749	835	460	466	928	1036	856	741
Temperature	deg C		21.1		19.4	17.9	16.7		19.2	18.5	18.1	17	15.7	8.7	14	13.9	13.8	11.6	12.9
Turbidity	NTU		1.74		0.66	3.92	2.26		4.38	1.74	4.77	2.91	2.99	2.31	2.01	2.96	1.45	4.77	1.4

Notes:
CCR = coal combustion residual
mg/L = milligrams per liter
mV= millivolts
pci/L= picoCuries per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"R"= Result was rejected during data validation.

Prepared by: DFSC
Checked by: KMC
Reviewed by MAH

Appendix A-2: Porewater Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

SYS_LOC_CODE		DAPZ-02A	DAPZ-02B	GAPIEZ06	GAPIEZ06	GAPIEZ06
SAMPLE_DATE_yyyy-MM-dd		2020-03-03	2020-03-03	2018-08-09	2018-09-13	2018-10-31
FRACTION		T	T	D	T	T
Chemical Name	Unit					
CCR Appendix III						
Boron	mg/L	7.4	13.8	9.6	8.6	8.3
Calcium	mg/L	489	175	210	210	210
Chloride	mg/L	21.9	119	56	58	55
Fluoride	mg/L	0.16	0.72	0.91	1.1 J	0.92
pH	SU	7.33	7.62	7.51	7.43	9.37
Sulfate	mg/L	1760	2420	750	720	740
Total Dissolved Solids	mg/L	2810	3830		1300	1300
CCR Appendix IV						
Antimony	mg/L	0.001 U	0.001 U	0.0014 J	0.002 U	0.002 U
Arsenic	mg/L	0.001 U	0.0018	0.011	0.011	0.012
Barium	mg/L	0.028	0.033	0.03	0.029	0.03
Beryllium	mg/L	0.0002 U	0.0002 U	0.001 U	0.00052 J	0.001 U
Cadmium	mg/L	0.00052	0.0002 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.0038	0.0023 J+	0.002 U	0.002 U
Cobalt	mg/L	0.0022	0.001 U	0.0004 J	0.00029 J	0.001 U
Fluoride	mg/L	0.16	0.72	0.91	1.1 J	0.92
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.008 U	0.016	0.0041 J	0.0038 J	0.0033 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.81	0.063	0.079	0.094	0.11
Selenium	mg/L	0.011	0.001 U	0.001 J	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Supplemental Parameters						
Alkalinity, Bicarbonate (HCO3)	mg/L				170	
Alkalinity, Carbonate (CO3)	mg/L				5 U	
Alkalinity, Hydroxide (OH)	mg/L				5 U	
Alkalinity, Total	mg/L	99.6	224	170	170	160
Ferric Iron	mg/L			2.8 J	2.7 J	0.19
Ferrous Iron	mg/L			0.1 U	0.1 R	0.088 J
Iron	mg/L	0.61	14.2			
Magnesium	mg/L	48.9	18.4	53	51	45
Manganese	mg/L	0.12	0.7			
Nitrate	mg/L			0.031 J		
Nitrate as N	mg/L	0.75 J+	0.1 U		0.05 U	
Nitrite as N	mg/L				0.05 U	
Nitrogen, Nitrate-Nitrite	mg/L					0.038 J
Phosphorus (as phosphate)	mg/L			0.031 U	0.028 J	0.12 J
Potassium	mg/L	59.1	17.5	3.9 J	4.1	5 U
Sodium	mg/L	286	1050	100	110	99
Field Parameters						
Dissolved Oxygen	mg/L	0.61	0.00	1.33	0.7	0.80
Oxidation-Reduction Potential	mV	66.9	-197.4	-130.8	-118.2	-261
Eh	mV	266.9	2.6	69.2	81.8	-61
pH	SU	7.33	7.62	7.51	7.43	9.37
Specific Conductance	uS/cm	3025	4772	1518	1371	1672
Temperature	deg C	9.4	11.7	15.91	16.1	15.1
Turbidity	NTU	28.9	2.74	3.73	4.29	3.4

Notes:
CCR= coal combustion residual
mg/L = milligrams per liter
mV= millivolts
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated and may be biased high.
"R"= Indicates the result was rejected during data validation.

Prepared by: DFSC
Checked by: KMC
Reviewed by: MAH

APPENDIX B

Groundwater Flow Model Technical Memorandum

TECHNICAL MEMORANDUM

DATE November 12, 2020

TO Danielle Sylvia Cofelice, PE and PJ Nolan, Ph.D.

CC Mark Haney, Joe Gormley, and Rens Verburg

FROM: Ross Bennett, PE(NH) and Brandon Poiencot, PE

GROUNDWATER FLOW MODEL TECHNICAL MEMORANDUM

R.M. SCHAHFER GENERATING STATION

1.0 GROUNDWATER MODELING

This Memorandum presents Golder's summary of groundwater modeling activities associated with the evaluation of hydrogeologic conditions and potential remedial designs at the R.M. Schahfer Generating Station in Wheatfield, Indiana (the Site).

A steady state groundwater flow model was developed and calibrated. This memorandum includes the following to document development of the groundwater flow model and includes:

1) Objectives;
2) Groundwater Flow Model Development
3) Model selection (numerical);
4) Model Geometry
5) Boundary Conditions
6) Input Parameters
7) Model Calibration and Verification
8) Parameter Sensitivity analysis
9) Design Simulations
10) Summary

The conceptual model (including geology, hydrology, lithology and analytical data) used to support numerical model development is described Section 2.0 of the CCR Assessment of Corrective Measures Report (Golder, 2019).

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1.1 Objectives

The primary objective of the modeling was to simulate the groundwater flow conditions in the area surrounding R.M. Schahfer Generating Station to support evaluation of the remedy design including the feasibility of Monitored Natural Attenuation (MNA) as part of the assessment of corrective measures process for the Coal Combustion Residuals (CCR) surface impoundments for the Site.

The general scope of the groundwater modeling is to:

- Simulate the groundwater flow regimes on Site;
- Predict the travel times and flow paths of unattenuated particles originating at areas impacted by metals contamination;
- Inform remedy design (e.g., groundwater pump and treat design);
- Inform the groundwater monitored natural attenuation study.

2.0 GROUNDWATER FLOW MODEL DEVELOPMENT

2.1 Numerical Implementation

Golder developed the groundwater flow model for the site using the USGS MODFLOW-2005 Modular Three-Dimensional Finite-Difference Groundwater Flow Model (Harbaugh, 2005). The pre- and post-processing software used for the modeling was Groundwater Vistas (Vistas) Version 7.24 (Environmental Simulations Inc.).

Development of a numerical groundwater flow model involved the following steps:

- Definition of the model geometry including lateral and vertical extent, number and thickness of model layers, and grid spacing
- Definition and placement of model boundary conditions
- Selection of input parameters such as hydraulic conductivity (horizontal and vertical) and precipitation recharge

The following sections describe the steps used to develop the model.

2.2 Model Geometry

The finite-difference model grid location is shown on Attachment A**.** The model area (excluding no-flow cells) is approximately 10,800 feet (along x-axis) by 12,300 feet (along y-axis) at the widest points. The southwest corner of the model grid (model coordinates 0, 0) corresponds with Site coordinates 2165530.5N and 2962863.0 W (Indiana State Plane West). The model grid is oriented parallel with cardinal directions. The model grid contains 504 rows and 432 columns. The grid cell size in the XY direction is uniform, at 25 feet by 25 feet across the entire model domain. Based on geologic and hydrogeologic conditions discussed in Section 2.0 of the CCR Assessment of Corrective Measures Report (Golder, 2019), the model utilizes three layers, with the lowermost layer representing the medium to coarse sand and the upper two layers representing the fine sands. Layers 1 and 2 have the same hydraulic properties, but they were divided to focus boundary condition cells in the upper portion of the aquifer using Layer 1. The base of Layer 3 is the top of the shale bedrock surface and ranges from 597 to 624

feet mean sea level (MSL). The surface topography is based on publicly available lidar data and ranges from 646 to 723 feet MSL. A cross section of model geometry along model column 200 is shown on Attachment B.

2.3 Model Boundary Conditions

Boundary conditions in groundwater models consist of physical and hydraulic boundaries within the model area. Physical boundary conditions are well-defined geologic and hydrologic features that influence groundwater flow patterns. The following sections describe the boundary conditions used in the model.

2.3.1 Constant Head Boundaries

Constant head boundaries (CHB) were assigned along an unnamed stream in Layer 1 in the southwestern corner of the model to recreate the approximate constant hydraulic heads where long-term average stream water levels are expected to remain relatively constant. Constant heads were also used within the basins that are surrounded slurry walls to simulate the average surface water elevations in the basins. The modeled CHBs are shown on Attachment C and summarized on Table B-1.

2.3.2 River Boundary Conditions

River boundary conditions are a head-dependent boundary condition, where the model computes the difference in head between the boundary and the model cell where the boundary is defined. River Boundary condition cells were used for the Kankakee River, as shown in Attachment A. River heads were defined by two USGS gauging stations that fell within the model grid, downstream at USGS station 05517530 in Kouts and upstream at USGS 05517500 at Dunns Bridge. The river width was estimated from satellite imagery, the river bottom elevation was assumed to be three feet lower than the stage, and the bed thickness was assumed to be 10 feet. The hydraulic conductivity of the river was set through calibration at 64.5 feet/day which is slightly lower than aquifer hydraulic conductivities discussed in Section 1.1.2.4.1.

2.3.3 Stream Boundary Conditions

Stream boundary conditions are a simplified version of river boundary conditions where surface water flow is monitored by MODFLOW and water is added or removed from the model based on the stream stage. Stream boundary conditions were used in the Model for Davis Ditch and Stalbaum Ditch, as shown in Attachment C. The stream width was estimated from satellite imagery, the stream bottom elevation was assumed to be 0.5 to 2 feet lower than the stage depending on size of the stream, and the bed thickness was assumed to be 5 feet. The hydraulic conductivity of the river was set at 100 feet/day for Davis Ditch where loosing stream conditions were expected, and at 0.5 feet per day in Stalbaum ditch where perched conditions where assumed to exist. Stream stage was set off two gauging stations in Stalbaum, SW-04 and SW-10. Elsewhere stream stage was estimated from surface elevations and then refined through model calibration.

2.3.4 Drain Boundary Conditions

Drain boundary conditions are a version of river/stream boundary conditions that can only remove water from the model. Drain boundary conditions were used in the Model for intermittent streams and drainage ditches, as shown in Attachment C. The drain width was estimated from satellite imagery, the drain bottom elevation was assumed to be 1 to 2 feet lower than the stage depending on size of the drain, and the bed thickness was assumed to be 1 foot. The hydraulic conductivity of the drains was set at 100 feet/day. Drain stage was estimated from surface elevations and then refined through model calibration.

2.3.5 No Flow Boundaries

No flow boundaries were assigned to the northeast side of the Kankakee River, as shown in Attachment C.

2.3.6 Horizontal Flow Barriers

A hydraulic flow barrier (HFB) or wall is a condition that limits flow between adjacent cells based on an assigned thickness and hydrologic conductivity. To model the slurry walls that are present around ponds, Golder used the HFB boundary condition with an assigned thickness of 1 foot and a horizontal hydraulic conductivity (K) value of 0.0000001 to model slurry walls that surround the basins. The location of HFB boundaries are presented in Attachment C

2.4 Model Input Parameters

The following paragraphs describe the input parameter data used for the model. Golder simulated steady state conditions in the model. Transient dependent parameters such as porosity and storage/storativity were not included in the model calibration process.

2.4.1 Hydraulic Conductivity

Golder based hydraulic conductivity values for the Site model on pumping test analysis results as discussed in Section 6.0 of the AT-01 Aquifer Test Report (Golder, 2020) and summarized in Table B-2. Golder used these results to assign initial hydraulic conductivity values to the groundwater flow model, and to check that the hydraulic conductivity values resulting from model calibration were within the range of values observed. Golder assigned a uniform Kx/Ky hydraulic conductivity value of 215 feet/day and a Kz of 21.5 feet/day across the entire model area for Layers 1 and 2. Layer 3 had a slightly lower hydraulic conductivity of 200 feet/day and a Kz of 20.0 feet/day across the entire model area. These hydraulic conductivities are based on a best fit from model calibration, and are within range of measured conductivities.

2.4.2 Precipitation Recharge

Precipitation recharge is the amount of precipitation that recharges the aquifer, which is generally the precipitation rate minus losses due to runoff and evapotranspiration. Recharge rates calculated for the area were presented in Letsinger (2015) and used in the model. After model calibration a best fit recharge value of 7.1 inches per year (0.00162 feet/day) was established, which was similar to the published rates. A recharge rate of 0.04 inches/year (0.00001 ft/day) was used for the capped landfill areas. Precipitation recharge rates are shown in Attachment D.

2.4.3 Groundwater Extraction and Recharge Wells

Groundwater extraction or recharge wells are present on and adjacent to the Site and were modeled in all versions of the model, as shown in Attachment D. The well field located on the northeast corner of the model contains eight wells that remove a total of 55,343 cubic feet/day. In the central portion of the Site the 5 cooling tower wells and two Miox wells remove a total of 7,701 cubic feet/day, and just west of the Site on well on the adjacent property removes 9,625 cubic feet/day.

3.0 MODEL CALIBRATION AND VERIFICATION

Model calibration consists of successive refinement of the model property assignments and input data from initial assumptions/estimates to improve the fit between observed and model-predicted results. A solution of a groundwater flow model problem requires information including aquifer parameters such as hydraulic conductivity, spatial boundary conditions, and the location and magnitude of applied stresses, such as recharge and drainage.

A solution is attained only when the proper combination of the above parameters and inputs are selected such that the physical problem is accurately represented by the model. The calibrated model described below should be considered a limited hydrologic effort founded on the available information within the context of necessary simplifying assumptions.

The purpose of the calibration effort was to simulate "steady-state" groundwater flow conditions that approximate the general flow patterns inferred from September 2019 groundwater level measurements. The model was calibrated through trial-and-error adjustment of model parameter values and through use of Model-Independent PEST, developed by Watermark Computing, to refine aquifer parameters. PEST allows model input parameters to be adjusted automatically over a given range until the model predicted head matches the observed head with the lowest possible numerical difference, referred to as the calibration residual (Doherty, 2016). Golder set the allowable range of parameter adjustment in PEST to represent realistic values as determined by previously published literature for the region and aquifer tests at the Site.

At each well location, the head residuals were calculated in Groundwater Vistas as the difference between the measured and simulated head values. Positive residual values indicate simulated head values were lower than measured elevations, while negative residual values indicate simulated head values were higher than measured elevations.

As a measure of the accuracy of the model, Groundwater Vistas calculates summary statistics using calculated residuals, which are used as measures of error in the calibrated model. The residual mean (RM) is the arithmetic mean of all calculated residual values. The absolute residual mean (ARM) is the arithmetic mean of the absolute value of the residuals (i.e., all negative residuals are considered positive). The root mean square error (RMSE) is the square root of the mean of the squared value of target residuals. Other statistics such as the residual standard deviation (RSD) (i.e., the square root of the variance [the average of the squared deviations from the mean]), and the sum of squared residuals (SSR) (computed by squaring each residual and adding them together) can also be useful in evaluation of the calibration process. While calibrating the model, Golder selected parameters estimated by PEST that were within a valid range from published literature or Site-specific data that resulted in improved calibration summary statistics.

3.1 Simulated Heads Calibrated to September 2019 Conditions

Measured groundwater elevations for 112 monitoring points from September 2019 were used for calibration, as presented in Table B-3. The model files for September 2019 calibration simulation use the root file name *V12_2019.* The simulated heads and residuals for targets screened in Layer 1 are presented in Attachment F. Based on the simulated contours of groundwater elevation, groundwater flows from the south/southwest toward the Site before it travels to the Kankakee River in the north/northeast.

A comparison of model-predicted versus observed September 2019 potentiometric heads for the 112 selected calibration points resulted in a RM of -0.36 feet and a RMSE of 0.72 feet. The calibration statistics for the model are presented in Table B-4. The RM of -0.36 feet, represents 4.9 percent of the total measured head difference for the model area (approximately 7.41 feet). The absolute residual mean for the model run is 0.57 feet, which is 7.7 percent of the total hydraulic head difference for the entire modeling area. The residual mean and the absolute residual mean are within the generally accepted standard of 10 percent of the total hydraulic head difference for the modeling area.

3.1.1 Water Balance

An effective measure of model calibration is the analysis of the water budget calculated by MODFLOW. The model provides flows across boundaries, flows to and from all sources and sinks, and flows generated by storage. Inflows into the model include:

- Constant head boundaries: 16,716 ft^3/d,
- Rivers: 165,339 ft^3/d,
- Streams: 182,984 ft^3/d and
- Recharge: 545,949 ft^3/d.

Outflows in the model include

- Constant head boundaries: 5,640 ft^3/d,
- Wells: 70,469 ft^3/d,
- Rivers: 474,633 ft^3/d,
- Streams: 400,512 ft^3/d, and
- Drains: 45,574 ft^3/d.

The outflow deficit is 85,842 cubic feet per day (ft^3/d), which is equivalent to error between outflow and inflow estimates of approximately 8.9 percent.

3.1.2 Numerical Model Verification

Model verification was performed using a second water level calibration data set from October 2018. The model input parameter values defined in the September 2019 simulation were maintained. The verification data is presented in Table B-5. The model files for the October 2018 conditions use the root file name *V12.1_2019*. The verification results indicate a RM of 0.33 feet, which represents 4.1 percent of the total hydraulic head difference for the model area. The absolute residual mean for this simulation was 0.52 feet, which is 6.5 percent of the total hydraulic head difference for the entire model area. The verification statistics suggests that the model is calibrated and verified.

4.0 DESIGN SIMULATIONS

Using the calibrated model, Golder used MODPATH (Pollack, 1989) to simulate travel times for particles released from the metals cleaning basin. Particles were started in Layer 3 of the model to simulate the release of contaminants in the deeper part of the aquifer where Boron concentrations exceeded 10 micrograms/liter. Effective porosity of the aquifer was varied between 0.16, 0.3, and 0.46 to represent values within the expected range for medium to fine sand. The length of the particle traces produced by MODPATH along with travel time estimates were used to calculate average groundwater velocities. These travel time calculations are presented in Table B-6.

5.0 GROUNDWATER MODELING SUMMARY

Through standard numerical groundwater modeling procedures, Golder developed a steady state groundwater flow model for the Site that is considered calibrated and verified. This model was utilized to inform the groundwater monitored natural attenuation study by simulating travel times for particles released from the metals cleaning basin.

6.0 REFERENCES

Doherty, 2016. PEST, Model-Independent Parameter Estimation. User Manual 6th Edition.

Golder, 2019, CCR Assessment of Corrective Measures Northern Indiana Public Service Company Rollin M Schahfer Generating Station Wheatfield, Indiana. April 2019.

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Harbaugh, Arlen W, 2005. MODFLOW-2005, The U.S. Geological Survey Modular Ground-Water Model—the Ground-Water Flow Process. U.S. Geological Survey Techniques and Methods 6-A16

Letsinger, S. L., 2015, Map of Indiana showing near-surface aquifer recharge: Indiana Geological Survey Miscellaneous Map 92, scale 1:500,000.

Pollock, D.W., 1989 Documentation of computer programs to compute and display pathlines using results from the U.S. Geological Survey modular three-dimensional finite-difference groundwater flow model. U.S. Geological Survey, Open File Report 89-381.

List of Attachments:

Attachment A Model Grid

Attachment B Cross Section of Model Grid

Attachment C Boundary Conditions

Attachment D Precipitation Recharge Zones

Attachment E Active Pumping Wells

Attachment F Model Calibration – September 2019

List of Tables

Table B-1 Boundary Conditions

Table B-2 Site Pumping Test Results

Table B-3 Measured Groundwater Elevations - September 2019

Table B-4 Calibration Residuals and Summary Statistics - September 2019

Table B-5 Verification Residuals and Summary Statistics – October 2018

Table B-6 Travel Time Simulations

Table B-1: Boundary Conditions
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Constant Head Boundaries

Name	Layer	Reach	Starting Head (ft)	Ending Head (ft)
Intake Settling Basin	1	104	675.0	675.0
Final Settling Basin	1	101	675.0	675.0
Drying Area	1	100	672.0	672.0
Unnamed SW. Stream	1	1	663.17	661.20

Rivers

Name	Layer	Starting Stage (ft)	Starting Bed Elevation (ft)	Ending Stage (ft)	Ending Bed Elevation (ft)	Starting Width (ft)	Ending Width (ft)	Length (ft)	Thickness of Bed (ft)	Hydraulic Conductivity (ft/d)
Kakakanee River	1	651.82	649.10	646.72	644.01	135.28	159.88	24.0	10.0	64.41

Streams

Name	Layer	Starting Stage (ft)	Starting Bed Elevation (ft)	Ending Stage (ft)	Ending Bed Elevation (ft)	Starting Width (ft)	Ending Width (ft)	Length (ft)	Thickness of Bed (ft)	Hydraulic Conductivity (ft/d)	Slope of Channel (ft/ft)
Davis Ditch	1	661.99	659.99	650.29	646.31	20.05	74.80	50	10.0	63.41	0.001
Stalbaum Ditch	1	660.74	659.74	654.5	652.0	10.07	50	28	1.0	50	0.001
Fisher Ditch	1	661.49	659.49	660.88	658.88	30.04	32.08	51	5.0	100	0.001
Stalbaum South Ancillary Ditch	1	661.50	660.0	659.21	657.76	2.06	29.93	31	1.0	10	0.001
Stalbaum East Ancillary Ditch	1	661.0	655.36	657.17	655.21	18.80	30.36	13	5.0	0.1	0.001
Coal Yard Ditch	1	660.7	659.00	660.7	659	5.0	5.0	50	1.0	50	0.001

Drains

Name	Layer	Starting Stage (ft)	Ending Stage (ft)	Starting Width (ft)	Ending Width (ft)	Length (ft)	Thickness of Bed (ft)	Hydraulic Conductivity (ft/d)
Sands Ditch	1	662.0	654.1	1.0	5	38	1	50
W. Sands Drain	1	660.0	655.6	2	2	27	1	50
Hilliard St Ditch	1	659	659	2	2	24	1	10
N. LF Drain	1	661	661	8.8	8.8	50.0	1.0	62.0
S. LF Drain	1	661	661	8.8	8.8	50.0	1.0	62.0
W. LF Drain	1	661	661	5	5	50	2	100

Hydraulic Flow Barriers (Slurry Walls)

Name	First Layer	Last Layer	Thickness (ft)	Hydraulic Conductivity (ft/d)
Intake Settling Basin Slurry Wall	1	3	1	1.00E-07
Final Settling Basin Slurry Wall	1	3	1	1.00E-07
Drying Area Slurry Wall	1	3	1	1.00E-06

Table B-2: Site Pumping Test Results
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Pumping Test Results		Estimated Hydraulic Conductivity (ft/d)
SHALLOW WELLS	*Minimum:*	192
	Maximum:	363
	Arithmetic Mean:	266
DEEP WELLS	*Minimum:*	234
	Maximum:	320
	Arithmetic Mean:	268

Table B-3: Measured Groundwater Elevations - September 2019
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Well ID	Layer	Groundwater Elevation (ft msl)
GAMW01	1	658.89
GAMW01B	3	658.72
GAMW03	1	659.84
GAMW03B	3	659.26
GAMW07	1	660.74
GAMW07B	3	660.79
GAMW08	1	658.87
GAMW08B	3	658.98
GAMW09	1	659.27
GAMW09B	3	658.87
GAMW12	1	658.64
GAMW12B	3	658.66
GAMW13	1	658.35
GAMW13B	3	658.37
GAMW14	1	658.14
GAMW14B	3	658.12
GAMW15	1	660.35
GAMW15B	3	660.33
GAMW16	1	659.31
GAMW16B	3	659.46
GAMW17B	3	658.92
GAMW18	1	658.92
GAMW18B	3	659.17
GAMW20	1	658.21
GAMW24	1	658.66
GAMW24B	2	658.73
GAMW25	1	658.41
GAMW25B	2	658.41
GAMW26	1	658.33
GAMW26B	3	658.26
GAMW27	1	658.29
GAMW27B	3	658.32
GAMW29	1	657.48
GAMW29B	3	657.48
GAMW30	1	657.42
GAMW30B	3	657.51
GAMW31	1	657.24
GAMW31B	2	657.25
GAMW32	1	657.19
GAMW32B	3	657.15
GAMW33	1	657.04
GAMW33B	3	657.13
GAMW34	1	657.58

Table B-3: Measured Groundwater Elevations - September 2019
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Well ID	Layer	Groundwater Elevation (ft msl)
GAMW34B	3	657.59
GAMW35B	2	658.16
GAMW36	1	656.67
GAMW36B	3	656.69
GAMW37B	2	657.26
GAMW38	1	657.91
GAMW38B	3	657.91
GAMW39	2	657.88
GAMW39B	3	657.84
GAMW40	1	657.66
GAMW40B	3	657.65
GAMW42	1	658.12
GAMW42B	3	658.13
GAMW43	1	657.83
GAMW43B	3	657.83
GAMW44	1	657.71
GAMW44B	3	657.69
GAMW45B	3	654.52
GAMW46	1	655.22
GAMW46B	3	655.21
GAMW48	1	654.5
GAMW48B	3	654.51
GAMW49	1	656.26
GAMW49B	3	656.34
GAMW50	1	656.37
GAMW50B	3	656.35
GAMW51	1	658.07
GAMW51B	3	658.19
GAMW52	1	657.81
GAMW52B	3	657.82
GAMW53	1	658.04
GAMW53B	3	658.21
GAMW54	1	657.87
GAMW54B	3	657.82
GAMW55B	3	657.78
GAMW56	1	657.81
GAMW56B	3	657.77
GAMW02	1	660.14
GAMW05	1	658.17
GAMW06	1	659.65
GAMW10	1	657.63
GAMW11	1	657.37
GAMW20B	3	658.25

Table B-3: Measured Groundwater Elevations - September 2019
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Well ID	Layer	Groundwater Elevation (ft msl)
MW-1D	3	659.11
MW-1S	2	659.09
MW-2S	2	657.7
MW-3D	3	656.68
MW-4S	2	657.08
MW-5D	3	658.17
MW-5S	2	658.14
MW-6D	3	654.1
MW-6S	2	654.07
MW-7D	3	656.12
MW-7S	2	656.1
MW-8S	3	654.65
MW-9D	3	655.18
MW-9S	3	655.14
MW-10D	3	658.66
MW-10S	1	658.61
MW-11D	3	656.75
MW-11S	2	656.73
MW-12D	3	656.97
MW-12S	2	656.95
MW-13D	3	657.2
MW-13S	2	657.17
MW-14D	2	656.51
MW-14S	2	656.54
SW-4	1	661.48
SW-10	1	660

Table B-4: Calibration Residuals and Summary Statistics - September 2019
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Name	Observed Groundwater Elevation (ft msl)	Computed Groundwater Elevation (ft msl)	Residual (ft)
Layer 1			
GAMW01	658.89	658.87	0.02
GAMW03	659.84	660.22	-0.38
GAMW07	660.74	662.14	-1.40
GAMW08	658.87	658.87	0.00
GAMW09	659.27	659.05	0.22
GAMW12	658.64	658.58	0.06
GAMW13	658.35	658.50	-0.15
GAMW14	658.14	658.57	-0.43
GAMW15	660.35	662.08	-1.73
GAMW16	659.31	659.11	0.20
GAMW18	658.92	659.30	-0.38
GAMW20	658.21	658.72	-0.51
GAMW24	658.66	659.16	-0.50
GAMW25	658.41	658.67	-0.26
GAMW26	658.33	658.34	-0.01
GAMW27	658.29	658.09	0.20
GAMW29	657.48	658.19	-0.71
GAMW30	657.42	658.20	-0.78
GAMW31	657.24	658.12	-0.88
GAMW32	657.19	657.99	-0.80
GAMW33	657.04	657.92	-0.88
GAMW34	657.58	658.44	-0.86
GAMW36	656.67	657.59	-0.92
GAMW38	657.91	658.24	-0.33
GAMW40	657.66	658.27	-0.61
GAMW42	658.12	658.62	-0.50
GAMW43	657.83	658.54	-0.71
GAMW44	657.71	658.56	-0.85
GAMW46	655.22	654.39	0.83
GAMW48	654.5	654.25	0.25
GAMW49	656.26	656.37	-0.11
GAMW50	656.37	656.86	-0.49
GAMW51	658.07	658.84	-0.77
GAMW52	657.81	657.89	-0.08
GAMW53	658.04	658.21	-0.17
GAMW54	657.87	658.36	-0.49
GAMW56	657.81	658.51	-0.70
GAMW02	660.14	659.81	0.33
GAMW05	658.17	658.77	-0.60
GAMW06	659.65	660.42	-0.77

Table B-4: Calibration Residuals and Summary Statistics - September 2019
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Name	Observed Groundwater Elevation (ft msl)	Computed Groundwater Elevation (ft msl)	Residual (ft)
GAMW10	657.63	658.34	-0.71
GAMW11	657.37	658.19	-0.82
MW-10S	658.61	659.16	-0.55
SW-4	661.48	657.77	3.71
SW-10	660	659.21	0.79
Layer 2			
GAMW24B	658.73	659.16	-0.43
GAMW25B	658.41	658.67	-0.26
GAMW31B	657.25	658.12	-0.87
GAMW35B	658.16	659.00	-0.84
GAMW37B	657.26	658.24	-0.98
GAMW39	657.88	658.29	-0.41
MW-1S	659.09	659.72	-0.63
MW-2S	657.7	658.54	-0.84
MW-4S	657.08	657.79	-0.71
MW-5S	658.14	658.13	0.01
MW-6S	654.07	654.60	-0.53
MW-7S	656.1	656.26	-0.16
MW-11S	656.73	657.28	-0.55
MW-12S	656.95	657.48	-0.53
MW-13S	657.17	657.95	-0.78
MW-14S	656.54	657.27	-0.73
Layer 3			
GAMW01B	658.72	658.87	-0.15
GAMW03B	659.26	660.22	-0.96
GAMW07B	660.79	660.99	-0.20
GAMW08B	658.98	658.87	0.11
GAMW09B	658.87	659.05	-0.18
GAMW12B	658.66	658.58	0.08
GAMW13B	658.37	658.50	-0.13
GAMW14B	658.12	658.57	-0.45
GAMW15B	660.33	662.22	-1.89
GAMW16B	659.46	659.11	0.35
GAMW17B	658.92	659.55	-0.63
GAMW18B	659.17	659.30	-0.13
GAMW26B	658.26	658.34	-0.08
GAMW27B	658.32	658.13	0.19
GAMW29B	657.48	658.19	-0.71
GAMW30B	657.51	658.20	-0.69
GAMW32B	657.15	657.98	-0.83
GAMW33B	657.13	657.92	-0.79

Table B-4: Calibration Residuals and Summary Statistics - September 2019
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Name	Observed Groundwater Elevation (ft msl)	Computed Groundwater Elevation (ft msl)	Residual (ft)
GAMW34B	657.59	658.44	-0.85
GAMW36B	656.69	657.59	-0.90
GAMW38B	657.91	658.24	-0.33
GAMW39B	657.84	658.29	-0.45
GAMW40B	657.65	658.27	-0.62
GAMW42B	658.13	658.62	-0.49
GAMW43B	657.83	658.54	-0.71
GAMW44B	657.69	658.56	-0.87
GAMW45B	654.52	653.66	0.86
GAMW46B	655.21	654.39	0.82
GAMW48B	654.51	654.24	0.27
GAMW49B	656.34	656.36	-0.02
GAMW50B	656.35	656.86	-0.51
GAMW51B	658.19	658.84	-0.65
GAMW52B	657.82	657.88	-0.06
GAMW53B	658.21	658.21	0.00
GAMW54B	657.82	658.36	-0.54
GAMW55B	657.78	658.47	-0.69
GAMW56B	657.77	658.51	-0.74
GAMW20B	658.25	658.72	-0.47
MW-1D	659.11	659.72	-0.61
MW-3D	656.68	657.50	-0.82
MW-5D	658.17	658.13	0.04
MW-6D	654.1	654.61	-0.51
MW-7D	656.12	656.26	-0.14
MW-8S	654.65	654.32	0.33
MW-9D	655.18	654.27	0.91
MW-9S	655.14	654.28	0.86
MW-10D	658.66	659.16	-0.50
MW-11D	656.75	657.27	-0.52
MW-12D	656.97	657.48	-0.51
MW-13D	657.2	657.95	-0.75
MW-14D	656.51	657.27	-0.76

Calibration Parameter	Value
Residual Mean (ft)	-0.36
Redsidual Standard Deviation (ft)	0.63
Absolute Residual Mean (ft)	0.57
Residual Sum of Squares	59
RMS Error	0.72
Minimum Residual (ft)	-1.89
Maximum Residual (ft)	3.71

Table B-4: Calibration Residuals and Summary Statistics - September 2019
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Name	Observed Groundwater Elevation (ft msl)	Computed Groundwater Elevation (ft msl)	Residual (ft)
Range of Observations (ft)			7.41
Scaled Residual Standard Deviation			0.085
Scaled Absolute Mean			0.076
Scaled RMS (%)			9.8
Number of Observations			112

Table B-5: Verification Residuals and Summary Statistics – October 2018
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Name	Observed Groundwater Elevation (ft msl)	Computed Groundwater Elevation (ft msl)	Residual (ft)
Layer 1			
GAMW01	659.19	658.87	0.32
GAMW03	660.82	660.22	0.60
GAMW07	659.27	660.62	-1.35
GAMW08	659.06	658.87	0.19
GAMW09	660.34	659.05	1.29
GAMW12	658.84	658.58	0.26
GAMW13	658.72	658.50	0.22
GAMW14	659.55	658.57	0.98
GAMW15	659.10	660.00	-0.90
GAMW16	659.07	659.11	-0.04
GAMW18	659.57	659.30	0.27
GAMW20	659.81	658.72	1.09
GAMW24	659.90	659.16	0.74
GAMW25	659.67	658.67	1.00
GAMW26	659.73	658.34	1.39
GAMW27	659.67	658.09	1.58
GAMW29	658.28	658.19	0.09
GAMW30	658.62	658.20	0.42
GAMW31	658.13	658.12	0.01
GAMW32	657.99	657.99	0.00
GAMW33	657.84	657.92	-0.08
GAMW34	658.47	658.44	0.03
GAMW36	657.71	657.59	0.12
GAMW38	659.19	658.24	0.95
GAMW40	658.76	658.27	0.49
GAMW42	658.40	658.62	-0.22
GAMW43	658.16	658.54	-0.38
GAMW44	657.95	658.56	-0.61
GAMW46	655.25	654.39	0.86
GAMW48	654.68	654.25	0.43
GAMW49	656.86	656.37	0.49
GAMW50	657.22	656.86	0.36
GAMW51	658.42	658.84	-0.42
GAMW52	657.99	657.89	0.10
GAMW53	658.14	658.21	-0.07
GAMW54	658.47	658.36	0.11
GAMW56	658.86	658.51	0.35
GAMW02	660.52	659.81	0.71
GAMW05	658.53	658.77	-0.24
GAMW06	658.63	660.42	-1.79

Table B-5: Verification Residuals and Summary Statistics – October 2018
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Name	Observed Groundwater Elevation (ft msl)	Computed Groundwater Elevation (ft msl)	Residual (ft)
GAMW10	658.61	658.34	0.27
GAMW11	657.97	658.19	-0.22
MW-10S	659.83	659.16	0.67
SW-4	662.48	657.77	4.71
SW-10	660.45	659.21	1.24
Layer 2			
GAMW24B	659.95	659.16	0.79
GAMW25B	659.69	658.67	1.02
GAMW31B	658.14	658.12	0.02
GAMW35B	659.16	659.00	0.16
GAMW37B	658.42	658.24	0.18
GAMW39	659.08	658.29	0.79
MW-1S	659.76	659.72	0.04
MW-2S	658.58	658.54	0.04
MW-4S	657.62	657.79	-0.17
MW-5S	659.47	658.13	1.34
MW-6S	654.83	654.60	0.23
MW-7S	656.72	656.26	0.46
MW-11S	657.55	657.28	0.27
MW-12S	657.68	657.48	0.20
MW-13S	657.97	657.95	0.02
MW-14S	657.49	657.27	0.22
Layer 3			
GAMW01B	659.23	658.87	0.36
GAMW03B	660.31	660.22	0.09
GAMW07B	659.29	660.56	-1.27
GAMW08B	659.12	658.87	0.25
GAMW09B	659.94	659.05	0.89
GAMW12B	657.90	658.58	-0.68
GAMW13B	658.70	658.50	0.20
GAMW14B	658.50	658.57	-0.07
GAMW15B	659.13	660.03	-0.90
GAMW16B	659.14	659.11	0.03
GAMW17B	659.18	658.84	0.34
GAMW18B	660.15	659.30	0.85
GAMW26B	659.66	658.34	1.32
GAMW27B	659.70	658.13	1.57
GAMW29B	658.43	658.19	0.24
GAMW30B	658.71	658.20	0.51
GAMW32B	657.95	657.98	-0.03
GAMW33B	657.89	657.92	-0.03

Table B-5: Verification Residuals and Summary Statistics – October 2018
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Name	Observed Groundwater Elevation (ft msl)	Computed Groundwater Elevation (ft msl)	Residual (ft)
GAMW34B	658.46	658.44	0.02
GAMW36B	657.72	657.59	0.13
GAMW38B	659.21	658.24	0.97
GAMW39B	659.04	658.29	0.75
GAMW40B	658.68	658.27	0.41
GAMW42B	658.41	658.62	-0.21
GAMW43B	658.10	658.54	-0.44
GAMW44B	657.91	658.56	-0.65
GAMW45B	654.52	653.66	0.86
GAMW46B	655.24	654.39	0.85
GAMW48B	654.67	654.24	0.43
GAMW49B	656.94	656.36	0.58
GAMW50B	657.25	656.86	0.39
GAMW51B	658.58	658.84	-0.26
GAMW52B	658.00	657.88	0.12
GAMW53B	658.24	658.21	0.03
GAMW54B	658.42	658.36	0.06
GAMW55B	658.68	658.47	0.21
GAMW56B	658.87	658.51	0.36
GAMW20B	659.85	658.72	1.13
MW-1D	659.76	659.72	0.04
MW-3D	657.50	657.50	0.00
MW-5D	659.47	658.13	1.34
MW-6D	654.86	654.61	0.25
MW-7D	656.70	656.26	0.44
MW-8S	654.80	654.32	0.48
MW-9D	655.15	654.27	0.88
MW-9S	655.14	654.28	0.86
MW-10D	659.83	659.16	0.67
MW-11D	657.52	657.27	0.25
MW-12D	657.64	657.48	0.16
MW-13D	657.96	657.95	0.01
MW-14D	657.46	657.27	0.19

Calibration Parameter	Value
Residual Mean (ft)	0.33
Redsidual Standard Deviation (ft)	0.71
Absolute Residual Mean (ft)	0.52
Residual Sum of Squares	69
RMS Error	0.78
Minimum Residual (ft)	-1.79
Maximum Residual (ft)	4.71

Table B-5: Verification Residuals and Summary Statistics – October 2018
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

Name	Observed Groundwater Elevation (ft msl)	Computed Groundwater Elevation (ft msl)	Residual (ft)
Range of Observations (ft)			7.96
Scaled Residual Standard Deviation			0.09
Scaled Absolute Mean			0.066
Scaled RMS (%)			9.9
Number of Observations			112

Table B-6: Travel Time Simulations
Groundwater Flow Model Technical Memorandum
NIPSCO LLC R. M. Schahfer Generating Station

	Shallow Flow Paths				Deep Flow Paths			
Starting Well	**GAMW-16**	**GAMW-18**	**GAMW-17B**	**GAMW-09B**	**GAMW-16B**	**GAMW-18B**	**GAMW-17B**	**GAMW-09B**
Ending Well	**GAMW-53**	**GAMW-55**	**GAMW-54B**	**GAMW-54B**	**GAMW-53B**	**GAMW-55B**	**GAMW-54B**	**GAMW-54B**
Distance (ft)	**1521**	**1964**	**1200**	**1714**	**1521**	**1964**	**1200**	**1714**
Effective Porosity = 16%								
Travel Time (years)	4.8	11.0	4.5	8.9	5.0	11.0	5.5	9.0
Velocity (ft/year)	317	179	267	193	304	179	218	190
Time to Davis Ditch (years)	5.5	-	-	-	6	-	-	-
Time to property boundry near GAMW46B (years)	-	27	49	41	-	28.5	45	41
Effective Porosity = 30%								
Travel Time (years)	8.5	19.8	8.0	16.0	8.9	20.0	10.0	16.5
Velocity (ft/year)	179	99	150	107	171	98	120	104
Time to Davis Ditch (years)	10	-	-	-	9.9	-	-	-
Time to property boundry near GAMW46B (years)	-	49.8	79	75	-	51.5	80	76
Effective Porosity = 46%								
Travel Time (years)	13.0	31.0	12.0	25.0	13.5	29.0	15.0	25.0
Velocity (ft/year)	117	63	100	69	113	68	80	69
Time to Davis Ditch (years)	15	-	-	-	15	-	-	-
Time to property boundry near GAMW46B (years)	-	76.8	122	117	-	77	130	120

Notes:
ft = feet



LEGEND

NOTE(S)
1. BASED ON MODEL V12_2019.

REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 WEB MERCATOR AUXILIARY SPHERE

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

GROUNDWATER FLOW MODEL TECHNICAL MEMORANDUM
MSRB, MCWB, AND DRYING AREA
NIPSCO LLC R. M. SCHAHFER GENERATING STATION

TITLE

MODEL GRID

CONSULTANT

GOLDER

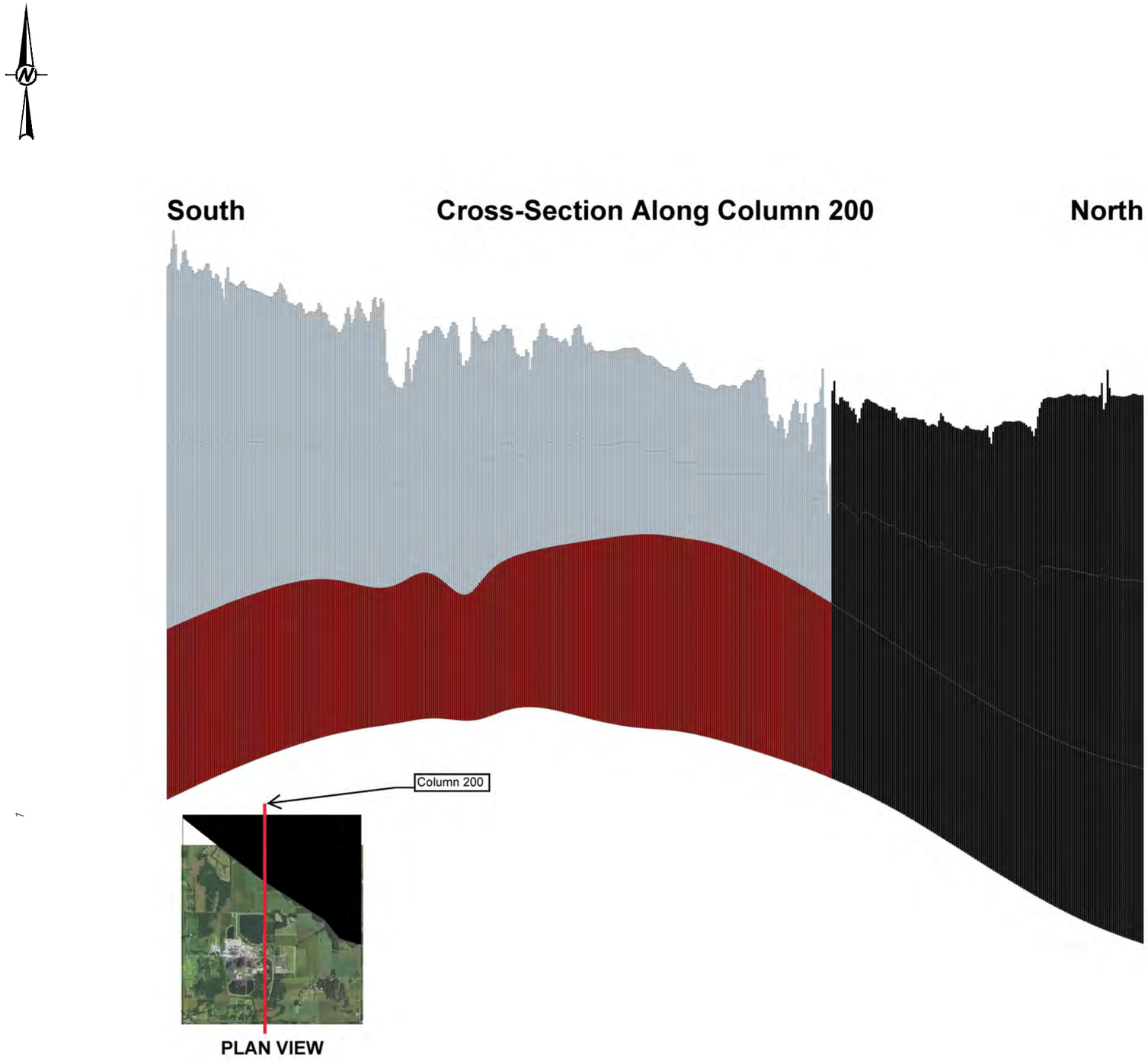
YYYY-MM-DD	2020-10-23
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BP
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	ATTACHMENT
19121567	-	-	A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 1in

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LEGEND

NOTE(S)
1. BASED ON MODEL V12_2019.

REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 WEB MERCATOR AUXILIARY SPHERE

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

GROUNDWATER FLOW MODEL TECHNICAL MEMORANDUM
MSRB, MCWB, AND DRYING AREA
NIPSCO LLC R. M. SCHAHFER GENERATING STATION

TITLE

CROSS SECTION OF MODEL GRID

CONSULTANT

GOLDER

YYYY-MM-DD	2020-10-23
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BP
APPROVED	RWB

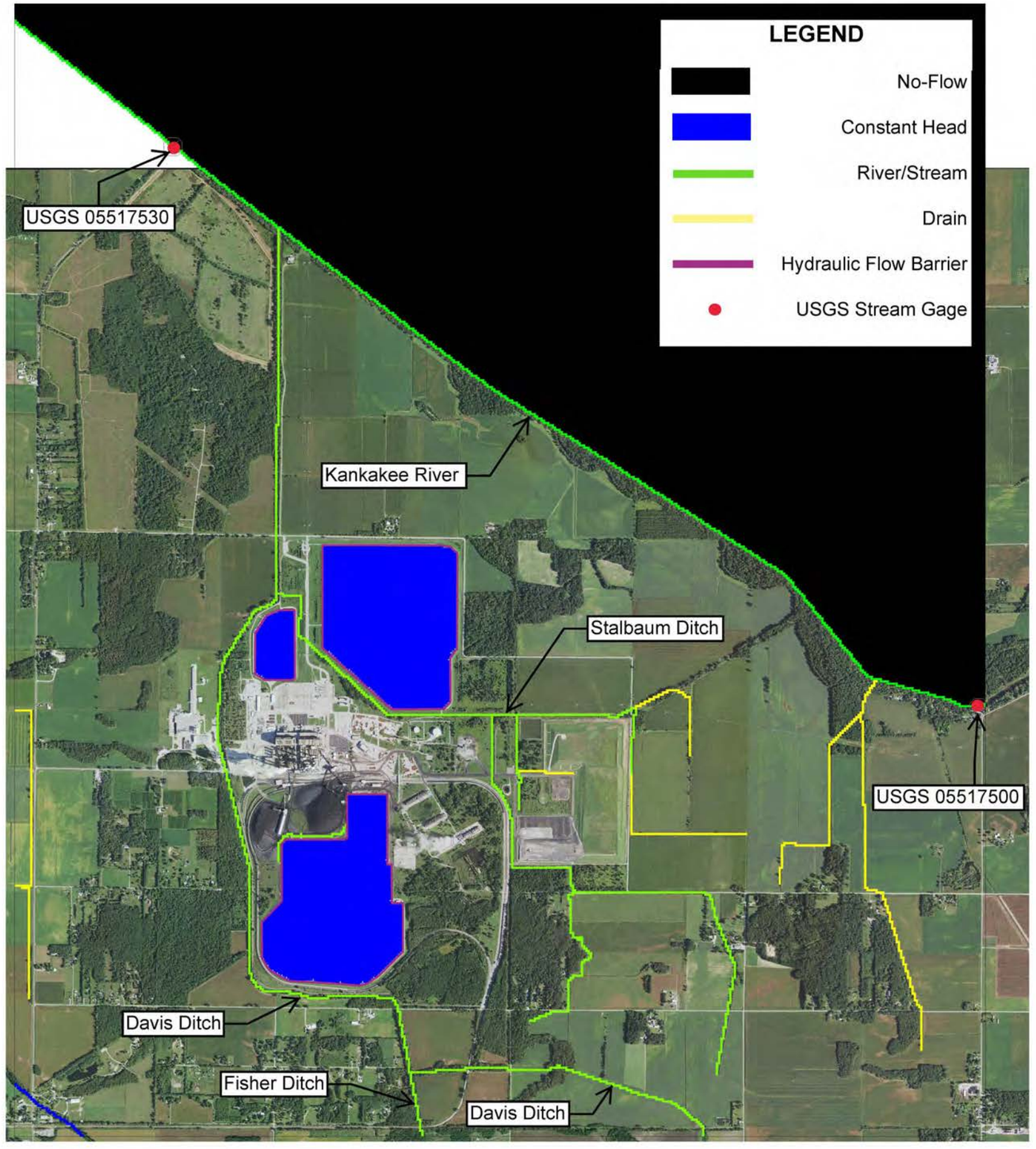
PROJECT NO.	CONTROL	REV.	ATTACHMENT
19121567	-	-	B

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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LEGEND

NOTE(S)
1. BASED ON MODEL V12_2019.

REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 WEB MERCATOR AUXILIARY SPHERE

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

GROUNDWATER FLOW MODEL TECHNICAL MEMORANDUM
MSRB, MCWB, AND DRYING AREA
NIPSCO LLC R. M. SCHAHFER GENERATING STATION

TITLE

BOUNDARY CONDITIONS

CONSULTANT

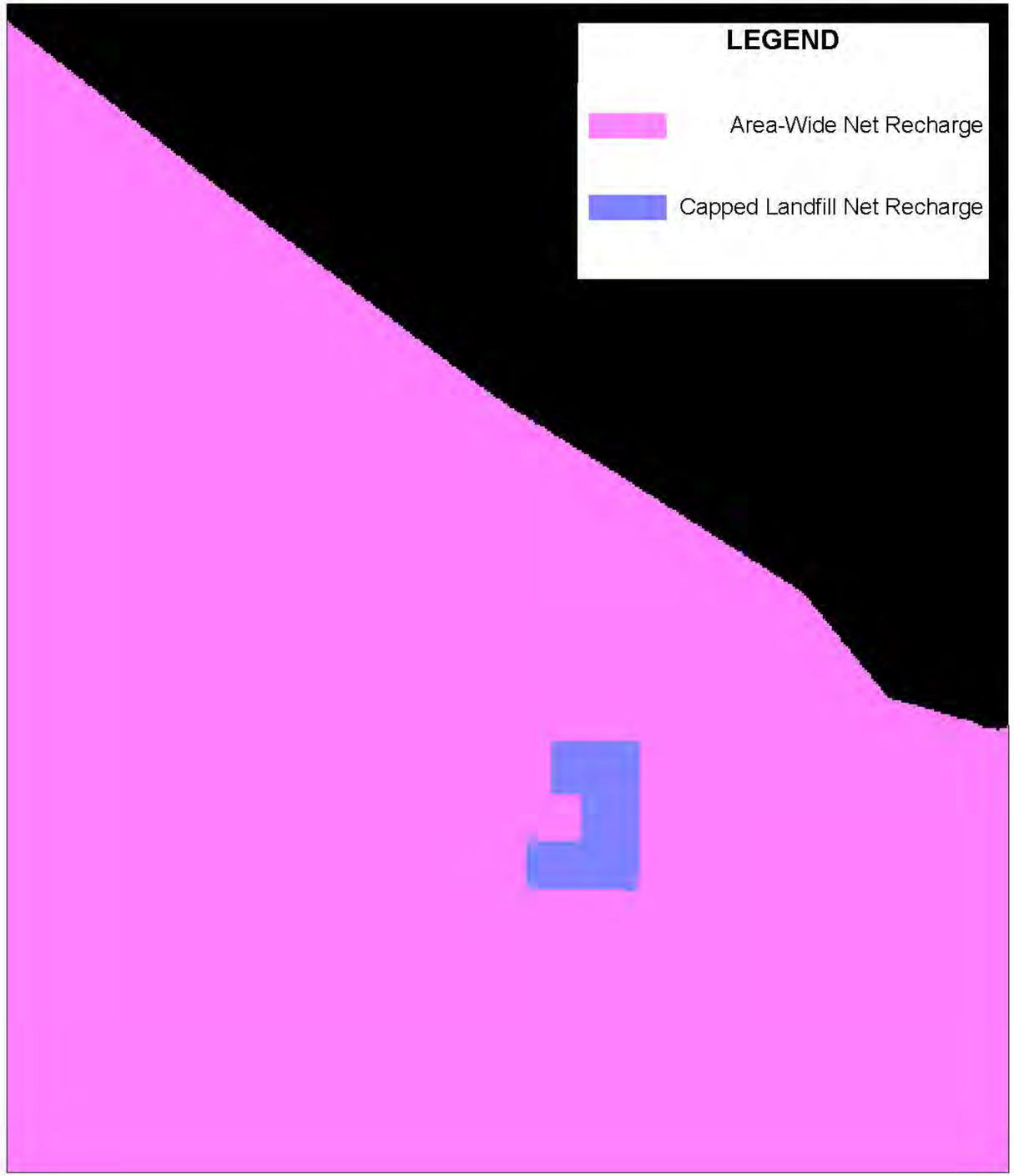
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YYYY-MM-DD	2020-10-23
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BP
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	ATTACHMENT
19121567	-	-	C

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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LEGEND

NOTE(S)
1. BASED ON MODEL V12_2019.

REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 WEB MERCATOR AUXILIARY SPHERE

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

GROUNDWATER FLOW MODEL TECHNICAL MEMORANDUM
MSRB, MCWB, AND DRYING AREA
NIPSCO LLC R. M. SCHAHFER GENERATING STATION

TITLE

PRECIPITATION RECHARGE ZONES

CONSULTANT

GOLDER

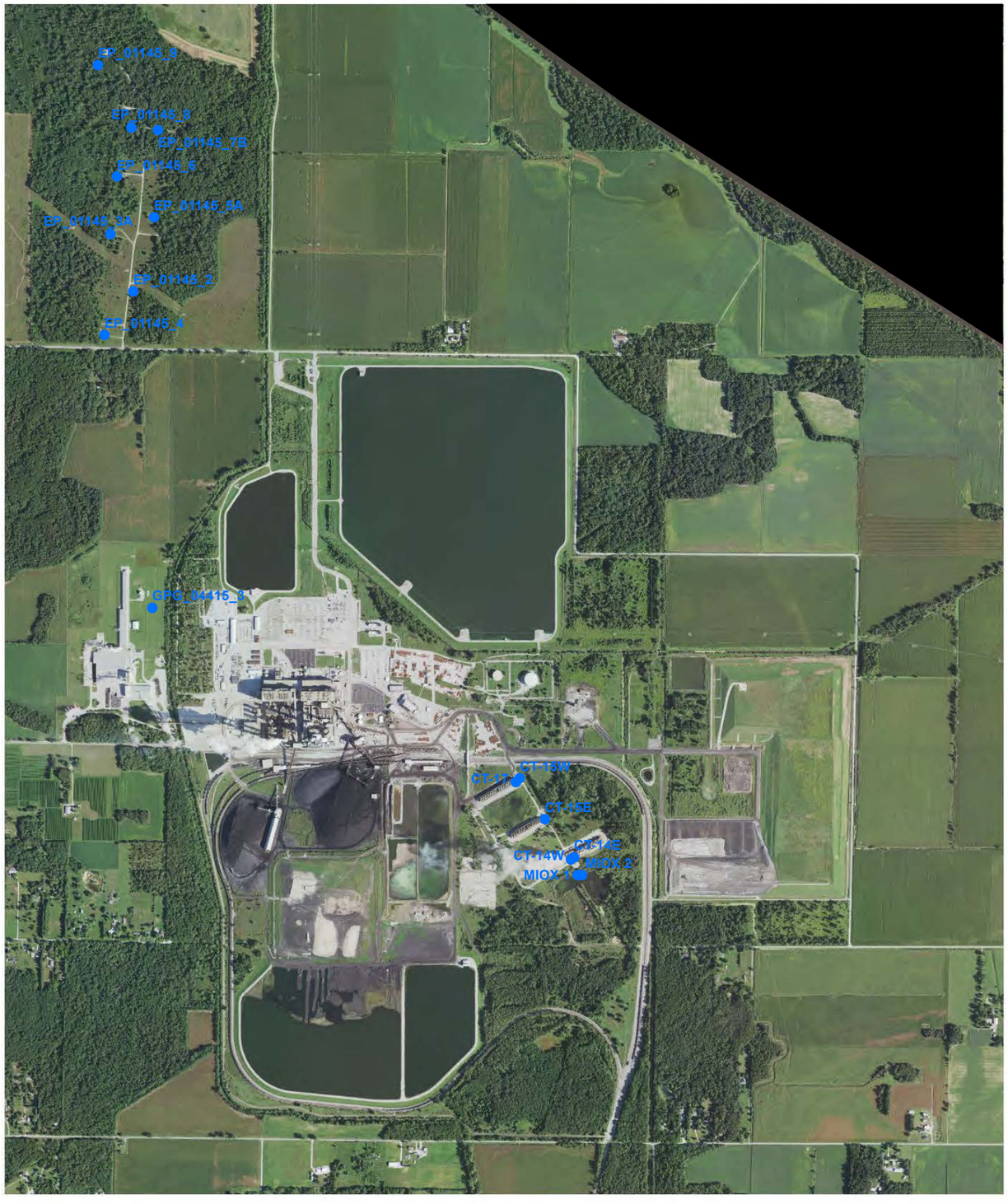
YYYY-MM-DD	2020-10-23
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BP
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	ATTACHMENT
19121567	-	-	D

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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LEGEND

- Well Location

0 840 1,680

Feet

1 " = 1,667 feet

NOTE(S)

1. BASED ON MODEL V12_2019.

REFERENCE(S)

1. COORDINATE SYSTEM: NAD 1983 STATEPLANE INDIANA WEST FIPS 1302 FEET
2. 2016 NAIP IMAGERY SOURCED FROM AGOL ONLINE FEATURE SERVICE LAYER.

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

GROUNDWATER FLOW MODEL TECHNICAL MEMORANDUM
MSRB, MCWB, AND DRYING AREA
NIPSCO LLC R. M. SCHAHFER GENERATING STATION

TITLE

ACTIVE PUMPING WELLS

CONSULTANT

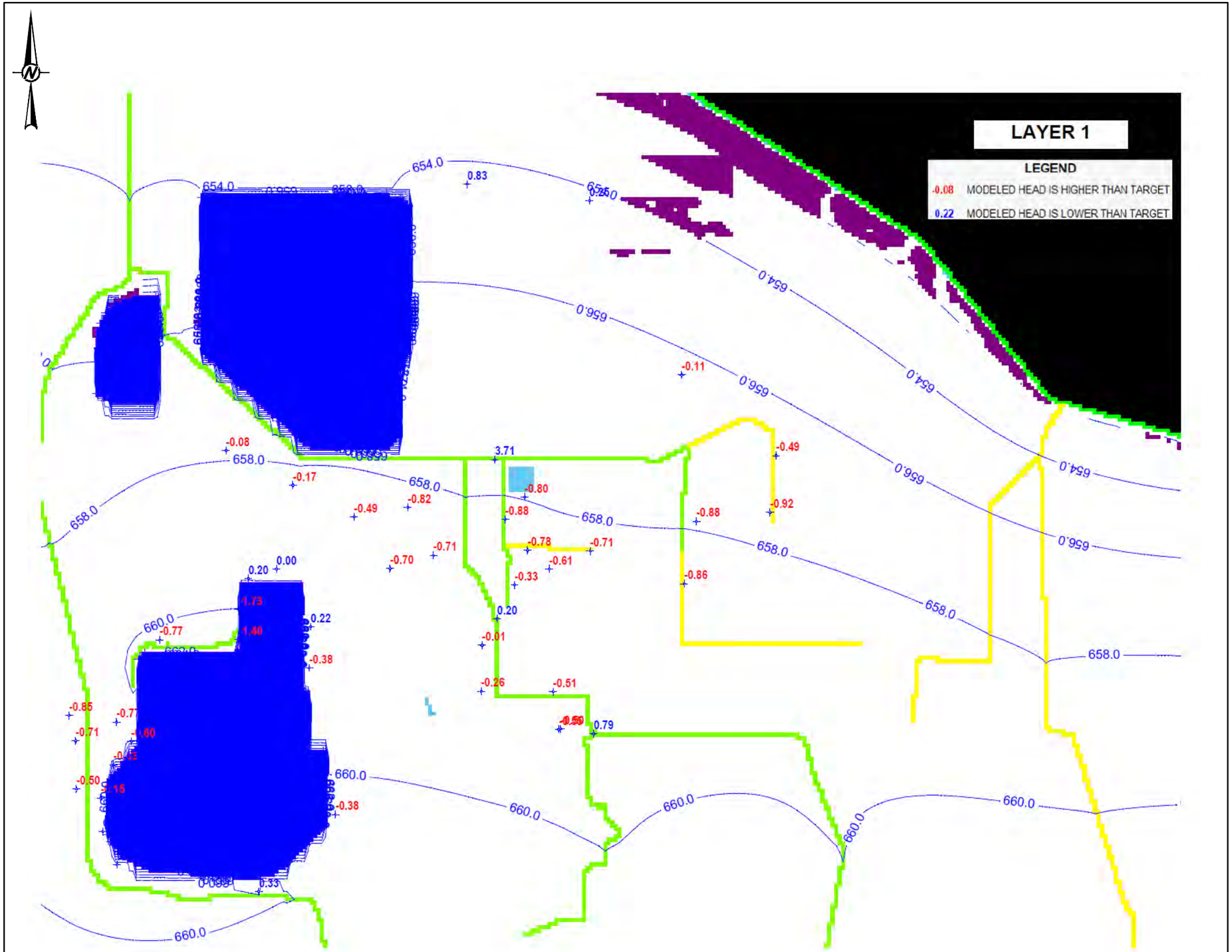
GOLDER

YYYY-MM-DD	2020-10-26
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BP
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	ATTACHMENT
19121567	-	-	E

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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LEGEND

NOTE(S)
1. BASED ON MODEL V12_2019.

REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 WEB MERCATOR AUXILIARY SPHERE

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

GROUNDWATER FLOW MODEL TECHNICAL MEMORANDUM
MSRB, MCWB, AND DRYING AREA
NIPSCO LLC R. M. SCHAHFER GENERATING STATION

TITLE

MODEL CALIBRATION - SEPTEMBER 2019

CONSULTANT

GOLDER

YYYY-MM-DD	2020-10-23
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BP
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	ATTACHMENT
19121567	-	-	F

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

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MCU C Soil Borings and Monitoring Well Logs 40 CFR Part §257.103(f)(2)(v)(C)(2)(ii)

BOREHOLE LOG: AT-01

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34.5
DEPTH TO BEDROCK: 33.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171895.266 E: 2971270.598
GROUND SURFACE ELEV.: 666.1
TOP OF CASING ELEV.: 668.6
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 6/7/2019 2:20:00 PM
END DATE/TIME: 6/7/2019 4:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	silty SAND- fine, brown to light brown, some organics			RS			0.0' to 1.7': (SM) silty SAND, fine, brown, some organics, poorly graded, non-cohesive, dry.		CETCO Grout 0-8 ft-bgs
				RS			1.6' to 2.8': (SM) silty SAND, fine, brown to light brown, poorly graded, cohesive, moist.		
	SAND- fine to coarse, light brown			RS			2.8' to 3.7': (SW) SAND, fine to medium, light brown, well-graded, non-cohesive, moist.		
			03'-5'	RS			3.7' to 4.7': (SP-SM) SAND, fine to coarse, light brown, some silt, poorly graded, non-cohesive, wet.		
660.0				RS			7.0' to 8.8': (SW) SAND, fine to medium, light brown, well-graded, non-cohesive, wet.		Bentonite Chips 8-10 ft-bgs
				RS			8.8' to 11.0': (SW) SAND, fine to coarse, light brown, well-graded, non-cohesive, wet.		4# Sand Filter Pack 10-33.5 ft-bgs
655.0	sandy SILT- fine to medium, tan		11'-12'	RS			11.0' to 12.5': (ML) sandy SILT, fine to medium, tan, poorly graded, non-cohesive, wet.		
			12.5'-13.5'	RS			12.5' to 13.5': (SW-SM) SAND, fine to medium, light brown, some silt, well-graded, non-cohesive, wet.		
	SAND- fine to coarse, brown to gray, trace gravel, trace silt			RS			13.5' to 13.8': (SW) SAND, fine to coarse, light brown, well-graded, non-cohesive, wet.		2" PVC Screen slot 0.010 13.5-33.5 ft-bgs
650.0			19'-20'	RS			17' to 20.3': (SP) SAND, fine to coarse, brown, trace fine gravel, trace silt, poorly graded, non-cohesive, wet.		
645.0			24'-25'	RS			22' to 25.25': (SP) SAND, fine to coarse, trace fine gravel, trace silt, gray and brown, poorly graded, non-cohesive, wet.		

LITHOLOGY LEGEND

USCS Silty Sand (SM)
USCS Poorly-graded Sand (SP)
USCS Well-graded Sand (SW)
Shale
USCS Sandy Silt (MLS)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: CRH
DATE: 5/6/20

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: AT-01

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34.5
DEPTH TO BEDROCK: 33.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171895.266 E: 2971270.598
GROUND SURFACE ELEV.: 666.1
TOP OF CASING ELEV.: 668.6
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 6/7/2019 2:20:00 PM
END DATE/TIME: 6/7/2019 4:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	SAND- fine to coarse, brown to gray, trace gravel, trace silt		29'-30'	RS			25.25' to 26.5': (SP) SAND, fine to coarse, gray and brown, trace fine gravel, trace silt, poorly graded, non-cohesive, wet.		
635.0	SHALE- gray			RS			33.5' to 34.5': clayey SHALE, gray, wet, soft, weathered.		#4 Sand 33.5-34.5 ft bgs
630.0									
625.0									
620.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)
USCS Poorly-graded Sand (SP)
USCS Well-graded Sand (SW)
Shale
USCS Sandy Silt (MLS)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: CRH
DATE: 5/6/20

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: AT-02

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 40
DEPTH TO BEDROCK: 38

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171314.764 E: 2971144.017
GROUND SURFACE ELEV.: 670.61
TOP OF CASING ELEV.: 672.57
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: Track-mounted mini sonic
START DATE/TIME: 11/17/2019 12:00:00 PM
END DATE/TIME: 11/18/2019 8:10:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
670.0	FILL- black/brown ash and sand			RS			0.0' to 1.0': FILL, (SP) SAND and ash, fine to coarse, black/brown, some fine to coarse angular gravel, poorly graded, non-cohesive, moist, compact.		CETCO Grout 0-14 ft-bgs
	FILL- sand, fine to medium, gray, some silt			RS			1.0' to 5.2': FILL, (SP-SM) SAND, fine to medium, gray, some silt, poorly graded, non-cohesive, moist, compact.		
665.0	SAND- fine to medium, olive brown to yellowish brown, some silt			RS			5.2' to 7.7': (SP-SM) SAND, fine to medium, olive brown to yellowish brown, some silt, poorly graded, non-cohesive, wet, compact.		
660.0	SAND- fine to medium, gray, some silt			RS			10.0' to 11.2': (SW) silty SAND, fine to medium, dark gray, poorly graded, non-cohesive, wet, compact.		Bentonite Chips 14-16 ft-bgs
				RS			11.2'-15' (SP-SM) SAND, fine to medium, gray, some silt, poorly graded, non-cohesive, wet, compact.		
655.0	SAND- fine to coarse, olive brown, some silt			RS			15'-19.4' (SP-SM) SAND, fine to medium, olive brown, some silt, poorly graded, non-cohesive, wet, compact.		#4 Sand Filter Pack 16-40 ft-bgs 6" Solid Steel Screen slot 0.020 18-38 ft-bgs
650.0				RS			20.0' to 23.2': (SP) SAND, fine to coarse, brown, poorly graded, non-cohesive, wet, loose.		
	sandy SILT- fine to medium, brown			RS			23.2' to 25.9': (ML) sandy SILT, fine to medium, brown, cohesive, wet, compact.		

LITHOLOGY LEGEND

Fill (made ground)
USCS Poorly-graded Sand (SP)
USCS Poorly-graded Sand with Silt (SP-SM)
Shale
USCS Sandy Silt (MLS)

DRILLING COMPANY: LAYNE
DRILLER: C. Stolzenbach
DRILL RIG: Track-mounted mini sonic

LOGGED BY: DFS
CHECKED BY: CRH
DATE: 5/7/20

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: AT-02

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 40
DEPTH TO BEDROCK: 38

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171314.764 E: 2971144.017
GROUND SURFACE ELEV.: 670.61
TOP OF CASING ELEV.: 672.57
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: Track-mounted mini sonic
START DATE/TIME: 11/17/2019 12:00:00 PM
END DATE/TIME: 11/18/2019 8:10:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
645.0	sandy SILT- fine to medium, brown			RS					
				RS			25.9' to 26.4': (ML) sandy silt, fine to medium, brown, some coarse sand, poorly graded, cohesive, wet, compact.		
				RS					
	SAND- fine to coarse, olive brown, some gravel, trace silt			RS			26.4' to 27.4': (ML) sandy SILT, fine to medium, brown, cohesive, wet, compact.		
							27.4' to 28.5': (SP) SAND, fine to coarse, olive brown, some fine gravel, trace silt, poorly graded, non-cohesive, wet, loose.		
640.0							30.0' to 35.5': (SP) SAND, fine to coarse, olive brown, trace silt, poorly graded, non-cohesive, wet, loose.		
				RS					
635.0							35.5' to 36.0': (SP) SAND, fine to coarse, olive brown, some fine to coarse gravel, trace silt, poorly graded, non-cohesive, wet, loose.		
				RS					
	SHALE			RS			38.0'-38.8' SHALE, clayey, gray, very hard		
				RS			38.8'-40.0' SHALE, clayey, gray, soft, loose		
630.0									
625.0									

LITHOLOGY LEGEND

Fill (made ground)
USCS Poorly-graded Sand (SP)
USCS Poorly-graded Sand with Silt (SP-SM)
Shale
USCS Sandy Silt (MLS)

DRILLING COMPANY: LAYNE
DRILLER: C. Stolzenbach
DRILL RIG: Track-mounted mini sonic

LOGGED BY: DFS
CHECKED BY: CRH
DATE: 5/7/20

Golder Associates

BOREHOLE LOG: GAMW-04

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK:

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2170737.635 E: 2968871.614
GROUND SURFACE ELEV.: 665.73
TOP OF CASING ELEV.: 669.21
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 6/27/2015
END DATE/TIME: 6/27/2015

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	brown to black fine SILTY SAND, trace gravel		1	SS		2 / 2	0-0.92': SAND, fine, poorly-graded, some organic silt in top 4 inches, light reddish-brown, plant roots, non-cohesive, wet, loose. (SP) 0.92-2': SILTY SAND, fine, poorly-graded, brown to black, trace gravel, non-cohesive, moist, loose. (SM) SPTs (2-3-4-3)		Cement and bentonite grout mix 0-1 ft-bgs Bentonite chips 1-3 ft-bgs Filter Pack #7 Sand 3-3.5 ft-bgs Filter Pack #5 Sand 3.5-15 ft-bgs 2" PVC Screen slot 0.010" 5-15 ft-bgs
660.0	gray to reddish-brown fine to medium SILTY SAND		2	SS		1.83 / 2	5-5.67': SILTY SAND, fine, poorly-graded, trace gravel, brown to black, non-cohesive, moist, loose. (SM) 5.67-6.17': SAND, fine, poorly-graded, light reddish-brown, trace silt, wet, loose. (SP) 6.17-7': SILTY SAND, fine, poorly-graded, gray to brown, non-cohesive, moist, loose. (SM) SPTs (2-3-4-5)		
655.0	gray fine SAND, trace silt		3	SS		1.58 / 2	10-12': SAND, fine, poorly-graded, gray, trace silt, wet, loose. (SP) SPTs (3-3-4-3)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: John
DRILL RIG: CME 75

LOGGED BY: AP
CHECKED BY: CEM
DATE: 7/27/15

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-06

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK:

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172320.062 E: 2969128.6
GROUND SURFACE ELEV.: 667.50
TOP OF CASING ELEV.: 670.81
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 6/29/2015
END DATE/TIME: 6/29/2015

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- BOILER SLAG and FLY ASH, gray clayey SAND		1	SS		1.92 / 2	0-1.42': BOILER SLAG and ASH, black, loose, wet, non-cohesive. (FILL) 1.42-2': CLAYEY SAND, gray, cohesive, stiff, W>PL. (FILL) SPTs (3-5-5-6)		Cement and bentonite grout mix 0-1 ft-bgs
665.0			2	SS		2 / 2	5-5.83': BOILER SLAG and ASH, black, loose, moist, non-cohesive. (FILL) 5.83-6.67': CLAYEY SAND, gray, cohesive, stiff W>PL. (FILL) 6.67-7': SAND, medium, poorly-graded, dark brown to light brown, trace silt, moist, loose. (SP) SPTs (3-4-4-6)		Bentonite chips 1-3 ft-bgs Filter Pack #7 Sand 3-4 ft-bgs Filter Pack #5 Sand 4-15 ft-bgs 2" PVC Screen slot 0.010" 5-15 ft-bgs
660.0									
	light brown medium SAND, trace silt		3	SS		2 / 2	10-11': CLAYEY SAND, dark gray, cohesive, wet, W>PL. (SC) 11-12': SAND, medium, poorly-graded, light brown, trace silt, wet, loose. (SP) SPTs (2-3-3-4)		
655.0									
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 75

LOGGED BY: HMV
CHECKED BY: CEM
DATE: 7/27/15

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-07

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK:

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172327.533 E: 2970256.339
GROUND SURFACE ELEV.: 666.60
TOP OF CASING ELEV.: 669.89
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 6/29/2015
END DATE/TIME: 6/29/2015

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	FILL- BOILER SLAG and black FLY ASH, brown medium SAND, trace gravel, trace silt		1	SS		2 / 2	0-0.83': SAND, medium, poorly-graded, dark brown, organics, trace gravel, trace silt, moist, loose. (FILL) 0.83-1.5': FLY ASH, black, non-cohesive, moist, loose. (FILL) 1.5-2': SAND, medium, poorly-graded, brown, trace silt, moist, loose. (FILL) SPTs (4-4-5-7)		Cement and bentonite grout mix 0-1 ft-bgs Bentonite chips 1-3 ft-bgs Filter Pack #7 Sand 3-4 ft-bgs Filter Pack #5 Sand 4-15 ft-bgs 2" PVC Screen slot 0.010" 5-15 ft-bgs
660.0	light brown to black fine to medium SAND, trace gravel, trace silt		2	SS		1.66 / 2	5-6.25': FLY ASH, black, trace gravel, trace silt, moist, loose. (FILL) 6.25-7': SAND, poorly-graded medium, brown, trace gravel, trace silt, loose, wet. (SP) SPTs (7-5-3-3)		
655.0			3	SS		1.42 / 2	10-11.08': SAND, fine to medium, poorly-graded, black, trace gravel, trace organics, trace silt, wet, very loose. (SP) 11.08-12': SAND, medium, poorly-graded, light brown, trace silt, wet, very loose. (SP) SPTs (5-2-2-7)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 75

LOGGED BY: HMV
CHECKED BY: CEM
DATE: 7/27/15

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-07B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 41
DEPTH TO BEDROCK: 40

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172318.589 E: 2970251.363
GROUND SURFACE ELEV.: 666.83
TOP OF CASING ELEV.: 669.37
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/25/2018 11:40:00 AM
END DATE/TIME: 7/25/2018 12:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- black BOILER SLAG and light to dark brown SILTY SAND, trace gravel			RS			0-0.8': SILTY SAND, fine, poorly-graded, light to dark brown, trace rounded gravel <1 cm, trace organics, dry. (SM)		Bentonite Grout 0-26 ft bgs
				RS					
				RS			0.8-1.4': SILTY SAND, fine, poorly-graded, dark brown, moist. (SM)		
665.0	dark brown fine SILTY SAND			RS					
	light gray fine GRAVELLY SAND, trace clay			RS			1.4-1.8': BOILER SLAG, black, moist. (FILL)		
	light gray to orange-brown fine to medium SAND			RS			1.8-2.7': SILTY SAND, fine, poorly-graded, dark brown, moist. (SM)		
				RS			2.7-3.2': GRAVELLY SAND, fine, poorly-graded, light gray, rounded gravel up to 2 inch, some clay, cohesive, wet. (SP)		
							3.2-3.4': SAND, fine to medium, well-graded, orange-brown, wet. (SW)		
660.0				RS			5-5.5': SAND, fine to medium, well-graded, orange-brown, wet. (SW)		
							5.5-7.8': SAND, fine to medium, well-graded, light gray to light brown, wet. (SW)		
							7.8-7.9': SAND, fine to medium, well-graded, orange, wet. (SW)		
				RS			7.9-9': SAND, fine to medium, well-graded, light gray to light brown, wet. (SW)		
							10-11.3': SAND, fine to medium, well-graded, light brown to light gray, wet. (SW)		
655.0	light brown to light gray fine to coarse SAND, trace to some gravel			RS			11.3-13.3': SAND, fine to coarse, well-graded, light brown to light gray, trace rounded gravel <1 cm, wet. (SW)		
							16-18': SAND, fine to coarse, well-graded, light brown to light gray, trace rounded gravel <1 cm, wet. (SW)		
650.0				RS					
							18-20': SAND, medium to coarse, well-graded, light brown, some rounded gravel <1 inch, trace fine sand, wet. (SW)		
				RS					
							20-22': SAND, medium to coarse, well-graded, light brown, some rounded gravel <1 inch, trace fine sand, wet. (SW)		
645.0				RS					
							22-25': SAND, fine to coarse, well-graded, light gray, some rounded gravel <1 inch, wet. (SW)		

LITHOLOGY LEGEND

Fill (made ground)
USCS Well-graded Sand (SW)
USCS Silty Sand (SM)
Shale
USCS Poorly-graded Gravelly Sand (SPG)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/12/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-07B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 41
DEPTH TO BEDROCK: 40

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172318.589 E: 2970251.363
GROUND SURFACE ELEV.: 666.83
TOP OF CASING ELEV.: 669.37
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/25/2018 11:40:00 AM
END DATE/TIME: 7/25/2018 12:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	light brown to light gray fine to coarse SAND, trace to some gravel			RS			25-29.2': SAND, fine to coarse, well-graded, light gray, some rounded gravel <1 inch, wet. (SW)		Bentonite Chips 26-28 ft bgs
				RS			30-32': SAND, fine to coarse, well-graded, light gray, some rounded gravel <1 inch, wet. (SW)		#5 Sand Filter Pack 28-40 ft bgs
635.0				RS			32-34': SAND, fine to coarse, well-graded, light gray, some rounded gravel 1 up to 3 inch, wet. (SW)		2" PVC Screen slot 0.010 30-40 ft bgs
			SB-07B-35'-37'	RS			35-36.3': SAND, fine to coarse, well-graded, light gray, some rounded gravel <1 inch, wet. (SW) 36.3-37': SAND, fine to coarse, well-graded, light gray, little rounded gravel 1 cm to 3 inch and <1 cm, wet. (SW)		
630.0				RS			37-37.5': SAND, fine to coarse, well-graded, light gray, little rounded gravel 1 cm to 3 inch and <1 cm, wet. (SW)		
	gray clayey SHALE			RS		1 / 1	40-41': CLAYEY SHALE, gray, weathered, wet. Less weathered from 40.5-41'.		#5 Sand 40-41 ft bgs
625.0									
620.0									

LITHOLOGY LEGEND

Fill (made ground)
USCS Well-graded Sand (SW)
USCS Silty Sand (SM)
Shale
USCS Poorly-graded Gravelly Sand (SPG)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/12/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-08

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK:

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173335.204 E: 2970799.89
GROUND SURFACE ELEV.: 666.01
TOP OF CASING ELEV.: 669.66
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 6/28/2015
END DATE/TIME: 6/28/2015

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	FILL- SANDY GRAVEL, BOILER SLAG, trace silt		1	SS		1.33 / 2	0-2': SANDY GRAVEL, poorly-graded, angular, gray-brown, lenses of black BOILER SLAG, trace silt, dry, compact. (FILL) SPTs (6-12-14-19)		Cement and bentonite grout mix 0-1 ft-bgs Bentonite chips 1-3 ft-bgs Filter Pack #7 Sand 3-4 ft-bgs Filter Pack #5 Sand 4-15 ft-bgs 2" PVC Screen slot 0.010" 5-15 ft-bgs
660.0	brown medium SAND, trace silt		2	SS		1.5 / 2	5-7': SAND, medium, poorly-graded, brown, trace silt, wet, very loose. (SP) SPTs (1-1-1-1)		
655.0			3	SS		2 / 2	10-12': SAND, medium, poorly-graded, brown to light brown, trace silt, wet, loose. (SP) SPTs (2-2-5-9)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 75

LOGGED BY: HMV
CHECKED BY: CEM
DATE: 7/27/15

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-08B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 37
DEPTH TO BEDROCK: 36

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173334.7 E: 2970790.588
GROUND SURFACE ELEV.: 665.92
TOP OF CASING ELEV.: 668.45
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/25/2018 2:35:00 PM
END DATE/TIME: 7/25/2018 3:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light brown GRAVEL			RS			0-0.25': GRAVEL, rounded <2 inch, light brown, dry. (GW)		Bentonite Grout 0-22 ft bgs
	light gray fine to coarse GRAVELLY SAND			RS					
665.0				RS			0.25-0.8': GRAVELLY SAND, fine to coarse, well-graded, light gray, rounded gravel up to <2 inch, dry. (SW)		
	dark brown fine SILTY SAND, some gravel								
	brown fine to medium CLAYEY SAND, some gravel			RS			0.8-1.5': SILTY SAND, fine, poorly-graded, dark brown, some rounded gravel <1 inch, moist. (SM)		
	brown fine to medium SAND			RS			1.5-3': CLAYEY SAND, fine to medium, well-graded, brown, some rounded gravel <1 inch, cohesive, dry. (SC)		
							3-5': SAND, fine to medium, well-graded, brown, moist. (SW)		
	light gray fine to medium SAND, some silt						5-7': SAND, fine to medium, well-graded, light gray, some silt, somewhat cohesive, wet. (SW)		
660.0				RS					
	light gray to light brown fine to coarse SAND, trace to some gravel								
655.0									
650.0							16-17.5': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
				RS					
				RS			17.5-19': SAND, fine to coarse, well-graded, light gray to light brown, trace rounded gravel <1 cm, wet. (SW)		
							20-24': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
645.0									
				RS					Bentonite Chips 22-24 ft bgs
				RS			24-28': SAND, fine to coarse, well-graded, light gray, wet. (SW)		#5 Sand Filter Pack 24-36 ft bgs

LITHOLOGY LEGEND

USCS Well-graded Gravel (GW)
USCS Clayey Sand (SC)
USCS Well-graded Gravelly Sand (SWG)
USCS Well-graded Sand (SW)
USCS Silty Sand (SM)
USCS Poorly-graded Gravelly Sand (SPG)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/12/18

Golder Associates

BOREHOLE LOG: GAMW-08B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 37
DEPTH TO BEDROCK: 36

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173334.7 E: 2970790.588
GROUND SURFACE ELEV.: 665.92
TOP OF CASING ELEV.: 668.45
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/25/2018 2:35:00 PM
END DATE/TIME: 7/25/2018 3:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	light gray to light brown fine to coarse SAND, trace to some gravel			RS					2" PVC Screen slot 0.010 26-36 ft bgs
				RS			28-30': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
635.0			SB-08B-30-32	RS			30-31.25': SAND, fine to coarse, well-graded, light gray, wet. (SW) 31.25-32': SAND, medium to coarse, well-graded, light gray, some rounded gravel <1 inch, wet. (SW)		
	light gray coarse SAND and GRAVEL			RS			32-34': SAND and rounded GRAVEL <1 cm, coarse, poorly-graded, light gray, wet. (SP)		
630.0	gray clayey SHALE			RS		2 / 1	36-37': CLAYEY SHALE, gray, wet.		#5 Sand 36-37 ft bgs
625.0									
620.0									

LITHOLOGY LEGEND

USCS Well-graded Gravel (GW)
USCS Clayey Sand (SC)
USCS Well-graded Gravelly Sand (SWG)
USCS Well-graded Sand (SW)
USCS Silty Sand (SM)
USCS Poorly-graded Gravelly Sand (SPG)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/12/18

Golder Associates

BOREHOLE LOG: GAMW-09

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK:

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172509.361 E: 2971291.294
GROUND SURFACE ELEV.: 665.18
TOP OF CASING ELEV.: 668.99
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 6/28/2015
END DATE/TIME: 6/28/2015

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	light brown to black medium SAND, trace silt		1	SS		1.75 / 2	0-1': SAND, medium, poorly-graded, black, organics, trace silt, moist, very loose. (SP) 1-2': SAND, medium, poorly-graded, light brown, trace silt, moist, very loose. (SP) SPTs (2-1-1-2)		Cement and bentonite grout mix 0-1 ft-bgs Bentonite chips 1-3 ft-bgs Filter Pack #7 Sand 3-4 ft-bgs Filter Pack #5 Sand 4-15 ft-bgs 2" PVC Screen slot 0.010" 5-15 ft-bgs
660.0			2	SS		1.5 / 2	5-6': SAND, medium, poorly-graded, brown, trace silt, moist, compact. (SP) 6-7': SAND, medium, poorly-graded, light brown, trace silt, moist, compact. (SP) SPTs (4-5-5-6)		
655.0			3	SS		1.92 / 2	10-10.58': SAND, medium, poorly-graded, brown, trace silt, wet, compact. (SP) 10.58-12': SAND, fine, poorly-graded, light brown, trace silt, wet, compact. (SP) SPTs (1-2-2-5)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: John
DRILL RIG: CME 75

LOGGED BY: HMV
CHECKED BY: CEM
DATE: 7/27/15

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-09B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34.5
DEPTH TO BEDROCK: 34.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172502.567 E: 2971291.67
GROUND SURFACE ELEV.: 665.35
TOP OF CASING ELEV.: 668.29
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/24/2016 1:10:00 PM
END DATE/TIME: 5/24/2016 3:09:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	brown fine SAND, occasional organics, trace silt		1	SS		1.9 / 2	0-1': SAND, organics, fine, poorly-graded; dark brown; trace silt, loose. (SP) 1-2': SAND, fine, poorly-graded; light brown; trace silt, dry, loose. (SP) SPTs (2-2-3-4)		Bentonite grout mix 0-20.5 ft-bgs
660.0			2	SS		1.3 / 2	5-7': SAND, fine, poorly-graded; light brown; trace organics, trace silt, dry, compact. (SP) SPTs (5-6-7-7)		
655.0			3	SS		1.2 / 2	10-12': SAND, 2" thick clayey lens, fine, poorly-graded; light brown; trace silt, dry, compact. (SP) SPTs (6-8-8-7)		
650.0			4	SS		1.9 / 2	15-17': SAND, fine, poorly-graded; light brown; trace silt, wet, loose. (SP) SPTs (2-4-3-5)		
645.0	red brown tan GRAVEL, trace silt light brown fine SAND, trace gravel, trace silt		5	SS		1.5 / 2	20-20.9': GRAVEL, rounded, well-graded; red brown tan; trace silt, wet, loose. (GW) 20.9-22': SAND, fine, poorly-graded; light brown; trace silt, wet, loose. (SP) SPTs (3-5-4-6)		Bentonite chips 20.5-22.5 ft-bgs Filter Pack #5 Sand 22.5-34.5 ft-bgs 2 PVC Screen slot

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Gravel (GW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-09B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34.5
DEPTH TO BEDROCK: 34.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172502.567 E: 2971291.67
GROUND SURFACE ELEV.: 665.35
TOP OF CASING ELEV.: 668.29
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/24/2016 1:10:00 PM
END DATE/TIME: 5/24/2016 3:09:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	light brown fine SAND, trace gravel, trace silt		6	SS		1.5 / 2	25-27': SAND, fine, poorly-graded; light brown; trace gravel, trace silt, wet, compact. (SP) SPTs (5-6-6-7)		0.010 24.5-34.5 ft-bgs
635.0			7	SS		1.1 / 2	30-32': SAND, fine, poorly-graded; light brown; trace gravel, trace silt, wet, loose. (SP) 34.5': auger refusal in SHALE; dark grey to black. SPTs (3-3-5-4)		
	SHALE								
630.0									
625.0									
620.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Gravel (GW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-15

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 37

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172753.762 E: 2970258.353
GROUND SURFACE ELEV.: 665.01
TOP OF CASING ELEV.: 668.25
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 5/25/2016 8:37:00 AM
END DATE/TIME: 5/25/2016 9:20:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	FILL- black FLY ASH, grey SAND, some boiler slag, some fine to coarse gravel, trace silt		1	SS		1.8 / 2	0-1.4': FLY ASH, some boiler slag, poorly-graded; black; trace medium angular gravel, trace silt, moist, compact. (FILL) 1.4-2': FLY ASH, some fine to coarse angular gravel, poorly-graded; black; trace silt, moist, compact. (FILL) SPTs (3-9-12-13)		Bentonite grout mix 0-1 ft-bgs Bentonite chips 1-3 ft-bgs Filter Pack #5 Sand 3-15 ft-bgs 2 PVC Screen slot 0.010 5-15 ft-bgs
660.0			2	SS		2 / 2	5-5.8': FLY ASH, some slag, poorly-graded; black; trace fine rounded gravel, trace silt, moist, loose. (FILL) 5.8-7': SAND; fine, poorly-graded, light grey; trace silt, moist, loose. (FILL) SPTs (1-3-4-4)		
655.0			3	SS		1.8 / 2	10-10.2': FLY ASH; black; trace silt, wet, loose. (FILL) 10.2-10.8': SAND, little coarse rounded gravel, poorly-graded; grey; trace silt, wet, loose. (FILL) 10.8-12': SAND, little fine rounded gravel, poorly-graded; light grey; trace silt, wet, loose. (FILL) SPTs (1-1-4-4)		
650.0									
645.0									

LITHOLOGY LEGEND

Fill (made ground)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 75

LOGGED BY: DSD
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-15B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 37.7
DEPTH TO BEDROCK: 37

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172749.68 E: 2970258.917
GROUND SURFACE ELEV.: 665.14
TOP OF CASING ELEV.: 668.05
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 5/24/2016 11:15:00 AM
END DATE/TIME: 5/24/2016 4:00:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	FILL- black FLY ASH, grey SAND, some boiler slag, some fine to coarse gravel, trace silt		1	SS		1.8 / 2	0-1.4': FLY ASH, some boiler slag, poorly-graded; black; trace medium angular gravel, trace silt, moist, compact. (FILL) 1.4-2': FLY ASH, some fine to coarse angular gravel, poorly-graded; black; trace silt, moist, compact. (FILL) SPTs (3-9-12-13)		Bentonite grout mix 0-23.7 ft-bgs
660.0			2	SS		2 / 2	5-5.8': FLY ASH, some slag, poorly-graded; black; trace fine rounded gravel, trace silt, moist, loose. (FILL) 5.8-7': SAND; fine, poorly-graded, light grey; trace silt, moist, loose. (FILL) SPTs (1-3-4-4)		
655.0			3	SS		1.8 / 2	10-10.2': FLY ASH; black; trace silt, wet, loose. (FILL) 10.2-10.8': SAND, little coarse rounded gravel, poorly-graded; grey; trace silt, wet, loose. (FILL) 10.8-12': SAND, little fine rounded gravel, poorly-graded; light grey; trace silt, wet, loose. (FILL) SPTs (1-1-4-4)		
650.0			4	SS		1.6 / 2	15-16.2': SAND, some fine angular gravel, some boiler slag, poorly-graded; grey; trace silt, wet, loose. (FILL) 16.2-17': SAND, some fine subrounded gravel, poorly-graded; light tan; trace silt, wet, loose. (FILL) SPTs (1-3-6-8)		
645.0			5	SS		0.3 / 2	20-22': GRAVEL and BOILER SLAG, some sand, fine, subrounded and angular, poorly-graded; light grey; trace silt, wet, compact. (FILL) SPTs (1-6-12-15)		Bentonite chips 23.7-25.7 ft-bgs

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Poorly-graded Sand (SP)
USCS Low Plasticity Clay (CL)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 75

LOGGED BY: DSD
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-15B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 37.7
DEPTH TO BEDROCK: 37

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172749.68 E: 2970258.917
GROUND SURFACE ELEV.: 665.14
TOP OF CASING ELEV.: 668.05
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 5/24/2016 11:15:00 AM
END DATE/TIME: 5/24/2016 4:00:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	light grey fine to medium SAND, some gravel, trace silt		6	SS		1.1 / 2	25-26.5': SAND, fine, poorly-grade; light grey; trace silt, wet, loose. (SP) 26.5-27': SAND, some fine angular gravel, medium, poorly-graded; light grey; trace silt, wet, loose. (SP) SPTs (1-3-4-7)		Filter Pack #5 Sand 25.7-37.7 ft-bgs
635.0			7	SS		2 / 2	30-31.25': SAND, fine to medium, poorly-graded; light grey; trace silt, wet, loose. (SP) 31.25-31.4': SAND and GRAVEL, fine, subrounded, well-graded; light grey; trace silt, wet, dense. (SW) 31.4-32': SAND, some silt, fine, poorly-graded; light grey; non-cohesive, wet, dense. (SP) SPTs (4-12-23-27)		2 PVC Screen slot 0.010 27.7-37.7 ft-bgs
630.0			8	SS		1.3 / 2	35-36.6': SAND, fine to medium, poorly-graded; light grey; trace silt, wet, compact. (SP) 36.6-36.9': SAND, fine subrounded gravel, poorly-graded; light grey; trace silt, wet, compact. (SP)		
	light grey CLAY, some fine rounded gravel grey SHALE		9	SS		0.7 / 0.7	36.9-37': CLAY, some fine rounded gravel, poorly-graded; light grey; cohesive, wet, very stiff. (CL) SPTs (3-11-12-22) 37-37.7': SHALE; grey; cohesive, moist, dense. SPTs (30-50/2)		
625.0									
620.0									

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Poorly-graded Sand (SP)
USCS Low Plasticity Clay (CL)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 75

LOGGED BY: DSD
CHECKED BY: JMR
DATE: 3/22/17

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NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-16R

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 20
DEPTH TO BEDROCK:

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173189.507 E: 2970396.681
GROUND SURFACE ELEV.: 664.35
TOP OF CASING ELEV.: 667.17
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: Geoprobe 7822 DT
START DATE/TIME: 9/23/2020 7:35:00 AM
END DATE/TIME: 9/23/2020 8:58:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL - sand backfill						0-10' Augered without sampling (sand backfill)		Cement-bentonite Grout 0-5 ft-bgs
660.0									1/4" Coated Bentonite Pellets 5-7 ft-bgs
									#5 Sand Filter Pack 7-20 ft-bgs
655.0	fine brown SAND, some medium, trace gravel, trace silt		1	SS		0.6 / 2	10-10.6': (SP) fine SAND, poorly graded, trace gravel, sub-angular to sub-rounded, trace silt, non cohesive, wet, very loose SPTs (WR-WR-WR-WR)		2 PVC Screen slot 0.010 10-20 ft-bgs
			2	SS		1.7 / 2	12-13.7': (SP) medium SAND, poorly graded, sub angular to sub rounded, non cohesive, wet, very loose SPTs (1-1-2-2)		
650.0			3	SS		1 / 2	14-15': (SP) fine to medium SAND, poorly graded, sub angular to sub rounded, trace gravel, trace silt, dark gray staining, non cohesive, wet, very loose SPTs (1-1-2-3)		
			4	SS		0.9 / 2	16-16.9': (SP) fine SAND, poorly graded, sub angular, trace gravel, trace silt, non cohesive, wet, very loose to loose SPTs (2-4-4-5)		
645.0			5	SS		1.2 / 2	18-19.2': (SP) fine to medium SAND, poorly graded, sub angular, trace silt, orange staining, non cohesive, wet, loose SPTs (4-5-5-6)		
640.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Strata Earth Services, LLC
DRILLER: Scott Komen
DRILL RIG: Geoprobe 7822 DT

LOGGED BY: KB
CHECKED BY: KJ
DATE: 10/19/20

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NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-16BR

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 150
DEPTH TO BEDROCK: 37

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173189.526 E: 2970399.45
GROUND SURFACE ELEV.: 664.39
TOP OF CASING ELEV.: 667.32
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: Geoprobe 7822 DT
START DATE/TIME: 9/23/2020 11:40:00 AM
END DATE/TIME: 9/23/2020 4:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL - sand backfill						0-10' Augered without sampling (sand backfill)		Cement-bentonite Grout 0-25 ft bgs
660.0				SS					
655.0	fine brown SAND, some medium, trace gravel, trace silt		1	SS		0.6 / 2	10-10.6': (SP) fine SAND, poorly graded, trace gravel, sub-angular to sub-rounded, trace silt, non cohesive, wet, very loose SPTs (WR-WR-WR-WR)		
			2	SS		1.7 / 2	12-13.7': (SP) medium SAND, poorly graded, sub angular to sub rounded, non cohesive, wet, very loose SPTs (1-1-2-2)		
650.0			3	SS		1 / 2	14-15': (SP) fine to medium SAND, poorly graded, sub angular to sub rounded, trace gravel, trace silt, dark gray staining, non cohesive, wet, very loose SPTs (1-1-2-3)		
			4	SS		0.9 / 2	16-16.9': (SP) fine SAND, poorly graded, sub angular, trace gravel, trace silt, non cohesive, wet, very loose to loose SPTs (2-4-4-5)		
645.0			5	SS		1.2 / 2	18-19.2': (SP) fine to medium SAND, poorly graded, sub angular, trace silt, orange staining, non cohesive, wet, loose SPTs (4-5-5-6)		
			5	SS		1.4 / 2	20-21.3': (SP) SAND, fine to medium, poorly-graded; brown; trace silt, wet, compact 21.3-22': (SW) SAND, some fine rounded gravel, fine to medium, well-graded; dark brown; trace silt, wet, compact SPTs (4-7-9-12)		
	brown fine to coarse SAND, some gravel, trace silt								
640.0									

LITHOLOGY LEGEND

Fill (made ground)
USCS Low Plasticity Clay (CL)
USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Strata Earth Services, LLC
DRILLER: Scott Komen
DRILL RIG: Geoprobe 7822 DT

LOGGED BY: KB
CHECKED BY: KJ
DATE: 10/19/20

Golder Associates

BOREHOLE LOG: GAMW-16BR

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 150
DEPTH TO BEDROCK: 37

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173189.526 E: 2970399.45
GROUND SURFACE ELEV.: 664.39
TOP OF CASING ELEV.: 667.32
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: Geoprobe 7822 DT
START DATE/TIME: 9/23/2020 11:40:00 AM
END DATE/TIME: 9/23/2020 4:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown fine to coarse SAND, some gravel, trace silt		6	SS		0 / 2	25-27': No recovery SPTs (4-7-10-14)		1/4" Coated Bentonite Pellets 25-28 ft-bgs
635.0			7	SS		1.3 / 2	30-31.6': (SW) SAND, fine to medium, well-graded; brown; trace silt, wet, compact 31.6-32': (SP) SAND, little small subrounded gravel, fine to medium, poorly-graded; grey; trace silt, wet, compact SPTs (1-3-10-12)		#5 Sand Filter Pack 28-40 ft-bgs 2 PVC Screen slot 0.010 30-40 ft-bgs
	grey to brown medium to coarse SAND, little gravel, trace silt								
630.0			8	SS		2 / 2	34-34.6': (SP) SAND, fine, poorly-graded; brown; trace silt, wet, dense 34.6-35': (SP) SAND, some fine rounded gravel, medium, poorly-graded; dark grey; trace silt, wet, dense		
	grey CLAY		9	SS		0.3 / 2	35-36': CLAY; grey; cohesive, dry, hard. (CL) SPTs (12-15-22-7)		
	weathered gray clayey SHALE						37-37.3': weathered gray clayey SHALE		
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

Fill (made ground)
USCS Low Plasticity Clay (CL)
USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Strata Earth Services, LLC
DRILLER: Scott Komen
DRILL RIG: Geoprobe 7822 DT

LOGGED BY: KB
CHECKED BY: KJ
DATE: 10/19/20

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-17

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 38

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173164.442 E: 2970944.074
GROUND SURFACE ELEV.: 668.81
TOP OF CASING ELEV.: 671.93
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/25/2016
END DATE/TIME: 5/25/2016

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- SAND, GRAVEL, ORGANICS, trace fly ash/ boiler slag, trace silt		1	SS		1.6 / 2	0-1.1': SAND, organics, fine, poorly-graded; light brown; trace silt, dry, loose. (FILL) 1.1-2': SAND, fine, poorly-graded; light brown; trace fly ash, trace silt moist, loose. (FILL) SPTs (1-3-2-2)		Bentonite grout mix 0-1 ft-bgs Bentonite chips 1-3 ft-bgs
665.0			2	SS		0.9 / 2	5-6.6': SAND, fine, poorly-graded; light brown; trace silt, moist, loose. (FILL) 6.6-6.7': GRAVEL, fly ash/ boiler slag, angular, medium, well-graded; trace silt, loose. (FILL) 6.7-7': SAND, fine, poorly-graded; light brown; trace fly ash/ boiler slag, trace silt, moist, loose. (FILL) SPTs (3-7-3-5)		Filter Pack #5 Sand 3-15 ft-bgs 2 PVC Screen slot 0.010 5-15 ft-bgs
660.0	dark brown to grey fine SAND, trace iron oxides, trace organics, trace silt		3	SS		1.6 / 2	10-11.1': SAND, fine, well-graded; light brown to brown; trace organics, trace fly ash/boiler slag, trace silt, wet, loose. (FILL) 11.1-12': SAND, fine, poorly-graded; dark brown to grey; trace iron oxides, trace silt, wet, loose. (SP) SPTs (3-5-1-2)		
655.0									
650.0									
645.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

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BOREHOLE LOG: GAMW-17B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 38
DEPTH TO BEDROCK: 38

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173164.838 E: 2970947.442
GROUND SURFACE ELEV.: 668.86
TOP OF CASING ELEV.: 670.60
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/25/2016 8:23:00 AM
END DATE/TIME: 5/25/2016 9:13:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- SAND, GRAVEL, ORGANICS, trace fly ash/ boiler slag, trace silt		1	SS		1.6 / 2	0-1.1': SAND, organics, fine, poorly-graded; light brown; trace silt, dry, loose. (FILL) 1.1-2': SAND, fine, poorly-graded; light brown; trace fly ash, trace silt moist, loose. (FILL) SPTs (1-3-2-2)		Bentonite grout mix 0-24 ft-bgs
665.0			2	SS		0.9 / 2	5-6.6': SAND, fine, poorly-graded; light brown; trace silt, moist, loose. (FILL) 6.6-6.7': GRAVEL, fly ash/ boiler slag, angular, medium, well-graded; trace silt, loose. (FILL) 6.7-7': SAND, fine, poorly-graded; light brown; trace fly ash/ boiler slag, trace silt, moist, loose. (FILL) SPTs (3-7-3-5)		
660.0	dark brown to grey fine SAND, trace iron oxides, trace organics, trace silt		3	SS		1.6 / 2	10-11.1': SAND, fine, well-graded; light brown to brown; trace organics, trace fly ash/boiler slag, trace silt, wet, loose. (FILL) 11.1-12': SAND, fine, poorly-graded; dark brown to grey; trace iron oxides, trace silt, wet, loose. (SP) SPTs (3-5-1-2)		
655.0			4	SS		1.8 / 2	15-17': SAND, fine, poorly-graded; dark brown to grey; trace organics, trace silt, wet, very loose. (SP) SPTs (1-2-2-3)		
650.0	dark brown fine to medium SAND, trace silt		5	SS		1 / 2	20-22': SAND, fine to medium, well-graded; dark brown; trace silt, wet, loose. (SW) SPTs (2-4-4-6)		
645.0									Bentonite chips 24-26 ft-bgs

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Poorly-graded Sand (SP)
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-17B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 38
DEPTH TO BEDROCK: 38

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173164.838 E: 2970947.442
GROUND SURFACE ELEV.: 668.86
TOP OF CASING ELEV.: 670.60
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/25/2016 8:23:00 AM
END DATE/TIME: 5/25/2016 9:13:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown fine to medium SAND, trace silt		6	SS		1.6 / 2	25-27': SAND, fine to medium, well-graded; dark brown; trace silt, wet, very loose. (SW) SPTs (1-1-2-2)		Filter Pack #5 Sand 26-38 ft-bgs
640.0			7	SS		1.3 / 2	30-32': SAND, fine to medium, well-graded; dark brown; trace silt, wet, loose. (SW) 38': auger refusal in SHALE; dark grey to black. SPTs (3-4-4-5)		2 PVC Screen slot 0.010 28-38 ft-bgs
635.0									
	SHALE								
630.0									
625.0									
620.0									

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Poorly-graded Sand (SP)
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-18

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK:

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171919.782 E: 2971272.405
GROUND SURFACE ELEV.: 666.04
TOP OF CASING ELEV.: 669.07
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/24/2016 11:12:00 AM
END DATE/TIME: 5/24/2016 11:28:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	FILL- dark brown SAND, trace fly ash/ boiler slag, trace organics, trace silt		1	SS		2 / 2	0-2': SAND, fine to medium; poorly-graded; dark brown; trace fly ash/boiler slag, trace organics, trace silt, moist, loose. (FILL) SPTs (3-3-3-3)		Bentonite grout mix 0-1 ft-bgs Bentonite chips 1-3 ft-bgs Filter Pack #5 Sand 3-15 ft-bgs 2 PVC Screen slot 0.010 5-15 ft-bgs
660.0	brown fine SAND, trace silt		2	SS		2 / 2	5-6.1': SAND, fine to medium, poorly-graded; dark brown; trace fly ash/ boiler slag, trace organics, trace silt, moist, loose. (FILL) 6.1-7': SAND; fine, poorly-graded; brown; trace silt, moist, loose. (SP) SPTs (2-4-5-6)		
655.0			3	SS		1.3 / 2	10-12': SAND; fine, poorly-graded; brown; trace silt, wet, loose. (SP) SPTs (2-4-4-7)		
650.0									
645.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-18B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171910.003 E: 2971272.53
GROUND SURFACE ELEV.: 665.94
TOP OF CASING ELEV.: 668.45
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/26/2018 9:35:00 AM
END DATE/TIME: 7/26/2018 10:35:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	dark brown SILTY SAND, some organics			RS			0-1.7': SILTY SAND, well-graded, dark brown, some organics, dry. (SM)		Bentonite Grout 0-21 ft bgs
	orange to dark brown fine SAND, some silt			RS			1.7-2.3': SAND, fine, poorly-graded, orange to dark brown, some silt, moist. (SP)		
	light brown fine to medium SAND			RS			2.3-4.2': SAND, fine to medium, well-graded, light brown, moist. (SW)		
660.0				RS			5-7.4': SAND, fine to medium, well-graded, light brown, wet. (SW)		
	light brown fine CLAYEY SAND			RS			7.4-8.75': CLAYEY SAND, fine, poorly-graded, light brown, cohesive, wet. (SC)		
655.0				RS			10-13': CLAYEY SAND, fine, poorly-graded, light brown, cohesive, wet. (SC)		
	light brown to light gray fine to coarse SAND, trace to some gravel			RS			13-13.7': SAND, fine to coarse, well-graded, light brown, wet. (SW)		
				RS			13.7-14.8': SAND, medium to coarse, well-graded, light brown, some rounded gravel <1 inch, some fine sand, wet. (SW)		
650.0				RS			16-20': SAND, fine to coarse, well-graded, light brown, some rounded gravel <1 inch, wet. (SW)		
645.0				RS			20-23.7': SAND, medium to coarse, well-graded, light brown, some rounded gravel <1 inch, little fine sand, wet. (SW)		Bentonite Chips 21-23 ft bgs #5 Sand Filter Pack 23-35 ft bgs
				RS					

LITHOLOGY LEGEND

USCS Silty Sand (SM)
USCS Clayey Sand (SC)
USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/12/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-18B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171910.003 E: 2971272.53
GROUND SURFACE ELEV.: 665.94
TOP OF CASING ELEV.: 668.45
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/26/2018 9:35:00 AM
END DATE/TIME: 7/26/2018 10:35:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	light brown to light gray fine to coarse SAND, trace to some gravel			RS			24-24.9': SAND, medium to coarse, well-graded, light brown, some rounded gravel <1 inch, some fine sand, wet. (SW)		2" PVC Screen slot 0.010 25-35 ft bgs
				RS			24.9-25.3': SAND, medium to coarse, well-graded, light gray, some rounded gravel <1 inch, trace fine sand, wet. (SW)		
							25.3-28': SAND, fine to coarse, well-graded, light gray, trace rounded gravel, wet. (SW)		
635.0				RS			28-32': SAND, fine to coarse, well-graded, light gray, trace rounded gravel, wet. (SW)		
			SB-18B-32'-34'	RS			32-33.75': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
	light gray SHALE			RS		2 / 1	35-35.5': SHALE, light gray, wet, little weathering.		#5 Sand 35-36 ft bgs
630.0	light gray clayey SHALE						35.5-36': CLAYEY SHALE, light gray, wet, little weathering.		
625.0									
620.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)
USCS Clayey Sand (SC)
USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/12/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-46

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2178839.026 E: 2973531.388
GROUND SURFACE ELEV.: 661.99
TOP OF CASING ELEV.: 664.78
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/15/2018 4:00:00 PM
END DATE/TIME: 5/15/2018 4:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown fine SAND, some silt								
	light brown fine CLAYEY SAND		1	SS		1.7 / 2	0-0.3': SAND, fine, poorly-graded, dark brown, some silt, moist, loose. (SP) 0.3-1': CLAYEY SAND, fine, poorly-graded, light brown, moist, loose. (SC) 1-1.7': SAND, fine, poorly-graded, orange, moist, loose. (SP) SPTs (2-2-3-4)		Bentonite Chips 0-3 ft bgs
	light brown to orange fine to medium SAND								
660.0			2	SS		1.8 / 2	5-6.8': SAND, fine to medium, well-graded, light brown to orange, moist, loose. (SW) SPTs (2-2-3-4)		#5 Sand Filter Pack 3-15 ft bgs 2" PVC Screen slot 0.010 5-15 ft bgs
655.0									
	light brown to light gray fine to coarse SAND, trace rounded gravel		3	SS		1.4 / 2	10-11.4': SAND, fine to coarse, well-graded, light brown, wet, compact. (SW) SPTs (4-5-7-8)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Clayey Sand (SC) | USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-46B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2178838.974 E: 2973532.878
GROUND SURFACE ELEV.: 661.98
TOP OF CASING ELEV.: 664.77
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/15/2018 2:20:00 PM
END DATE/TIME: 5/15/2018 3:00:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown fine SAND, some silt								CETCO Grout 0-18 ft bgs
	light brown fine CLAYEY SAND		1	SS		1.7 / 2	0-0.3': SAND, fine, poorly-graded, dark brown, some silt, moist, loose. (SP) 0.3-1': CLAYEY SAND, fine, poorly-graded, light brown, moist, loose. (SC) 1-1.7': SAND, fine, poorly-graded, orange, moist, loose. (SP) SPTs (2-2-3-4)		
660.0	light brown to orange fine to medium SAND		2	SS		1.8 / 2	5-6.8': SAND, fine to medium, well-graded, light brown to orange, moist, loose. (SW) SPTs (2-2-3-4)		
655.0			3	SS		1.4 / 2	10-11.4': SAND, fine to coarse, well-graded, light brown, wet, compact. (SW) SPTs (4-5-7-8)		
650.0	light brown to light gray fine to coarse SAND, trace rounded gravel		4	SS		2 / 2	15-17': SAND, fine to coarse, well-graded, light brown, trace rounded gravel <1 inch, wet, compact. (SW) SPTs (2-4-7-6)		Bentonite Chips 18-20 ft bgs
645.0			5	SS		1.2 / 2	20-21.2': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet, compact. (SW) SPTs (8-10-9-10)		#5 Sand Filter Pack 20-32 ft bgs
640.0									2" PVC Screen slot 0.010 22-32 ft bgs

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)
Shale
USCS Clayey Sand (SC)
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-46B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2178838.974 E: 2973532.878
GROUND SURFACE ELEV.: 661.98
TOP OF CASING ELEV.: 664.77
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/15/2018 2:20:00 PM
END DATE/TIME: 5/15/2018 3:00:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light brown to light gray fine to coarse SAND, trace rounded gravel		6	SS		1 / 2	25-26': SAND, fine to coarse, well-graded, light gray, trace rounded gravel up to 2 inches, wet, compact. (SW) SPTs (7-7-8-10)		
635.0									
							30-31': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet, loose. (SW)		
	light gray clayey SHALE		7	SS		2 / 2	31-32': CLAYEY SHALE, light gray, very soft from 31-31.5'. SPTs (3-3-3-4)		
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)
Shale
USCS Clayey Sand (SC)
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

BOREHOLE LOG: GAMW-52

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 39

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2175030.9 E: 2970079.13
GROUND SURFACE ELEV.: 664.07
TOP OF CASING ELEV.: 666.77
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/30/2018 2:00:00 PM
END DATE/TIME: 7/30/2018 2:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to dark brown fine SILTY SAND			RS			0-1.5': SILTY SAND, fine, poorly-graded, brown to dark brown, dry. (SM)		Bentonite Chips 0-4 ft bgs
	light gray to light brown fine to coarse SAND			RS			1.5-4': SAND, fine to coarse, well-graded, light brown, moist. (SW)		
660.0				RS			4-8': SAND, medium to coarse, well-graded, light gray, wet. (SW)		#5 Sand Filter Pack 4-15 ft bgs 2" PVC Screen slot 0.010 5-15 ft bgs
655.0									
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: TGB
CHECKED BY: KMC
DATE: 3/4/19

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NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-52B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 40
DEPTH TO BEDROCK: 39

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2175031.998 E: 2970073.234
GROUND SURFACE ELEV.: 664.5
TOP OF CASING ELEV.: 666.88
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/30/2018 11:30:00 AM
END DATE/TIME: 7/30/2018 12:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to dark brown fine SILTY SAND			RS			0-1.5': SILTY SAND, fine, poorly-graded, brown to dark brown, dry. (SM)		Bentonite Grout 0-23 ft bgs
	light gray to light brown fine to coarse SAND			RS			1.5-4': SAND, fine to coarse, well-graded, light brown, moist. (SW)		
660.0				RS			4-8': SAND, medium to coarse, well-graded, light gray, wet. (SW)		
655.0									
650.0				RS			16-20': SAND, medium to coarse, well-graded, light gray, wet. (SW)		
645.0	light gray coarse SAND, some gravel			RS			20-22': SAND, coarse, poorly-graded, light gray, some rounded gravel <1 inch, wet. (SP)		
	gray fine to coarse SAND			RS			22-24': SAND, fine to coarse, well-graded, gray, wet. (SW)		Bentonite Chips 23-25 ft bgs
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)
Shale
USCS Well-graded Sand (SW)
USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: TGB
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-52B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 40
DEPTH TO BEDROCK: 39

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2175031.998 E: 2970073.234
GROUND SURFACE ELEV.: 664.5
TOP OF CASING ELEV.: 666.88
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/30/2018 11:30:00 AM
END DATE/TIME: 7/30/2018 12:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	gray fine to coarse SAND			RS			25-29': SAND, fine to coarse, well-graded, gray, wet. (SW)		#5 Sand Filter Pack 25-37 ft bgs
635.0				RS			30-34': SAND, fine to coarse, well-graded, gray, wet. (SW)		2" PVC Screen slot 0.010 27-37 ft bgs. Broke PVC in well; trouble with well floating so well is set 2 feet above top of shale.
630.0			SB-52B-35'-37'	RS			35-37': SAND, fine to coarse, well-graded, gray, wet. (SW)		
				RS			37-39': SAND, fine to coarse, well-graded, gray, wet. (SW)		#5 Sand 37-40 ft bgs
625.0	gray clayey SHALE			RS			CLAYEY SHALE, gray, wet.		
620.0									
615.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)
Shale
USCS Well-graded Sand (SW)
USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: TGB
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

BOREHOLE LOG: GAMW-53

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 36

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174535.339 E: 2971036.469
GROUND SURFACE ELEV.: 664.68
TOP OF CASING ELEV.: 667.22
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/30/2018 10:30:00 AM
END DATE/TIME: 7/30/2018 10:40:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- dark brown SILTY SAND, some gravel			RS			0-1': SILTY SAND, well-graded, dark brown, some angular gravel <2 inch, dry. (FILL)		Bentonite Chips 0-4 ft bgs
	dark brown SILTY SAND			RS			1-2': SILTY SAND, well-graded, dark brown, dry. (SM)		
	light brown fine to medium SAND			RS			2-2.5': SAND, fine to medium, well-graded, light brown, dry. (SW)		
	dark brown fine SILTY SAND			RS			2.5-3': SILTY SAND, fine, poorly-graded, dark brown, dry. (SM)		
	light gray to gray fine to coarse SAND			RS			3-4': SAND, fine to medium, well-graded, light gray, moist. (SW)		#5 Sand Filter Pack 4-15 ft bgs
660.0				RS			4-5.75': SAND, fine to medium, well-graded, light gray, wet. (SW)		2" PVC Screen slot 0.010 5-15 ft bgs
				RS			5.75-7': SAND, fine to coarse, well-graded, gray, wet. (SW)		
655.0									
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Silty Sand (SM)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: TGB
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-53B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 37
DEPTH TO BEDROCK: 36

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174536.542 E: 2971032.602
GROUND SURFACE ELEV.: 664.62
TOP OF CASING ELEV.: 667.27
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/30/2018 8:40:00 AM
END DATE/TIME: 7/30/2018 9:30:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- dark brown SILTY SAND, some gravel			RS			0-1': SILTY SAND, well-graded, dark brown, some angular gravel <2 inch, dry. (FILL)		Bentonite Grout 0-22 ft bgs
	dark brown SILTY SAND			RS			1-2': SILTY SAND, well-graded, dark brown, dry. (SM)		
	light brown fine to medium SAND			RS			2-2.5': SAND, fine to medium, well-graded, light brown, dry. (SW)		
	dark brown fine SILTY SAND			RS			2.5-3': SILTY SAND, fine, poorly-graded, dark brown, dry. (SM)		
	light gray to gray fine to coarse SAND			RS			3-4': SAND, fine to medium, well-graded, light gray, moist. (SW)		
660.0				RS			4-5.75': SAND, fine to medium, well-graded, light gray, wet. (SW)		
				RS			5.75-7': SAND, fine to coarse, well-graded, gray, wet. (SW)		
655.0									
650.0							16-20': SAND, fine to coarse, well-graded, gray, wet. (SW)		
				RS					
645.0							20-22': SAND, fine to coarse, well-graded, gray, wet. (SW)		
				RS					
	dark gray to black with black staining fine to coarse SAND			RS			22-24': SAND, fine to coarse, well-graded, dark gray to black with black staining, no odor, wet. (SW)		Bentonite Chips 22-24 ft bgs
640.0									#5 Sand Filter Pack 24-36 ft bgs

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Silty Sand (SM)
USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: TGB
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-53B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 37
DEPTH TO BEDROCK: 36

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174536.542 E: 2971032.602
GROUND SURFACE ELEV.: 664.62
TOP OF CASING ELEV.: 667.27
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/30/2018 8:40:00 AM
END DATE/TIME: 7/30/2018 9:30:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark gray to black with black staining fine to coarse SAND		SB-53B-25'-27'	RS			25-27': SAND, fine to coarse, well-graded, dark gray to black with black staining, no odor, wet. (SW)		2" PVC Screen slot 0.010 26-36 ft bgs
				RS			27-29': SAND, fine to coarse, well-graded, dark gray to black with black staining, no odor, wet. (SW)		
635.0	gray fine to coarse SAND, some gravel		SB-53B-30'-32'	RS			30-31': SAND, fine to coarse, well-graded, gray, some rounded gravel <2 inch, wet. (SW)		
630.0									
	gray SHALE			RS		3 / 1	36-37': SHALE, gray, weathered, wet.		#5 Sand 36-37 ft bgs
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Silty Sand (SM)
USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: TGB
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-54

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 32

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174080.28 E: 2971911.363
GROUND SURFACE ELEV.: 663.87
TOP OF CASING ELEV.: 666.35
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/30/2018 7:40:00 AM
END DATE/TIME: 7/30/2018 8:00:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown fine SILTY SAND, some organics			RS			0-0.8': SILTY SAND, fine, well-graded, dark brown, some organics, moist. (SM)		Bentonite Chips 0-4 ft bgs
	light brown fine to medium SAND			RS			0.8-1.5': SAND, fine to medium, well-graded, light brown, moist. (SW)		
	dark brown fine SILTY SAND			RS			1.5-2.7': SILTY SAND, fine, well-graded, dark brown, cohesive, moist. (SM)		
	light gray fine to medium SAND			RS			2.7-3.3': SAND, fine to medium, well-graded, light gray, wet. (SW)		
660.0				RS			4-7.4': SAND, fine to medium, well-graded, light gray, wet. (SW)		#5 Sand Filter Pack 4-15 ft bgs 2" PVC Screen slot 0.010 5-15 ft bgs
655.0									
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-54B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 35
DEPTH TO BEDROCK: 32

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174081.639 E: 2971906.899
GROUND SURFACE ELEV.: 663.98
TOP OF CASING ELEV.: 666.45
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/27/2018 10:10:00 AM
END DATE/TIME: 7/27/2018 10:40:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown fine SILTY SAND, some organics			RS			0-0.8': SILTY SAND, fine, poorly-graded, dark brown, some organics, moist. (SM)		Bentonite Grout 0-18 ft bgs
	light brown fine to medium SAND			RS			0.8-1.5': SAND, fine to medium, well-graded, light brown, moist. (SW)		
	dark brown fine SILTY SAND			RS			1.5-2.7': SILTY SAND, fine, poorly-graded, dark brown, cohesive, moist. (SM)		
	light gray fine to medium SAND			RS			2.7-3.3': SAND, fine to medium, well-graded, light gray, wet. (SW)		
660.0							4-7.4': SAND, fine to medium, well-graded, light gray, wet. (SW)		
				RS					
655.0									
650.0									
	light gray fine to coarse SAND, trace to some gravel						16-20': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		
				RS					Bentonite Chips 18-20 ft bgs
645.0									
							20-23.7': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		#5 Sand Filter Pack 20-32 ft bgs
				RS					2" PVC Screen slot 0.010 22-32 ft bgs
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-54B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 35
DEPTH TO BEDROCK: 32

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174081.639 E: 2971906.899
GROUND SURFACE ELEV.: 663.98
TOP OF CASING ELEV.: 666.45
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/27/2018 10:10:00 AM
END DATE/TIME: 7/27/2018 10:40:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
635.0	light gray fine to coarse SAND, trace to some gravel		SB-54B-30'-32'	RS			30-31.8': SAND, medium to coarse, well-graded, light gray, some rounded gravel <2 inch, some fine sand, wet. (SW)		
	light gray clayey SHALE			RS		7 / 3	32-34': CLAYEY SHALE, light gray, weathered. 34-35': CLAYEY SHALE, light gray, little weathering.		#5 Sand 32-35 ft bgs
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-55R

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173631.971 E: 2972230.541
GROUND SURFACE ELEV.: 665.36
TOP OF CASING ELEV.: 667.71
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 6/8/2019 11:45:00 AM
END DATE/TIME: 6/8/2019 12:30:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	dark brown fine SILTY SAND, some gravel			RS			0-0.8': SILTY SAND, fine, poorly-graded, dark brown, some rounded gravel up to 3 inch, trace organics, moist. (SM)		Bentonite Chips 0-4 ft bgs
				RS			0.8-2.2': SILTY SAND, fine, poorly-graded, dark brown, cohesive, moist. (SM)		
	light brown fine to medium SAND			RS			2.2-3.2': SAND, fine to medium, well-graded, light brown, moist. (SW)		
	light brown to light gray fine SAND, some silt			RS			3.2-3.75': SAND, fine, poorly-graded, light brown to light gray, some silt, cohesive, moist. (SP)		
	light brown fine to medium SAND			RS			4-4.9': SAND, fine to medium, well-graded, light brown, moist. (SW)		#5 Filter Pack Sand 4-15 ft bgs
660.0	light gray to light brown medium to coarse SAND, some fine sand, trace gravel			RS			4.9-6.8': SAND, medium to coarse, well-graded, light gray, some fine sand, trace rounded gravel <1 inch, wet. (SW) 6.8-6.9': SAND, medium, brown. (SP) 6.9-7.8': SAND, medium to coarse, well-graded, light gray, some fine sand, trace rounded gravel <1 inch, wet. (SW)		2" PVC Screen slot 0.010 5-15 ft bgs
655.0									
650.0									
645.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)

USCS Well-graded Sand (SW)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: ANB
CHECKED BY: KMC
DATE: 12/3/19

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-55B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173632.338 E: 2972222.718
GROUND SURFACE ELEV.: 665.18
TOP OF CASING ELEV.: 667.51
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/26/2018 1:00:00 PM
END DATE/TIME: 7/26/2018 1:35:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	dark brown fine SILTY SAND, some gravel			RS			0-0.8': SILTY SAND, fine, poorly-graded, dark brown, some rounded gravel up to 3 inch, trace organics, moist. (SM)		Bentonite Grout 0-21 ft bgs
				RS			0.8-2.2': SILTY SAND, fine, poorly-graded, dark brown, cohesive, moist. (SM)		
	light brown fine to medium SAND			RS			2.2-3.2': SAND, fine to medium, well-graded, light brown, moist. (SW)		
	light brown to light gray fine SAND, some silt			RS			3.2-3.75': SAND, fine, poorly-graded, light brown to light gray, some silt, cohesive, moist. (SP)		
	light brown fine to medium SAND			RS			4-4.9': SAND, fine to medium, well-graded, light brown, moist. (SW)		
660.0	light gray to light brown medium to coarse SAND, some fine sand, trace gravel			RS			4.9-6.8': SAND, medium to coarse, well-graded, light gray, some fine sand, trace rounded gravel <1 inch, wet. (SW) 6.8-6.9': SAND, medium, brown. (SP) 6.9-7.8': SAND, medium to coarse, well-graded, light gray, some fine sand, trace rounded gravel <1 inch, wet. (SW)		
655.0									
650.0				RS			16-18': SAND, medium to coarse, well-graded, light brown, some fine sand, trace rounded gravel <1 inch, wet. (SW)		
	light gray coarse SAND, some rounded gravel, some medium sand			RS			18-20.7': SAND, coarse, poorly-graded, light gray, some rounded gravel <1 inch, some medium sand, wet. (SP)		
645.0	light gray fine to coarse SAND			RS			20.7-21.5': SAND, fine to coarse, well-graded, light gray, wet. (SW)		Bentonite Chips 21-23 ft bgs #5 Sand Filter Pack 23-35 ft bgs

LITHOLOGY LEGEND

USCS Silty Sand (SM)
Shale
USCS Well-graded Sand (SW)
USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-55B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173632.338 E: 2972222.718
GROUND SURFACE ELEV.: 665.18
TOP OF CASING ELEV.: 667.51
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/26/2018 1:00:00 PM
END DATE/TIME: 7/26/2018 1:35:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	light gray fine to coarse SAND			RS			25-29.2': SAND, fine to coarse, well-graded, light gray, wet. (SW)		2" PVC Screen slot 0.010 25-35 ft bgs
635.0	light gray fine to coarse SAND, some gravel		SB-55B-30'-32'	RS			30-32': SAND, fine to coarse, well-graded, light gray, some rounded gravel <2 inch, wet. (SW)		
				RS			32-33.2': SAND, fine to coarse, well-graded, light gray, some rounded gravel <2 inch, wet. (SW)		
630.0	light gray SHALE			RS			35-36': SHALE, light gray, dry, very weathered.		#5 Sand 35-36 ft bgs
625.0									
620.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)
Shale
USCS Well-graded Sand (SW)
USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-56

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173343.43 E: 2972428.296
GROUND SURFACE ELEV.: 665.43
TOP OF CASING ELEV.: 667.89
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/27/2018 8:45:00 AM
END DATE/TIME: 7/27/2018 8:55:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	dark brown fine SILTY SAND, some gravel, some organics and debris			RS			0 to 0.7': SILTY SAND, fine, poorly-graded, dark brown, some rounded gravel up to 3 inch, some organics and debris, dry. (SM)		Bentonite Chips 0-4 ft bgs
				RS					
	light gray to brown fine to coarse SAND			RS			0.7' to 1.6': SILTY SAND, fine, poorly-graded, dark brown, cohesive, moist. (SM)		
				RS			1.6 to 2.4': SAND, fine to medium, well-graded, dark and light brown, moist. (SW)		
							2.4 to 3.1': SAND, fine to medium, well-graded, light gray, moist. (SW)		#5 Sand Filter Pack 4-15 ft bgs
660.0				RS			5 to 5.4' SAND, fine to medium, well-graded, light gray, moist. (SW)		2" PVC Screen slot 0.010 5-15 ft bgs
				RS			5.4 to 6.25': SAND, fine to medium, well-graded, light gray, wet. (SW)		
				RS			6.25 to 8.4': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
655.0				RS			10 to 13.8': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
650.0									
645.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-56B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173343.227 E: 2972423.771
GROUND SURFACE ELEV.: 665.33
TOP OF CASING ELEV.: 667.80
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/27/2018 7:10:00 AM
END DATE/TIME: 7/27/2018 7:35:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	dark brown fine SILTY SAND, some gravel, some organics and debris			RS			0 to 0.7': SILTY SAND, fine, poorly-graded, dark brown, some rounded gravel up to 3 inch, some organics and debris, dry. (SM)		Bentonite Grout 0-21 ft bgs
				RS					
	light gray to brown fine to coarse SAND			RS			0.7 to 1.6': SILTY SAND, fine, poorly-graded, dark brown, cohesive, moist. (SM)		
				RS			1.6 to 2.4': SAND, fine to medium, well-graded, dark and light brown, moist. (SW)		
							2.4 to 3.1': SAND, fine to medium, well-graded, light gray, moist. (SW)		
660.0				RS			5 to 5.4' SAND, fine to medium, well-graded, light gray, moist. (SW)		
				RS			5.4 to 6.25': SAND, fine to medium, well-graded, light gray, wet. (SW)		
				RS			6.25 to 8.4': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
655.0				RS			10 to 13.8': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
650.0				RS			16 to 20': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
645.0	light to dark gray fine to coarse SAND, trace to some gravel			RS			20 to 23.8': SAND, fine to medium, well-graded, light gray, some coarse sand, trace rounded gravel <1 inch, wet. (SW)		Bentonite Chips 21-23 ft bgs #5 Sand Filter Pack 23-35 ft bgs

LITHOLOGY LEGEND

USCS Silty Sand (SM) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-56B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173343.227 E: 2972423.771
GROUND SURFACE ELEV.: 665.33
TOP OF CASING ELEV.: 667.80
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/27/2018 7:10:00 AM
END DATE/TIME: 7/27/2018 7:35:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	light to dark gray fine to coarse SAND, trace to some gravel			RS			25 to 28.25': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		2" PVC Screen slot 0.010 25-35 ft bgs
				RS			28.25 to 29': SAND, medium to coarse, well-graded, dark gray, some rounded gravel <1 inch, some fine sand. (SW)		
635.0			SB-56B-30'-32'	RS			30 to 31.75': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW) 31.75 to 32': SAND, medium to coarse, well-graded, dark gray, some rounded gravel <3 inch, trace fine sand, wet. (SW)		
				RS			32 to 33.2': SAND, medium to coarse, well-graded, dark gray, some rounded gravel <3 inch, trace fine sand, wet. (SW)		
630.0	light gray SHALE			RS		1.2 / 1	35 to 36': SHALE, light gray, moist, little weathering.		#5 Sand 35-36 ft bgs
625.0									
620.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-63B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 33.5
DEPTH TO BEDROCK: 33.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171969.161 E: 2971860.966
GROUND SURFACE ELEV.: 669.02
TOP OF CASING ELEV.: 668.74
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 6/7/2019 8:00:00 AM
END DATE/TIME: 6/7/2019 8:50:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to gray fine to medium SILTY SAND			RS			0' to 1.75': SILTY SAND, fine, trace rounded gravel <1inch, brown, non-cohesive, moist, trace organics, poorly graded (SM).		Bentonite Grout 0-19 ft bgs
	gray fine to medium SAND			RS			3' to 4.75': SAND, fine to medium, some rounded gravel <1inch, light brown, trace coarse sand, well-graded (SW).		
665.0				RS			4.75' to 11': SAND, medium to coarse, light brown, some fine sand, wet, non-cohesive, well-graded (SW).		
660.0				RS			11' to 11.5': SAND, medium to coarse, trace rounded gravel <1cm, gray, wet, non-cohesive, well graded (SW)		
655.0				RS			15' to 21.3': SAND, fine to coarse, gray, wet, non-cohesive, well-graded (SW).		
650.0	gray fine to coarse SAND			RS			21.3' to 22.8': CLAYEY SAND, fine to coarse, trace rounded gravel <1", gray, wet, non-cohesive, well-graded (SW-SC).		Bentonite Chips 19-21 ft bgs #5 Sand Filter Pack 21-23 ft bgs
645.0				RS			22.8' to 23': SAND, fine to coarse, trace gravel rounded <1", gray, wet, non-cohesive, well-graded (SW).		2" PVC Screen slot 0.010 23-33 ft bgs

LITHOLOGY LEGEND

USCS Well-graded Sand with Silt (SW-SM)
Shale
USCS Well-graded Sand (SW)
USCS Well-graded Sand with Clay (SW-SC)

DRILLING COMPANY: Layne
DRILLER: M. Backhaus
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: AMH
DATE: 9/16/19

Golder Associates

BOREHOLE LOG: GAMW-63B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 33.5
DEPTH TO BEDROCK: 33.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171969.161 E: 2971860.966
GROUND SURFACE ELEV.: 669.02
TOP OF CASING ELEV.: 668.74
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 6/7/2019 8:00:00 AM
END DATE/TIME: 6/7/2019 8:50:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	SAMPLE INFORMATION: Type	SAMPLE INFORMATION: PID (ppm)	SAMPLE INFORMATION: Soil Rec./Att. Or Core Rec. %	SAMPLE INFORMATION: Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	gray fine to coarse SAND			RS			25' to 31.75': SAND, fine to coarse, trace rounded gravel <1 inch, gray, wet, non-cohesive, well-graded (SW).		
640.0	gray CLAYEY SHALE			RS			33' to 33.5': CLAYEY SHALE, gray, weathered, soft		#5 Sand 33-33.5 ft bgs
635.0									
630.0									
625.0									
620.0									

LITHOLOGY LEGEND

USCS Well-graded Sand with Silt (SW-SM)
Shale
USCS Well-graded Sand (SW)
USCS Well-graded Sand with Clay (SW-SC)

DRILLING COMPANY: Layne
DRILLER: M. Backhaus
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: AMH
DATE: 9/16/19

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 12/17/19

BOREHOLE LOG: GAMW-64B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 30.5
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171789.81 E: 2972174.664
GROUND SURFACE ELEV.: 664.42
TOP OF CASING ELEV.: 666.83
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 6/7/2019 11:30:00 AM
END DATE/TIME: 6/7/2019 12:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown fine SILTY SAND			RS			0' to 1': SILTY SAND, fine, dark brown, trace organics, moist, non-cohesive, poorly graded (SM).		Bentonite Grout 0-17 ft bgs
				RS			1' to 1.8': SILTY SAND, fine, trace rounded gravel <1", dark brown, moist, non-cohesive, poorly graded (SM).		
	light brown fine to medium SAND, some orange streaking			RS			1.8' to 2.8': SAND, fine to medium, light brown, some clay, some orange streaking, moist, cohesive, well-graded (SW-SC).		
				RS			2.8' to 3.75': SAND, fine to coarse, light brown, some orange streaking, wet, non-cohesive, well-graded (SW).		
660.0									
				RS			7' to 8.5': SAND, fine to medium, light brown, trace coarse sand, wet, non-cohesive, well-graded (SW).		
	gray fine CLAYEY SAND, some dark gray streaks			RS			8.5' to 9': CLAYEY SAND, fine, gray with dark gray streaks, wet, non-cohesive, poorly graded (SC).		
655.0				RS			9' to 10.25': CLAYEY SAND, fine, gray, with dark gray streaks, wet, non-cohesive, poorly graded (SC).		
	gray fine to coarse SAND						10.25' to 17.5': SAND, fine to coarse, gray, wet, non-cohesive, well-graded (SW).		
				RS					
650.0									Bentonite Chips 17-19 ft bgs
							17.5' to 23.75': SAND, medium to coarse, gray, some rounded gravel <1cm, trace fine sand, non-cohesive, wet, well-graded (SW).		
645.0									#5 Sand Filter Pack 19-31 ft bgs
				RS					2" PVC Screen slot 0.010 21-30.5 ft bgs
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)
Shale
USCS Well-graded Sand (SW)
USCS Poorly-graded Sand with Clay (SP-SC)

DRILLING COMPANY: Layne
DRILLER: M. Backhaus
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: AMH
DATE: 9/16/19

Golder Associates

BOREHOLE LOG: GAMW-64B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 30.5
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171789.81 E: 2972174.664
GROUND SURFACE ELEV.: 664.42
TOP OF CASING ELEV.: 666.83
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 6/7/2019 11:30:00 AM
END DATE/TIME: 6/7/2019 12:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	SAMPLE INFORMATION: Type	SAMPLE INFORMATION: PID (ppm)	SAMPLE INFORMATION: Soil Rec./Att. Or Core Rec. %	SAMPLE INFORMATION: Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	gray fine to coarse SAND			RS			27' to 30.5': SAND, medium to coarse, gray, some rounded gravel <1cm, trace fine sand, non-cohesive, wet, well-graded (SW).		
635.0									
	gray CLAYEY SHALE			RS			30.5' to 31': CLAYEY SHALE, gray, slighty weathered, hard		#5 Sand 30.5-31 ft bgs
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)

Shale

USCS Well-graded Sand (SW)

USCS Poorly-graded Sand with Clay (SP-SC)

DRILLING COMPANY: Layne
DRILLER: M. Backhaus
DRILL RIG: SDC500-28EA

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Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 12/17/19

MCU D Multi-Cell Unit Analytical Data 40 CFR Part §257.103(f)(2)(v)(C)(3)

Table 1: Analytical Data
CCR Unit Multi-Cell Unit
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW04																		
Sample Date		2016-07-12	2016-09-08	2016-11-09	2017-01-10		2017-03-01	2017-04-26	2017-06-28	2017-08-22	2017-10-04	2018-03-13	2018-03-14	2018-04-20		2018-10-25	2019-04-23	2019-11-07	2020-05-13	
Sample Type		N	N	N	FD	N	N	N	N	N	N	FD	N	FD	N	N	N	N	FD	N
Chemical Name	Unit																			
CCR Appendix III																				
Boron	mg/L	0.48	1.4	2.4 O	1.1	1	1.2	0.74	0.92	1.2	0.54			0.74	0.72	0.78	0.74	1.3	0.66	0.64
Calcium	mg/L	110	230	300 O	270	240	230	220	200	200	140			140	140	210	130	190	115	112
Chloride	mg/L	2.2	27	69 O	13	14	13	5.4	12	13	4.5			3.7 J	4.4	10	3.7	9.5	2	2
Fluoride	mg/L	0.92 J+	0.2 J	10 UO	0.19 J	0.17 J	5 U	5 U	0.19 J	0.21 J	0.24 J	0.15 J	5 U	5 U	0.17 J-	0.26	0.16 J+	0.23	0.15	0.15
pH	SU	7.22	6.83	6.75		6.93	7.01	6.76	6.88	7.21	7.28		6.95		7.2	6.39	7	7.14		7.42
Sulfate	mg/L	140 J-	460	480 O	460	470	390	470	370	440	250			220	210	530	260	490	136	139
Total Dissolved Solids	mg/L	420	990	1400 O	1000	1000	890	870	880	920	610			580 J	580	980	600	900	411	419
CCR Appendix IV																				
Antimony	mg/L	0.002 U	0.002 U	0.00027 JO	0.002 U	0.00057 J	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U			0.002 U	0.00065 J	0.00092 J	0.001 U	0.001 U
Arsenic	mg/L	0.0059	0.013	0.0052 O	0.0058	0.0072	0.005 U	0.0099	0.012	0.012		0.004 J	0.0054			0.014	0.0023 J	0.0018 J	0.002	0.002
Barium	mg/L	0.041	0.077	0.11 O	0.095	0.079	0.089	0.069	0.084	0.09		0.11	0.077			0.074	0.068	0.066	0.076	0.077
Beryllium	mg/L	0.00027 J	0.001 U	0.001 UO	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.00048 J	0.00053 J	0.001 U	0.0002 U	0.0002 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 UO	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U	0.0002 U	0.0002 U
Chromium	mg/L	0.002 U	0.002 U	0.00036 JO	0.00036 J	0.0052 JO	0.002 U	0.002 U	0.002 U	0.002 U		0.0011 J	0.0012 J			0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.001 U	0.00031 J	0.00064 JO	0.0061	0.0058	0.0038	0.0049	0.003	0.0023		0.0028	0.0031			0.0026	0.0011	0.00043 J	0.001 U	0.001 U
Fluoride	mg/L	0.92 J+	0.2 J	10 UO	0.19 J	0.17 J	5 U	5 U	0.19 J	0.21 J	0.24 J	0.15 J	5 U	5 U	0.17 J-	0.26	0.16 J+	0.23	0.15	0.15
Lead	mg/L	0.001 U	0.001 U	0.001 UO	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0018 J	0.008 U	0.008 UO	0.0021 J	0.0023 J	0.0033 J	0.0033 J	0.0062 J	0.0062 J		0.008 U	0.008 U			0.0023 J	0.0045 J	0.0028 J	0.008 U	0.008 U
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 UO	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U	0.0002 U			0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.0075 J	0.023	0.073 O	0.037	0.038	0.034	0.016	0.02	0.034		0.0048 J	0.024			0.039	0.024	0.055	0.022	0.022
Radium, Total	pCi/L	5 U	0.583	0.697 O	0.804	0.515 U	0.362 U	0.379 U	0.364 U	0.352 U		1.35 J+	0.778 J+			0.473	0.591		0.459 U	0.64 U
Selenium	mg/L	0.005 U	0.005 U	0.00064 JO	0.0017 J	0.0021 J	0.005 U	0.005 U	0.005 U	0.005 U		0.001 J	0.001 J			0.005 U	0.0013 J	0.0052	0.001 U	0.001 U
Thallium	mg/L	0.001 U	0.001 U	0.001 UO	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Field Parameters																				
DO	mg/L	0.09	0.58	0.37		1.82	1.47	0.12	0.3	0.52	0.09		0.66		2.3	0.15	7.08	2.55		1.32
ORP	millivolts	59.6	-24	-6.9		-31.7	14	-57.8	-45	-27	-105.8		-181.8		-81.2	-58.1	19	-60.7		-28.6
pH	SU	7.22	6.83	6.75		6.93	7.01	6.76	6.88	7.21	7.28		6.95		7.2	6.39	7	7.14		7.42
SC	uS/cm	595	1345	1681		1109	910	1137	911	1153	813		562		770	1311	549	866		681
TEMP	deg C	13	17.3	16.3		10.5	8.05	10.2	13.1	15.9	16.1		7.55		3.5	15.5	4.2	13.2		9.8
TURB	NTU	4.04	1.48	2.21		2.28	4.26	4.04	4.88	1.65	0.51		4.92		3.12	1.92	4.48	1.38		3.51

Note:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

GAMW07																	GAMW07B				
2016-07-12	2016-09-08	2016-11-09	2017-01-10	2017-03-01	2017-04-26	2017-06-29	2017-08-23	2017-10-03		2018-03-15	2018-04-23	2018-10-26	2019-05-02	2019-11-08	2020-04-28		2018-09-06	2018-10-26	2019-05-02	2019-11-12	2020-04-28
N	N	N	N	N	N	N	N	FD	N	N	N	N	N	N	FD	N	N	N	N	N	N
1.2	1	0.91	0.91	1	0.68	0.67	0.68	0.71	0.72		1.2	1.3	0.85	0.85	0.87	0.87	20	23	18	15	11.1
170	190	200	170	170	190	220	190	220	220		210	230	220	180	209	211	370	430	380	400	370
7.8	6.6	5.3	6	7.6	2.8	3 J	3.2 J	3 J	3.6 J		4.7 J	6.3	6.5	4.8	6.5	6.3	10 U	250	170	150	113
0.72 J+	0.91 J	0.8 J	0.85 J	0.66 J	0.76 J	0.79 J	0.66 J	1.1 J	0.93 J	0.58 J	0.57 J	0.73	0.97	0.88	0.64	0.64	10 U	1.5	1.3	1.2	1.2
7.03	7.27	7.04	7.15	7.2	7.17	6.57	7.2		7.1	7.28	7.35	5.71	7.2	7.44		7.3	8.29	6.78	7.58	7.13	7.73
310 J-	330	320	320	290	310	360	380	460	450		450	530	500	480	403	399	10 U	1600	1500	1400	1260
770	830	840	750	710	810	970	910	970	1000		900	970	1100	940	840	846	2700	2600	920	2300	2140
0.00035 J	0.00039 J	0.00035 J	0.00028 J	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U	0.001 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U
0.0013 J	0.0016 J	0.0018 J	0.0028 J	0.005 U	0.0028 J	0.0025 J	0.0016 J			0.005 U		0.0012 J	0.0019 J	0.0011 J	0.001 U	0.001 U	0.0028 J	0.0015 J	0.0019 J	0.0017 J	0.0023
0.052	0.055	0.056	0.042	0.05	0.05	0.059	0.059			0.056		0.064	0.053	0.043	0.041	0.04	0.072	0.063	0.053	0.043	0.044
0.00011 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.001 U	0.001 U	0.0002 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0003 J	0.00022 J			0.001 U		0.00047 J	0.001 U	0.001 U	0.0002 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U
0.002 U	0.002 U	0.00047 J	0.00046 J	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
0.0056	0.0077	0.0055	0.0038	0.0044	0.0063	0.01	0.0095			0.006		0.01	0.0074	0.0049	0.0063	0.0064	0.00074 J	0.001 U	0.001 U	0.001 U	0.001 U
0.72 J+	0.91 J	0.8 J	0.85 J	0.66 J	0.76 J	0.79 J	0.66 J	1.1 J	0.93 J	0.58 J	0.57 J	0.73	0.97	0.88	0.64	0.64	10 U	1.5	1.3	1.2	1.2
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0007 J			0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
0.0034 J	0.008 U	0.008 U	0.0035 J	0.0031 J	0.0041 J	0.0037 J	0.0038 J			0.0024 J		0.0054 J	0.0041 J	0.0033 J	0.008 U	0.008 U	0.0043 J	0.0045 J	0.004 J	0.0035 J	0.008 U
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ			0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
0.0084 J	0.0098 J	0.0095 J	0.01 U	0.01 U	0.0083 J	0.0081 J	0.007 J			0.0066 J		0.0087 J	0.0097 J	0.0087 J	0.0073	0.0073	0.015	0.017	0.025	0.026	0.026
1.59	0.696	0.548	0.412 U	0.42 U	0.371 U	0.45	0.588			0.749 J+		0.823 J+	0.37 U		1.62	0.864 U	2.63	2.6 J+	2.31		1.73 U
0.005 U	0.005 U	0.003 J	0.003 J	0.005 U	0.008	0.0054	0.005			0.0028 J		0.0016 J	0.0045 J	0.0019 J	0.0017	0.0018	0.0012 J	0.005 U	0.005 U	0.005 U	0.001 U
0.00011 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.00024 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
0.6	1.81	0.59	0.52	0.51	1.96	1.02	0.84		0.48	0.8	3.52	2.64	0.81	0.38		0.34	0.13	0.67	0.19	0.2	0.1
111.2	64.2	-6.4	71.3	65.3	76.9	291.1	8.5		95.4	-55	-98.7	-233.3	135.1	-131.8		115.2	-197.6	-230.2	34.9	-196.7	-128.6
7.03	7.27	7.04	7.15	7.2	7.17	6.57	7.2		7.1	7.28	7.35	5.71	7.2	7.44		7.3	8.29	6.78	7.58	7.13	7.73
966	1072	1106	928	832	1121	1151	1157		1273	760	1060	1240	975	828		1223	5178	3237	2357	1686	2722
14.4	19.2	16.7	12.9	10.63	11.8	14.6	16.5		18	10	10	16.95	10.3	15.3		10.5	15.03	13.86	12.4	12.9	12.7
4.6	4.51	1.26	3.2	4.76	2.17	2.87	0.9		0.49	1.3	1.75	1.08	2.72	4.58		3.2	4.48	3.01	2.86	1.11	3.48

GAMW08																GAMW08B				
2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-02	2017-04-27	2017-06-29	2017-08-23	2017-10-04	2018-03-14	2018-04-23	2018-10-26	2019-05-08	2019-11-07	2020-04-24	2018-09-07	2018-10-26	2019-05-03	2019-11-07	2020-04-24
N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3.5	3.9	3.2	3.4	3.3	3.2	2.9	2.2	3.7		2.4	1.8	1.4	2.5	3	18	15	14	13	20.4
310	310	300	260	270	310	340	270	290		360	230	250	280	309	380	370	350	340	355
88	71	89	99	110	86	83	39	87		64	56	49	66	67	240	180	160	180	220
1 J+	1.2 J	0.73 J	0.87 J	0.94 J	0.92 J	1.3 J	2 J	0.68 J	1.2 J	1.3 J-	1.6	2.2	1.9	1.1 J-	1.6 J	1.5	1.9	1.7	1.5 J-
6.92	7.03	6.85	7.02	7.09	6.93	7	7.27	6.89	7.41	7.41	6.99	7.37	7.5	7.35	7.7	7.45	7.57	7.85	7.89
770 J-	690	680	610	630	770	800	640	670		800	460	540	670	719	1500	1500	1400	1300	1280
1600	1500	1600	1300	1400	1700	2000	1400	1500		1700	1100	1300	1300	1550	1900 J+	2300	2300	2200	2560
0.00073 J	0.00069 J	0.0014 J	0.00041 J	0.00043 J	0.002 U	0.00059 J	0.00075 J		0.002 U		0.00082 J	0.00076 J	0.00077 J	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U
0.0018 J	0.0019 J	0.0018 J	0.0027 J	0.0016 J	0.0031 J	0.0027 J	0.0023 J		0.005 U		0.0011 J	0.0015 J	0.0016 J	0.0012	0.005 U	0.005 U	0.005 U	0.005 U	0.001 U
0.068	0.065	0.065	0.05	0.055	0.064	0.074	0.077		0.066	0.069	0.053	0.058	0.066	0.061	0.042	0.03	0.025	0.023	0.028
0.00017 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.0004 J	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U
7.4E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.00037 J	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U
0.002 U	0.002 U	0.002 U	0.00029 J	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
0.036	0.034	0.059	0.047	0.05	0.037	0.047	0.02		0.022	0.027	0.011	0.0079	0.011	0.022	0.00066 J	0.001 U	0.001 U	0.001 U	0.001 U
1 J+	1.2 J	0.73 J	0.87 J	0.94 J	0.92 J	1.3 J	2 J	0.68 J	1.2 J	1.3 J-	1.6	2.2	1.9	1.1 J-	1.6 J	1.5	1.9	1.7	1.5 J-
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
0.0098	0.012	0.009	0.0098	0.0093	0.012	0.011	0.012		0.0089	0.009	0.011	0.015	0.0091	0.0087	0.0098	0.0073 J	0.0063 J	0.0058 J	0.008 U
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
0.034	0.036	0.024	0.02	0.019	0.038	0.049	0.083		0.058	0.058	0.059	0.08	0.068	0.048	0.037	0.039	0.057	0.044	0.05
1.07	1.08	1.09	0.581	0.777	0.632	1.11	0.762		1.13 J+	0.99	1 J+	0.473		0.762 U	1.67 J+	1.02 J+	0.704		1 U
0.005 U	0.0065	0.0033 J	0.0014 J	0.0032 J	0.011	0.0088	0.0081		0.024	0.022	0.0021 J	0.016	0.0036 J	0.0062	0.0014 J	0.005 U	0.005 U	0.005 U	0.001 U
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.00045 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1.9	0.38	1.62	1.27	0.96	0.63	1.96	0.93	0.21	0.97	5.09	0.21	0.44	4.2	0.34	0.42	0.12	0.13	2.61	0.12
159.7	64.6	-8	58.4	49.9	60.4	242.5	61.9	-15.9	110.1	-106.4	27.7	62.2	44.1	52.5	-185.5	-67	7.9	-67	-142.2
6.92	7.03	6.85	7.02	7.09	6.93	7	7.27	6.89	7.41	7.41	6.99	7.37	7.5	7.35	7.7	7.45	7.57	7.85	7.89
1925	1807	1664	1517	1494	2098	1834	1713	1840	1121	1732	1440	1102	1322	2009	2538	2375	2190	1896	3391
15.5	18.78	17.75	12.2	10.06	11.1	15.8	18.5	18.3	9.6	10.2	17.2	11	10.84	10.5	14.6	14.5	12.8	8.05	13
2.3	3.22	0.58	1.26	1.56	1.1	2.41	0.68	4.38	1.11	1.54	1.4	1.81	0.31	2.5	3.4	1.63	1.72	2.89	2.91

GAMW09																		
2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-01		2017-04-26		2017-06-28	2017-08-23	2017-10-03	2018-03-14	2018-04-23	2018-10-25	2019-05-02		2019-11-07	2020-04-24
N	N	N	N	FD	N	FD	N	N	N	N	N	N	N	FD	N	N	N
5.7	4.7	7.3	5.3	7.7	7.6	5.9	6.1	4.9	7.9	7.3		4.9	6.3	3	3	2.7	3.3
320	240	210	210	200	200	220	240	270	280	220		220	220	200	200	150	178
63	55	58	58	75	73	71	67	53	39	64		58	82	46	46	39	54.4
0.15 J+	10 U	10 U	0.22 J	0.13 J	0.14 J	0.16 J	0.13 J	0.18 J	2 J	0.21 J	5 U	0.26 J-	0.28	0.27	0.27	0.33	0.3 J-
7.27	7.25	7.12	6.68		7.44		7.15	7.25	7.31	7.3	7.28	6.87	6.88		7.1	7.06	7.15
910 J-	570	360	500	440	420	460	460	600	740	540		510	510 J-	530	530	380	390
1500	1100	880	980	1000	990	1000	960	1300	1400	1100		930	1100	970	980	770	772
0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.001 U
0.0015 J	0.0013 J	0.00076 J	0.0031 J	0.005 U	0.005 U	0.0028 J	0.0029 J	0.002 J	0.0027 J		0.005 U		0.005 U	0.005 U	0.005 U	0.005 U	0.001 U
0.059	0.043	0.036	0.039	0.035	0.037	0.039	0.042	0.047	0.054		0.041	0.039	0.039	0.041	0.041	0.036	0.032
0.00012 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00036 J	0.001 U	0.001 U	0.001 U		0.001 UO		0.00092 J	0.00058 J	0.00052 J	0.00049 J	0.00039
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.00033 J	0.001 U	0.001 U	0.001 U	0.0002 U
0.0036	0.002 U	0.00062 J	0.0013 J	0.002 U	0.002 U	0.002 U	0.002 U	0.0011 J	0.0015 J		0.0016 J		0.002 U	0.0012 J	0.0012 J	0.002 U	0.002 U
0.001 U	0.00018 J	0.0002 J	0.0002 J	0.001 U	0.001 U	0.00029 J	0.00025 J	0.001 U	0.001 U		0.001 U		0.00038 J	0.00049 J	0.00055 J	0.00035 J	0.001 U
0.15 J+	10 U	10 U	0.22 J	0.13 J	0.14 J	0.16 J	0.13 J	0.18 J	2 J	0.21 J	5 U	0.26 J-	0.28	0.27	0.27	0.33	0.3 J-
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
0.0019 J	0.008 U	0.008 U	0.0016 J	0.0011 J	0.0012 J	0.008 U	0.008 U	0.0017 J	0.0018 J		0.008 U		0.008 U	0.008 U	0.008 U	0.008 U	0.008 U
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
0.02	0.017	0.029	0.023	0.027	0.027	0.021	0.021	0.028	0.032		0.025	0.035	0.04	0.043	0.043	0.035	0.052
1.5	0.568	0.477 U	0.467 U	0.55	0.469	0.593	0.414	0.707	0.803		1.45 J+	0.096	0.679	0.505	0.427 U		0.317 U
0.014	0.0091	0.0049 J	0.011	0.014	0.014	0.019	0.02	0.013	0.027		0.0082	0.011	0.0098	0.012	0.012	0.0077	0.0096
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
3.59	6.69	1.98	6.1		3.41		3.92	5.27	3.24	5.98	6.71	5.43	0.22		5.82	5.54	3.14
-1.4	75.7	27.6	236		90.5		152.6	280.8	58.9	139.5	-116.3	-90.8	-48.8		53.6	-25.7	44
7.27	7.25	7.12	6.68		7.44		7.15	7.25	7.31	7.3	7.28	6.87	6.88		7.1	7.06	7.15
1671	736	1110	822		1041		1209	702	1542	1331	600	1156	1274		888	685	774
14.4	18.4	16.9	11.9		10.75		11.9	14.7	17.2	18.2	10.2	10.6	17.9		11.4	15.9	10.3
1.59	3.92	1.15	1.34		3.12		1.88	1.91	0.91	0.39	0.82	2.44	2.41		3.41	1.55	2.37

GAMW09B																			GAMW15															
2016-07-13		2016-09-08	2016-11-09	2017-01-10	2017-03-01	2017-04-26	2017-06-28	2017-08-23		2017-10-03	2018-03-14	2018-04-23	2018-09-06	2018-10-26	2019-05-08	2019-11-07	2020-04-27	2016-07-13	2016-09-08		2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-23	2017-10-03	2018-03-15	2018-04-24	2018-10-26	2019-05-06	2019-11-08	2020-04-27
FD	N	N	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N
24	25	25	16	11	11	11	12	16	16	16		14	12	12	14	8	6.1	0.75	0.45 J	1 J	1.1	0.6	0.44	0.45	0.87	0.91	0.66		0.72	0.76	0.71	0.73	0.68
260	280	270	190	200	170	170	180	180	180	160		160	150	180	150	150	148	100	130	120	100	82	81	95	160	150	77		170	120	140	100	128
210	180	190	130	110	120	130	150	170	160	140		150	180	150	140	110	117	28	31	31	27	28	27	27	27	25	19		24	21	22	28	25.2
0.54 J+	0.55 J+	0.67 J	0.68 J	0.1 J	1.3 J	1.2 J	1.4 J	1.2 J	0.37 J	1.5 J	1.4 J	1.6 J	1.8 J	1.6	1.6	1.5	1.3	1.2 J+	0.85 J	0.85 J	0.74 J	0.8 J	0.77 J	0.74 J	0.82 J	0.82 J	0.93 J	0.67 J	0.76 J	0.69	0.52	0.73	0.6
	7.08	7.15	6.96	7.36	7.44	7.29	7.36		7.46	7.36	7.56	7.43	7.32	7.46	7.49	7.56	7.65	6.88		6.98	6.83	6.96	6.99	6.76	6.61	6.96	6.88	6.95	6.89	5.2	7.1	7.34	7.34
970 J-	1000 J-	960	740	670 J+	550	570	640	630	650	550		430	570	580	520	440	387	160 J-	260	260	150	140	140	160	300	330	260		410	240	380	260	227
2100	2000	2100	1700	1300	1200	1200	1500	1500	1500	1300		990	1300	1200	1200	990	906	570	660	630	520	400	400	420	780	750	660		790	5900	740	640	572
0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.002 U	0.00041 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.001 U
0.0024 J	0.0026 J	0.002 J	0.0014 J	0.0027 J	0.005 U	0.004 J	0.004 J	0.0031 J	0.0031 J		0.0054	0.0064	0.0044 J	0.004 J	0.0057	0.0042 J	0.0049	0.056	0.072	0.069	0.078	0.076	0.054	0.062	0.059	0.066		0.058		0.091	0.081	0.075	0.061
0.069	0.071	0.076	0.062	0.048	0.04	0.046	0.055	0.062	0.058		0.045	0.04	0.049	0.047	0.041	0.029	0.034	0.044	0.053	0.053	0.039	0.032	0.031	0.034	0.054	0.058		0.047		0.046	0.047	0.037	0.039
0.00012 J	9.1E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.0002 U
0.00027 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.0002 U
0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00027 J	0.00028 J	0.00029 J	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U
0.001 U	0.001 U	0.00069 J	0.00028 J	0.00045 J	0.001 U	0.00028 J	0.00045 J	0.00041 J	0.00041 J		0.001 U		0.00058 J	0.00028 J	0.00025 J	0.001 U	0.001 U	0.0019	0.0022	0.0022	0.0021	0.0019	0.0018	0.0022	0.0029	0.0027		0.0025		0.0023	0.0035	0.0017	0.0018
0.54 J+	0.55 J+	0.67 J	0.68 J	0.1 J	1.3 J	1.2 J	1.4 J	1.2 J	0.37 J	1.5 J	1.4 J	1.6 J	1.8 J	1.6	1.6	1.5	1.3	1.2 J+	0.85 J	0.85 J	0.74 J	0.8 J	0.77 J	0.74 J	0.82 J	0.82 J	0.93 J	0.67 J	0.76 J	0.69	0.52	0.73	0.6
0.001 U	0.001 U	0.001 U	0.00017 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U
0.0055 J	0.0065 J	0.008 U	0.008 U	0.0049 J	0.0045 J	0.0056 J	0.0054 J	0.0047 J	0.0042 J		0.0031 J		0.0037 J	0.0052 J	0.0055 J	0.0033 J	0.008 U	0.0053 J	0.008 U	0.008 U	0.008 U	0.004 J	0.0024 J	0.0041 J	0.0058 J	0.005 J		0.0023 J		0.0054 J	0.0053 J	0.0027 J	0.008 U
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U
0.01 U	0.0079 J	0.0075 J	0.0097 J	0.013	0.015	0.015	0.013	0.0094 J	0.01		0.014	0.012	0.01	0.011	0.012	0.0096 J	0.013	0.02	0.027	0.026	0.023	0.022	0.022	0.026	0.017	0.019		0.029		0.016	0.017	0.029	0.031
1.12	1.86	1.65	1.14	0.453	1.09	0.774	1.85	1.01	1.27		1.18 J+	0.868	1.04	1.24 J+	1.01		0.902 U	5 U	0.479	0.513	0.646 U	0.555 J+	0.339 U	0.463 U	0.335	0.342 U		0.657 J+		0.858 J+	0.476 U		0.136 U
0.005 U	0.005 U	0.005 U	0.005 U	0.002 J	0.005 U	0.0014 J	0.001 J	0.0015 J	0.0016 J		0.005 U		0.002 J	0.0019 J	0.005 U	0.0011 J	0.001 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U		0.005 U	0.005 U	0.005 U	0.001 U
0.0003 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.0002 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U
	0.44	1.06	0.43	0.38	0.44	0.61	0.71		0.57	0.45	0.1	0.04	0.61	0.28	0.04	0.35	0.17	0.48		0.48	0.14	0.25	0.16	0.19	1	0.32	0.29	0.06	0.02	1.97	0.15	0.12	0.09
	-57.7	67.3	-76.4	-100.1	-80.6	-102.6	68.2		19.7	-46.8	-121.6	-130.5	-100.5	-101.1	-16.8	-131.8	-106	-79.2		-60.1	-111	-114.3	-104.1	-104.4	-46.9	-43.7	-13.8	-56.8	-99.1	-254.7	-27.5	-100	-103.9
	7.08	7.15	6.96	7.36	7.44	7.29	7.36		7.46	7.36	7.56	7.43	7.32	7.46	7.49	7.56	7.65	6.88		6.98	6.83	6.96	6.99	6.76	6.61	6.96	6.88	6.95	6.89	5.2	7.1	7.34	7.34
	2356	2435	2088	1559	1352	1592	1561		1922	1722	1053	1301	1556	1693	1165	9.24	1419	779		909	733	594	584	674	9.32	1004	901	581	933	855	730	598	950
	14.1	14.7	15.1	13.6	13.45	14.5	14.8		15.5	16	14	14.4	16.1	16	14.2	14.4	13.3	15.3		20.3	19.9	14.6	12.1	11.6	14.6	16.6	18.1	10.8	10.6	17.1	8.3	15.8	11.5
	3.48	4.29	2.17	0.99	2.58	1.88	1.69		2.54	1.96	4.18	4.11	2.96	1.39	4.7	3.36	4.8	4.48		2.96	3.41	3.98	4.4	4.92	4.2	3.1	4.11	3.98	4.29	3.1	4.9	6.9	4.51

GAMW15B																	GAMW16																
2016-07-13	2016-09-08	2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-03	2018-03-15	2018-04-24	2018-09-06	2018-10-26	2019-05-08	2019-11-08	2020-04-27	2016-07-13	2016-09-08	2016-11-09	2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-04	2018-03-15	2018-04-24	2018-10-29		2019-05-03	2019-11-08	2020-04-23	
N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N
1.1	1.7	2	3.7	3.3	3.6	3.1	2.1	2.1		4.4	4.1	4.9	10	6.2	7.9	1.1	1.8	1.6	1.2	0.89	1.3	1	1.4	1.1		1.4	1.4	1.4	1.6	1.9	1.1	
160	160	160	180	160	170	190	170	73		230	200	210	280	280	273	230	180	170	120	160	210	220	240	57		220	160	160	210	210	302	
52	58	62	81	64	65	71	64	64		87	89	93	110	80	104	53	37	30	28	24	25	28	31	42		58	36	36	28	59	21.9	
0.65 J+	0.62 J	0.46 J	0.74 J	0.77 J	0.75 J	0.72 J	0.61 J	0.5 J	0.69 J	0.79 J	0.6 J	0.6	0.84 J+	0.89	0.84	1.4 J+	1.6 J	1.3 J	1.5	1.3 J	1.3 J	1.2 J	1.3 J	1.5 J	1 J	1.2 J	1.1	1.1	0.99	1.1	0.88	
7.81	7.49	7.04	7.52	7.48	7.11	7.26	7.37	7.42	7.45	7.36	7.8	6.74	7.43	7.57	7.56	7.92	7.18	7.48	7.5	7.58	7.17	7.36	7.06	7.62	7.41	7.67		7.28	7.46	7.8	7.79	
380 J-	390	340	500	390	460	530	540	500		790	720	770	1300	940	912	530 J-	400	320	47 O	300	500	480	630	520		530	340	350	570	530	757	
830	800	840	1000	890	980	1200	1100	1100		1400	1400	1400	2100	1600	1720	1100	810	790	570	670	930	1000	1100	980		1100	740	730	1100	1100	1290	
0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.00028 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	
0.003 J	0.0011 J	0.0014 J	0.0022 J	0.0011 J	0.00098 J	0.00084 J	0.00081 J		0.005 U		0.005 U	0.005 U	0.00088 J	0.005 U	0.001 U	0.011	0.0077	0.012	0.0084	0.0079	0.006	0.008	0.0096		0.002 J	0.0065	0.01	0.0098	0.005	0.0082	0.009	
0.054	0.053	0.056	0.056	0.051	0.052	0.064	0.069		0.068		0.07	0.064	0.081	0.054	0.054	0.049	0.042	0.035	0.024	0.029	0.043	0.044	0.054		0.057	0.045	0.035	0.035	0.034	0.034	0.046	
7.8E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	
0.00062 J	0.002 U	0.002 U	0.00033 J	0.00034 J	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00062 J	0.002 U	0.002 U	0.0031	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
0.001 U	0.001 U	0.001 U	0.001 U	0.00016 J	0.001 U	0.001 U	0.001 U		0.00029 J		0.00037 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00068 J	0.00051 J	0.00046 J	0.00055 J	0.00092 J	0.00094 J	0.0011		0.0013		0.00059 J	0.00061 J	0.00066 J	0.00061 J	0.0012	
0.65 J+	0.62 J	0.46 J	0.74 J	0.77 J	0.75 J	0.72 J	0.61 J	0.5 J	0.69 J	0.79 J	0.6 J	0.6	0.84 J+	0.89	0.84	1.4 J+	1.6 J	1.3 J	1.5	1.3 J	1.3 J	1.2 J	1.3 J	1.5 J	1 J	1.2 J	1.1	1.1	0.99	1.1	0.88	
0.001 U	0.001 U	0.00023 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	
0.0069 J	0.008 U	0.008 U	0.0077 J	0.0053 J	0.0082	0.0082	0.0077 J		0.007 J		0.008	0.0096	0.012	0.0085	0.0086	0.00043 J	0.008 U	0.008 U	0.00023 J	0.008 U	0.008 U	0.008 U	0.008 U		0.008 U		0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	
0.011	0.013	0.01	0.012	0.015	0.014	0.014	0.012		0.011		0.01	0.011	0.012	0.01	0.012	0.024	0.036	0.045	0.044	0.03	0.027	0.023	0.024		0.027	0.031	0.033	0.033	0.027	0.028	0.022	
1.26	0.594	0.61	1.14 J+	0.876	0.687	0.789	0.872		1.69 J+		1.31	1.51 J+	1.61		1.08 U	1.68	0.543	0.527 U	0.629 U	0.648	0.392 U	0.339 U	0.429		0.862 J+	0.29	0.862 J+	1.32 J+	0.685 U		0.325 U	
0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U		0.0017 J	0.005 U	0.005 U	0.005 U	0.001 U	0.005 U	0.005 U	0.0005 J	0.0005 J	0.005 U	0.0012 J	0.005 U	0.005 U		0.0015 J		0.005 U	0.005 U	0.005 U	0.0015 J	0.001 U	
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.0003 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	
0.22	0.91	0.56	0.22	0.46	0.3	0.43	0.64	0.23	0.08	0.04	0.29	2.06	0.23	0.16	0.16	0.16	0.27	0.48	0.31	0.36	0.14	0.5	0.14	0.06	0.22	0.22		1.27	0.29	4.02	0.19	
-129.7	-21.6	-94.6	-132.6	-81.7	-79.6	-21.3	-36.5	-42.6	-64	-102.4	-91.2	-256.1	46.3	-189.2	-98.1	-18.06	711.6	-124.8	-78.8	-136.9	-73.6	-114.2	9.6	-158.4	-55.9	-106.5		-216.8	8	-2	-124.3	
7.81	7.49	7.04	7.52	7.48	7.11	7.26	7.37	7.42	7.45	7.36	7.8	6.74	7.43	7.57	7.56	7.92	7.18	7.48	7.5	7.58	7.17	7.36	7.06	7.62	7.41	7.67		7.28	7.46	7.8	7.79	
834	1049	1060	1237	940	1096	1099	1110	1294	1255	1612	2757	1889	1798	1384	2359	1331	1112	927	751	821	1257	1123	1406	1254	1029	1239		1046	1001	1014	1680	
12.71	15.9	16.1	13.9	13.6	13	13.8	14.2	14.5	13.3	13	14.13	13.6	8.1	13.8	13.9	15.02	18.8	18.15	12.1	9.72	10.6	15.41	18	17.8	8.71	9.2		17.81	10.5	17.52	10.3	
4.72	1.56	1.48	3.8	2.23	3.65	3.16	1.78	0.4	4.59	4.88	3.59	1.35	3.56	1.49	4.3	3.89	2.16	1.93	3.16	4.14	3.25	4.33	2.45	4.95	4.62	12.81		3.64	4.65	3.98	8.11	

GAMW16B																		
2016-07-13	2016-09-08	2016-11-09		2017-01-11	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-04	2018-03-15	2018-04-24	2018-09-07	2018-10-29	2019-05-06	2019-11-08		2020-04-24	
N	N	FD	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	N	
1.8	1.6	1.4	1.4	1.4	1.4	1.1	3.4	6.5	2.9		4.1	7.6	9.7	12	11	10	8.2	
230	190	180	180	210	210	270	220	260	100		250	310	350	350	300	280	230	
63	56	57	55	57	47	71	71	120	78		140	160	150	190	220	210	122	
1.1 J+	1.1 J	0.84 J	0.73 J	0.99 J	0.87 J	0.83 J	0.76 J	0.78 J	1 J	0.8 J	0.76 J	0.73 J	0.64	0.76	1	1	0.78 J-	
7.76	7.47		7.41	7.57	7.55	7.3	7.51	7.28	7.54	7.6	7.65	7.97	7.02	7.49		7.85	7.73	
580 J-	480	500	440	50 O	470	730	720	640	580		690	760	890	940	1500	1500	884	
1100	1000	1000	1000	1000	1000	1300	1200	1400	1200		1400	20 U	1600	1800	2400	2400	1860	
0.002 U	0.002 U	0.00057 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.00095 J		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	
0.0068	0.0064	0.011	0.011	0.012	0.0095	0.012	0.0096	0.0081		0.0099	0.0097	0.011	0.0088	0.0071	0.0079	0.0076	0.008	
0.072	0.04	0.036	0.035	0.038	0.039	0.055	0.043	0.046		0.053	0.058	0.068	0.071	0.079	0.055	0.054	0.043	
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.00022 J		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	
0.002 U	0.002 U	0.00029 J	0.002 U	0.00026 J	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	
0.001 U	0.00016 J	0.00019 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.0003 J		0.00054 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	
1.1 J+	1.1 J	0.84 J	0.73 J	0.99 J	0.87 J	0.83 J	0.76 J	0.78 J	1 J	0.8 J	0.76 J	0.73 J	0.64	0.76	1	1	0.78 J-	
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	
0.0055 J	0.008 U	0.0032 J	0.0022 J	0.0058 J	0.0035 J	0.0072 J	0.006 J	0.0061 J		0.007 J		0.0059 J	0.0059 J	0.007 J	0.0054 J	0.0055 J	0.008 U	
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	
0.013	0.012	0.012	0.012	0.012	0.013	0.023	0.016	0.013		0.016	0.015	0.012	0.011	0.014	0.02	0.019	0.017	
1.31	1.05	0.866	0.794	0.998 J+	0.577	1.23	0.795	1.21		1.11 J+	0.99	1.17 J+	1.64 J+	0.984			1.42 U	
0.005 U	0.005 U	0.00061 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		0.005 U		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.001 U	
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	
1.23	1.63		0.39	0.3	0.21	0.12	0.32	0.16	0.15	0.28	0.25	1.02	4.23	0.33		3.41	0.14	
-122.6	-89		-126.3	-148.5	-132.2	-130.2	-123.1	-32.7	-135.8	-75.5	-117.8	-101.5	-166.8	21.2		-99.5	-129.6	
7.76	7.47		7.41	7.57	7.55	7.3	7.51	7.28	7.54	7.6	7.65	7.97	7.02	7.49		7.85	7.73	
1147	1297		1158	1230	1192	1645	1333	1665	1461	1142	1653	3104	2098	1692		2340	2595	
13.04	14.44		15.27	14.3	13.37	12.3	13.48	14.3	15	12.6	12.3	15	17.7	11.2		14.65	13	
4.1	3.99		1.8	2.76	4.21	4.58	3.27	2.48	3.9	4.08	4.2	4.99	3.49	3.72		2.81	6.61	

GAMW17																				
2016-07-14	2016-09-08	2016-11-09	2017-01-10	2017-03-02	2017-04-27	2017-06-29	2017-08-24	2017-10-04	2018-03-14		2018-04-23		2018-10-29	2019-05-09	2019-11-08	2020-04-24		
N	N	N	N	N	N	N	N	N	FD	N	FD	N	N	N	N	N		
12	12	11	11	11	8.9	7.6	12	12			5.8	5.8	16	7.7	4.9	7.6		
150	160	170	180	200	180	120	150	64			110	110	200	130	120	198		
110	100	130	150	140	81	170	130	160			40	38	150	90	92	106		
1.8 J+	2.2 J	2 J	1.9 J	1.6 J	1.6 J	0.79 J	1.9 J	2.4 J	5 U	1.7 J	1.9 J	1.9 J-	1.7	1.6	1.7	1.2 J-		
7.56	7.27	7.21	7.33	7.54	7.23	7.4	7.16	7.22		7.62		7.82	6.85	7.53	7.75	7.34		
330 J-	330	360	390	390	390	520	250	350			240	220	430	300	290	459		
940	920	940	1000	1100	950	1400	890	1000			630	620	1100	800	860	1120		
0.00034 J	0.00032 J	0.00032 J	0.002 U	0.00028 J	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U			0.002 U	0.002 U	0.002 U	0.001 U		
0.0054	0.0056	0.0042 J	0.0069	0.0055	0.0054	0.0035 J	0.0028 J		0.005 U	0.0027 J			0.004 J	0.0021 J	0.0028 J	0.0023		
0.047	0.056	0.054	0.05	0.054	0.048	0.044	0.06		0.041	0.058		0.029	0.073	0.041	0.052	0.067		
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.00076 J	0.001 U	0.0002 U		
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U	0.0002 U		
0.0015 J	0.002 U	0.0011 J	0.0011 J	0.0012 J	0.0012 J	0.002 U	0.002 U		0.0017 J	0.0014 J			0.002 U	0.002 U	0.002 U	0.002 U		
6.3E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U	0.001 U		
1.8 J+	2.2 J	2 J	1.9 J	1.6 J	1.6 J	0.79 J	1.9 J	2.4 J	5 U	1.7 J	1.9 J	1.9 J-	1.7	1.6	1.7	1.2 J-		
0.00018 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.001 U	0.001 U	0.001 U		
0.0047 J	0.008 U	0.0036 J	0.0047 J	0.0024 J	0.0045 J	0.0058 J	0.0076 J		0.008 U	0.0035 J			0.0066 J	0.0035 J	0.0052 J	0.008 U		
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U	0.0002 U			0.0002 U	0.0002 U	0.0002 U	0.0002 U		
0.015	0.012	0.011	0.01 U	0.01	0.011	0.018	0.024		0.024	0.024		0.02	0.017	0.017	0.012	0.03		
0.569	0.451 U	0.447 U	0.553 U	0.428	0.477	0.403 U	0.71		0.816 J+	0.384 U		0.205	1.1 J+	0.518 U		1.02 U		
0.019	0.03	0.018	0.023	0.028	0.026	0.0081	0.0032 J		0.0074	0.021		0.015	0.022	0.004 J	0.011	0.0011		
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U	0.001 U			0.001 U	0.00063 J	0.001 U	0.001 U		
5.78	1.7	1.8	1.01	2.35	7.33	3.18	4.33	3.3		4.99		9	1.78	5.75	6.47	3.15		
45.8	825.9	6.1	82.3	6.6	67.9	23.3	8	57.9		-90.2		-90.2	-237	53.1	35	25.2		
7.56	7.27	7.21	7.33	7.54	7.23	7.4	7.16	7.22		7.62		7.82	6.85	7.53	7.75	7.34		
1059	1287	1141	1272	1541	1290	902	1151	1357		832		675	1513	894	798	1017		
17.23	20.6	18.63	13.6	10.95	11.8	17.71	24.4	22.3		10.9		11.4	20	12.1	17.23	9.31		
1.56	1.09	0.58	2.58	0.44	2.21	1.02	1.5	2.51		0.54		1.19	0.45	0.44	0.86	0.73		

GAMW17B																
2016-07-13	2016-09-08	2016-11-09	2017-01-10	2017-03-02	2017-04-27	2017-06-29	2017-08-23	2017-10-04	2018-03-14	2018-04-23	2018-09-06	2018-10-29	2019-05-09	2019-11-08	2020-04-24
N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
18	19	19	21	22	20	16	13	11		13	10	12	12	9.4	8.7
230	250	240	250	270	250	240	160	57		180	150	150	180	150	141
180	170	180	190	200	200	71	99	130		140	120	110	130	110	111
0.9 J+	0.98 J	0.68 J	0.58 J	0.6 J	0.6 J	2.1 J	1.3 J	1.1 J	0.55 J	0.58 J	0.84 J	0.71	0.62	0.67	0.68 J-
7.43	7.37	7.1	7.24	7.44	7.02	7.25	7.19	7.38	7.48	7.39	7.63	7.4	7.15	7.66	7.22
710 J-	680	710	740	710	680	300	380	420		520	350	350	270	350	314
1500	1400	1400	1500	1700	1500	660	1000	960		1100	940	950	980	990	835
0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.001 U
0.0024 J	0.0021 J	0.0024 J	0.0035 J	0.0023 J	0.0022 J	0.0023 J	0.0026 J		0.0011 J		0.0017 J	0.0023 J	0.0022 J	0.0019 J	0.0015
0.078	0.079	0.086	0.092	0.1	0.089	0.065	0.06		0.085	0.069	0.066	0.073	0.11	0.074	0.065
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.00033 J	0.001 U	0.0002 U
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U
0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U		0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.0003 J	0.001 U	0.001 U	0.001 U	0.001 U
0.9 J+	0.98 J	0.68 J	0.58 J	0.6 J	0.6 J	2.1 J	1.3 J	1.1 J	0.55 J	0.58 J	0.84 J	0.71	0.62	0.67	0.68 J-
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
0.0017 J	0.008 U	0.008 U	0.0019 J	0.00046 J	0.0021 J	0.0019 J	0.008 U		0.008 U		0.008 U	0.008 U	0.008 U	0.008 U	0.008 U
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
0.024	0.021	0.013	0.011	0.012	0.011	0.017	0.021		0.017	0.016	0.01	0.011	0.0073 J	0.01	0.014
1.79	1.84	2.53	2.58	1.25	1.94	1.03	2.4		1.64 J+	1.21	1.47	2.48 J+	1.71		1.74
0.005 U	0.005 U	0.005 U	0.00053 J	0.00051 J	0.005 U	0.005 U	0.005 U		0.005 U		0.0011 J	0.005 U	0.005 U	0.005 U	0.001 U
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		0.001 U		0.001 U	0.001 U	0.00022 J	0.001 U	0.001 U
0.33	0.24	0.67	0.36	0.13	0.13	0.18	0.14	0.09	0.16	0.11	0.2	0.88	0.23	4.2	0.2
-115	654	-100.8	-119.6	-91.8	102.3	-98.6	-51.1	-129.4	-95.2	-131.9	-91.9	-244.5	11.8	-3.6	-94.1
7.43	7.37	7.1	7.24	7.44	7.02	7.25	7.19	7.38	7.48	7.39	7.63	7.4	7.15	7.66	7.22
1525	1734	1568	171.9	2251	1950	1488	1244	1337	1235	1463	2077	1380	1060	890	920
15.29	16.16	15.77	15	14.8	14.4	15.62	16.5	16.6	15.2	15.2	16.55	16.1	13.6	15.05	13.12
4.09	2.48	0.62	0.92	0.58	2.11	2.35	1.86	3.45	3.76	3.88	3.55	4.86	3.61	2.68	4.58

GAMW18																													
2016-07-13	2016-09-08	2016-11-09		2017-01-10	2017-03-01	2017-04-26	2017-07-12		2017-08-23	2017-10-03		2018-03-14	2018-04-23	2018-10-25	2019-04-29	2019-11-07	2020-04-23
N	N	FD	N	N	N	N	FD	N	N	FD	N	N	N	N	N	N	N	N
1.8	3.5	1.9	1.8	1.3	1	0.77	1.2	1.2	1.5	1.9	1.9		1.2	1.7	0.95	1.7	1.2
320	610 O	370	360	330	280	210	280	290	300	380 J	64 J		320	230	320	360	294
17	39	17	17	9.3	5	4.3	10	10	11	23	23		7.3	22	12	27	16.7
0.047 J+	0.036 J	10 U	10 U	5 U	5 U	2 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.057	0.074	0.15	0.17
6.95	6.83		6.7	6.88	7.11	6.6		6.96	7.02		6.91	7.2	7.21	6.54	6.71	7.18	6.96
760 J-	1400	850	830	640	540	370	600	610	690	960	950		670	550	780	920	679
1300	2200	1500	1500	1200	1000	730	1100	1100	1300	1600	1500		2400	1100	1400	1500	1130
0.002 U	0.002 U	0.00096 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U	0.001 U
0.0014 J	0.0023 J	0.0014 J	0.00091 J	0.0014 J	0.005 U	0.0015 J	0.0021 J	0.0021 J	0.0011 J			0.005 U		0.005 U	0.00079 J	0.005 U	0.001 U
0.038	0.047	0.041	0.039	0.037	0.024	0.021	0.051	0.052	0.055			0.048	0.035	0.037	0.039	0.05	0.033
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.00094 U	0.001 U	0.0002 U
8.1E-05 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.001 U	0.001 U	0.0002 U
0.002 U	0.002 U	0.00067 J	0.00046 J	0.0005 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U			0.002 U		0.002 U	0.002 U	0.002 U	0.002 U
0.002 U	0.00023 J	0.00047 J	0.0002 J	0.00024 J	0.001 U	0.00023 J	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.00028 J	0.001 U	0.001 U
0.047 J+	0.036 J	10 U	10 U	5 U	5 U	2 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.057	0.074	0.15	0.17
0.001 U	0.001 U	0.00051 J	0.00025 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.00067 J		0.001 U	0.001 U	0.001 U	0.001 U
0.00096 J	0.008 U	0.008 U	0.008 U	0.00042 J	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U			0.008 U		0.008 U	0.008 U	0.008 U	0.008 U
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ			0.0002 U		0.0002 U	0.0002 U	0.0002 U	0.0002 U
0.11	0.18 O	0.14 O	0.13 O	0.094	0.1	0.1	0.1	0.11	0.1			0.097	0.085	0.057	0.062	0.076	0.071
5 U	0.803	0.474	0.449	0.581 U	0.398 U	0.384 U	0.493	0.337 U	0.629			0.373 U	0.259	0.477	0.365 U		0.238 U
0.01	0.018	0.0065	0.0052	0.0099	0.011	0.0053	0.012	0.012	0.006			0.009	0.0084	0.015	0.015	0.012	0.018
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			0.001 U		0.001 U	0.001 U	0.001 U	0.001 U
4.83	4.77		5.93	7.52	8.86	7.79		6.04	4.52		5.32	6.5	8.49	3.78	7.01	2.95	5.6
98.9	76.8		28.7	106.8	97.9	209.2		203.2	24.7		121.9	-129.6	-51.6	-36.6	129.2	-41.1	241.3
6.95	6.83		6.7	6.88	7.11	6.6		6.96	7.02		6.91	7.2	7.21	6.54	6.71	7.18	6.96
1474	2362		1740	1255	986	970		1299	1414		1760	905	1170	1230	1060	1338	995
16.3	20.1		16.6	9.65	8.47	11.2		17.9	19.8		19.3	8.1	8.9	17.4	8.8	14.2	9.18
3.32	1.63		2.38	3.05	4.44	2.48		1.71	1.03		4.16	4.59	0.71	1.29	4.55	2.04	1.33

GAMW18B						GAMW46									GAMW46B									GAMW52					GAMW52B				
2018-09-10	2018-10-25		2019-04-29	2019-11-07	2020-04-23	2018-06-13	2019-03-01	2019-04-17	2019-06-06	2019-07-18	2019-08-26	2019-10-04	2019-11-19	2020-04-21	2018-06-13	2019-03-04	2019-04-17	2019-06-07	2019-07-18	2019-08-26	2019-10-04	2019-11-19	2020-04-21	2018-09-10	2018-10-31	2019-05-09	2019-11-14	2020-04-30	2018-09-11	2018-10-31	2019-05-09	2019-11-14	2020-04-30
N	FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
13	12	13	14	11	10.9	0.055 J	0.1 U	0.033 J	0.1 U	0.032 J	0.053 J	0.043 J	0.049 J	0.1 U	0.05 J	0.05 J	0.037 J	0.047 J	0.03 J	0.05 J	0.047 J	0.046 J	0.1 U	0.34	0.17	0.077 J	0.13	0.1 U	0.75	0.8	1	1.3	0.77
260	200	220	240	180	299	56	14	28	25 J-	25	25	23	27	24.5	25	58	58	56	52	58	49	56	53.8	75	59	52	72	48.3	160	160	110	130	129
150	140	140	170	140	117	8.4	2.4	1.9		1.8	1.6	1.6	1.6	1.6	3	7.9	7.9		7.2	8	7.1	6.9	5.5	34	9.1	5.5	37	8.2	530	470	380	370	496
0.77 J	0.74	0.73	0.88	0.99	0.91	0.052 J	0.068	0.063		0.065	0.06	0.079 J+	0.062	0.062	0.048 J	0.066	0.076		0.072	0.069	0.073 J+	0.072	0.084	0.36 J	0.3	0.25 J+	0.3	0.29	10 U	0.18	0.21 J+	0.23	0.26
7.73		6.86	7.15	7.68	7.21	7.93	8.17	8.23	7.52	8.15	7.9	7.81	7.77	8.64	8.2	7.11	7.99	7.58	8.18	7.62	7.44	7.47	8.08	7.5	7.06	7.17	7.59	7.98	8.3	7.1	7.42	7.34	7.6
1100	1000	1100	1100	840	1220	55	34	30		28	29	30	27	24.7	29	64	64		64	68	65	64	58.8	86	39	24	67	21.6	210	190	220	290	216
2100	2000	2000	2100	1500	2060	260	160	150		130	150	140 J+	140	101	150	260	290		240	220 J	250	240	209	400	250	240	350	205	1500	1300	1100	1100	1260
0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U
0.0018 J	0.0026 J	0.0028 J	0.0037 J	0.0041 J	0.0029	0.0014 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00086 J	0.005 U	0.001 U	0.0015 J	0.0012 J	0.00076 J	0.005 U	0.00091 J	0.00095 J	0.0013 J	0.001 J	0.001 U	0.005 U	0.005 U	0.005 U	0.005 U	0.001 U	0.0013 J	0.0016 J	0.00083 J	0.0012 J	0.0011
0.048	0.035	0.039	0.039	0.024	0.041	0.027	0.0028 J	0.0059	0.0065	0.0054	0.0054	0.0049 J	0.0059	0.0053	0.0086	0.027	0.026	0.025	0.023	0.024	0.021	0.025	0.025	0.039	0.019	0.015	0.02	0.013	0.32	0.31	0.25	0.28	0.29
0.001 U	0.001 U	0.001 U	0.00053 U	0.001 U	0.0002 U	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00054 J	0.001 U	0.0002 U	0.001 U	0.0011	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0011	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.00042 J	0.001 U	0.001 U	0.0002 U
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.00024 J	0.001 U	0.001 U	0.0002 U	0.001 U	0.00029 J	0.001 U	0.001 U	0.0002 U
0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.0014 J	0.002 U	0.002 U	0.002 U	0.0021	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
0.00027 J	0.00026 J	0.00028 J	0.00024 J	0.00024 J	0.001 U	0.0002 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00034 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00058 J	0.00031 J	0.001 U	0.001 U	0.001 U	0.001 U	0.00032 J	0.001 U	0.001 U	0.001 U
0.77 J	0.74	0.73	0.88	0.99	0.91	0.052 J	0.068	0.063		0.065	0.06	0.079 J+	0.062	0.062	0.048 J	0.066	0.076		0.072	0.069	0.073 J+	0.072	0.084	0.36 J	0.3	0.25 J+	0.3	0.29	10 U	0.18	0.21 J+	0.23	0.26
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
0.025	0.015	0.016	0.023	0.015	0.026	0.008 U	0.04 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.0017 J	0.008 U	0.008 U	0.002 J	0.008 U	0.008 U	0.003 J	0.008 U	0.0017 J	0.008 U	0.008 U	0.0025 J	0.008 U	0.0041 J	0.0031 J	0.0033 J	0.0071 J	0.0086
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
0.024	0.014	0.015	0.026	0.011	0.039	0.0031 J	0.01	0.01 U	0.01 U	0.01 U	0.01 U	0.0015 J	0.01 U	0.001 U	0.0018 J	0.0024 J	0.0022 J	0.0025 J	0.0028 J	0.0028 J	0.0025 J	0.003 J	0.0021	0.005 J	0.0035 J	0.0016 J	0.0017 J	0.0012	0.014	0.015	0.0095 J	0.0086 J	0.016
1.7	1.28	1.46			0.75 U	0.384 U	0.486 U	0.33 U		0.427 U	0.505 U	0.566		0.186 U	0.392 U	0.402 U	0.308 U		0.427 U	0.609 U	0.408 U		1.5 U	0.796	1 J+	0.53 U		1.07 U	3.52	5.55 J+	2.63		2.44
0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.001 U	0.001 J	0.025 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.001 U	0.0017 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.001 U	0.0014 J	0.0017 J	0.0014 J	0.0011 J	0.001 U	0.005 U	0.005 U	0.005 U	0.005 U	0.001 U
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00059 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00068 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
0.24		0.29	0.92	0.36	0.18	0.12	1.85	4.18	6.44	6.58	4.03	2.44	3.36	3.42	3.59	0.08	1.9	0.3	1.4	1.25	0.31	0.3	0.17	0.48	0.21	6.42	2.2	6.9	0.44	0.1	0.15	0.19	0.09
-140.7		-103.4	109.2	-144.8	-77.7	-171.4	1.9	7.7	157.6	25.5	40.6	9.16	-141.1	125.6	-29.4	111.9	-111.1	-133.1	-93.9	-119.9	33.7	-229.6	-137.1	-30.3	85.1	108.2	-43.2	165.6	-214.9	-103.5	6.31	-102.9	-104.2
7.73		6.86	7.15	7.68	7.21	7.93	8.17	8.23	7.52	8.15	7.9	7.81	7.77	8.64	8.2	7.11	7.99	7.58	8.18	7.62	7.44	7.47	8.08	7.5	7.06	7.17	7.59	7.98	8.3	7.1	7.42	7.34	7.6
3311		2147	1902	1475	1897	367	155	161	179	153	153	152	132	208	211	268	294	282	274	284	260	242	405	896	448	308	320	389	1934	2005	1652	1353	2424
15.39		14.9	11.8	13.7	12.1	11.4	8	9.1	11.1	13.2	14.2	14.8	11.7	8.3	11.3	9.6	10.8	11	11.9	12.3	12.3	11.3	10	19.97	17.6	14.2	15.3	10.9	17.26	16.6	15.3	16.1	15.3
2.78		3.58	3.21	3.14	2.35	3.96	1.91	1.33	0.51	0.82	0.69	0.89	0.66	2.18	3.45	3.26	4.3	3.25	3.11	1.15	4.16	2.84	4.02	0.45	0.83	0.42	0.74	1.57	1.6	0.88	2.35	1.01	4.92

GAMW53					GAMW53B					GAMW54					GAMW54B					GAMW55				GAMW55B							GAMW55R	
2018-09-11	2018-10-30	2019-04-30	2019-11-14	2020-05-01	2018-09-11	2018-10-30	2019-04-30	2019-11-14	2020-05-01	2018-09-10	2018-10-31	2019-04-30	2019-11-14	2020-05-04	2018-09-10	2018-10-31	2019-05-01	2019-11-15	2020-05-04	2018-09-10		2018-10-29		2018-09-11		2018-10-29	2019-05-01	2019-11-15	2020-05-05		2019-11-15	2020-05-05
N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	FD	N	FD	N	N	N	N	FD	N	N	N
0.19	0.25	0.056 J	0.13	0.1 U	2.5	3.1	2.2	0.73	3.3	0.84	0.77	0.39	0.37	0.42	5.6	6.5	5.9	6	2.7	1.9	1.9	1.8	1.8	7.1	7.4	8.2	9.1	11	0.21 J	10.9 J	1.1	0.96
45	53	17	25	32	180	190	150	140	180	93	88	93	81	131	210	220	200	240	214	260	250	270	260	250	250	260	210	210	116 J	219 J	180	169
4.9	4.6	1.9	3.6	4.3	90	85	81	74	107	15	10	10	4	12.3	100	95	110	120	68.3	58	59	69	70	220	220	190	170	150	119	119	61	46.3
0.17 J	0.17	0.05 U	0.05 U	0.05 U	0.52 J	0.46	0.51	0.7	0.46	0.18 J	0.17	0.14	0.28	0.18	0.41 J	0.52	0.59	0.58	0.54	0.51 J	0.52 J	0.47	0.47	0.29 J	10 U	0.25	0.31	0.31	0.33	0.32	0.62	0.52
6	6.47	5.93	6.21	6.42	7.3	7.35	7.41	7.52	7.48	6.24	7.92	6.82	7.08	6.74	6.95	8.71	7.27	7.2	7.43		6.77		7.04		7.07	7.19	7.31	7.46		7.45	7.31	7.51
51	56	37	36	32.6	430	510	340	320	488	190	150	190	76	284	750	730	710	720	470	590	600	630	620	820	820	910	790	750	676	674	480	345
240	250	130	160	161	1100	1100	900	770	1060	500	400	470	350	618	1600	1400	1500	1400	1000	1200	1300	1300	1300	1800	1900	1800	1700	1400	1400	1420	950	846
0.002 U	0.002 U	0.002 U	0.00061 J	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.0011 J	0.00074 J	0.00078 J	0.001 J	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.001 U	0.002 U	0.001 U
0.013	0.015	0.00097 J	0.0018 J	0.0015	0.00079 J	0.00083 J	0.001 J	0.0016 J	0.0028	0.0024 J	0.0028 J	0.0022 J	0.0045 J	0.0045	0.0025 J	0.0032 J	0.0045 J	0.005	0.0042	0.00083 J	0.005 U	0.005 U	0.005 U	0.0014 J	0.0011 J	0.005 U	0.005 U	0.005 U	0.0079 J	0.001 UJ	0.005 U	0.001 U
0.027	0.028	0.019	0.026	0.023	0.052	0.054	0.044	0.072	0.099	0.043	0.039	0.031	0.031	0.052	0.098	0.093	0.08	0.084	0.06	0.099	0.097	0.068	0.069	0.14	0.14	0.12	0.074	0.067	0.045 J	0.067 J	0.035	0.046
0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.00059 J	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.0002 U	0.001 U	0.0002 U
0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.0002 U	0.001 U	0.0002 U
0.0019 J	0.0018 J	0.0012 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
0.00084 J	0.00099 J	0.0005 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00053 J	0.00052 J	0.00062 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0065	0.0058	0.0044	0.0044	0.00034 J	0.00028 J	0.001 U	0.001 U	0.001 U	0.0087 J	0.001 UJ	0.001 U	0.001 U
0.17 J	0.17	0.05 U	0.05 U	0.05 U	0.52 J	0.46	0.51	0.7	0.46	0.18 J	0.17	0.14	0.28	0.18	0.41 J	0.52	0.59	0.58	0.54	0.51 J	0.52 J	0.47	0.47	0.29 J	10 U	0.25	0.31	0.31	0.33	0.32	0.62	0.52
0.0014	0.00089 J	0.00057 J	0.00063 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
0.008 U	0.008 U	0.008 U	0.0021 J	0.008 U	0.0042 J	0.0052 J	0.005 J	0.0066 J	0.011	0.008 U	0.008 U	0.008 U	0.0023 J	0.008 U	0.0048 J	0.0036 J	0.0048 J	0.0074 J	0.008 U	0.0021 J	0.0017 J	0.008 U	0.008 U	0.0064 J	0.0064 J	0.0054 J	0.0055 J	0.0078 J	0.008 U	0.013	0.0035 J	0.008 U
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
0.012	0.015	0.0051 J	0.011	0.0068	0.0083 J	0.0075 J	0.0098 J	0.02	0.016	0.043	0.044	0.023	0.03	0.014	0.018	0.019	0.0085 J	0.012	0.018	0.03	0.028	0.026	0.026	0.0057 J	0.0055 J	0.0055 J	0.0046 J	0.005 J	0.009 J	0.0053 J	0.024	0.02
0.547 U	1.45 J+	0.344 U		0.316 U	1.69	0.48 J+	1.26		1.73	0.5	1.08 J+	0.393 U		0.734 U	2.03	2.7 J+	1.82		0.701 U	1.4	0.802	0.922 J+	1.24 J+	3.35	3.18	3.66 J+	2.08		3.06	3.02		1.39 U
0.005 U	0.005 U	0.005 U	0.005 U	0.001 U	0.005 U	0.005 U	0.005 U	0.005 U	0.001 U	0.0017 J	0.0012 J	0.0043 J	0.0035 J	0.0043	0.005 U	0.005 U	0.005 U	0.005 U	0.001 U	0.0037 J	0.0031 J	0.0027 J	0.0027 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.002	0.001 U	0.0046 J	0.0045
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00049 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00021 J	0.001 U	0.00023 J	0.00022 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00022 J	0.001 U
0.53	0.86	3.11	0.84	1.39	0.26	0.8	0.36	0.09	0.12	0.61	1.41	0.72	0.26	0.65	0.42	2.12	0.42	0.31	0.1		1.73		0.33		0.37	0.17	0.11	0.17		0.1	0.72	1.95
-24.6	-199.5	43.7	-54.8	168	-183.2	-168	27.7	-75.3	-118.9	107.8	-294.7	48.4	-69.5	24.5	-123.4	-315.7	-23.1	-43.3	117.5		21.6		-69.4		-129.5	-115.9	-57.5	-137.9		-101.9	-28.9	148.6
6	6.47	5.93	6.21	6.42	7.3	7.35	7.41	7.52	7.48	6.24	7.92	6.82	7.08	6.74	6.95	8.71	7.27	7.2	7.43		6.77		7.04		7.07	7.19	7.31	7.46		7.45	7.31	7.51
307	400	125	155	260	1354	1620	1160	870	1634	675	630	493	374	960	1816	1983	1636	1310	630		1493		1574		2109	2201	1967	1491		2018	1017	1270
21.3	20.1	11.4	17.5	13.3	20.89	20.4	18.7	19.7	20.2	21.2	18.53	10.5	15.3	11.4	17.6	17.29	15.5	15.8	15.6		21.1		19.4		19.2	18.5	18.1	17.9		17.1	16.7	12.8
9.93	5.17	4.76	4.8	4.8	2.43	3	3.45	2.5	7.86	2.03	1	3.24	2.31	4.9	4.2	1.64	4.49	1.67	4.31		1.74		0.66		4.38	1.74	4.77	3.92		4.11	2.26	2.4

GAMW56					GAMW56B				
2018-09-11	2018-10-26	2019-04-29	2019-11-15	2020-05-05	2018-09-11	2018-10-29	2019-04-29	2019-11-15	2020-05-05
N	N	N	N	N	N	N	N	N	N
0.26	0.28	0.21	0.2	0.22	1.2	1.2	2.3	3.2	2.1
130	110	91	120	115	140	140	150	150	141
3.1	2.4	3.2	2.1	2.8	50	36	55	64	50.8
1.2 J	0.99	0.53	0.71	0.66	0.41 J	0.33	0.4	0.44	0.55
6.82	7.17	6.83	7.06	7.05	6.95	6.91	7.08	7.21	7.52
57	63	54	56	56.3	170	130	260	360	280
470	480	420	440	456	740	690	830	860	753
0.002 U	0.002 U	0.002 U	0.002 U	0.001 U	0.002 U	0.002 U	0.002	0.002 U	0.001 U
0.019	0.022	0.011	0.0097	0.0076	0.005 U	0.005 U	0.005	0.005 U	0.001 U
0.068	0.049	0.044	0.04	0.047	0.076	0.072	0.082	0.076	0.071
0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001	0.001 U	0.0002 U
0.001 U	0.001 U	0.001 U	0.001 U	0.0002 U	0.001 U	0.001 U	0.001	0.001 U	0.0002 U
0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002	0.002 U	0.002 U
0.0017	0.0053	0.0084	0.0081	0.0092	0.001 U	0.001 U	0.001	0.001 U	0.001 U
1.2 J	0.99	0.53	0.71	0.66	0.41 J	0.33	0.4	0.44	0.55
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001	0.001 U	0.001 U
0.0034 J	0.0039 J	0.0023 J	0.0053 J	0.008 U	0.0051 J	0.0035 J	0.0044	0.0062 J	0.0082
0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002	0.0002 U	0.0002 U
0.013	0.0094 J	0.0072 J	0.0079 J	0.0093	0.004 J	0.003 J	0.0031	0.0064 J	0.0086
0.728	0.698 J+			0.669 U	1.26	1.28 J+			2.11
0.005 U	0.005 U	0.005 U	0.005 U	0.0022	0.005 U	0.005 U	0.005	0.005 U	0.001 U
0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001	0.001 U	0.001 U
0.99	0.28	1.3	0.34	0.21	0.29	0.26	0.79	0.18	0.09
-97.4	-95.4	64	-86.6	-42.1	-102.8	-44.4	31.8	-105.7	-105.5
6.82	7.17	6.83	7.06	7.05	6.95	6.91	7.08	7.21	7.52
749	835	460	466	782	928	1036	856	741	1179
17	15.7	8.7	14	9.6	13.9	13.8	11.6	12.9	11.8
2.91	2.99	2.31	2.01	2.4	2.96	1.45	4.77	1.4	4.56

Prepared by: DFSC
Checked by: KMC
Reviewed by: MAH

MCU E 2019 Annual Groundwater Monitoring and Corrective Action Report- Material Storage Runoff Basin, Metal Cleaning Waste Basin, Metal Cleaning Waste Basin, and Drying Area- January 2020

2019 Annual Groundwater Monitoring and Corrective Action Report - Material Storage Runoff Basin, Metal Cleaning Waste Basin, and Drying Area

NIPSCO LLC R. M. Schahfer Generating Station

Prepared Pursuant to 40 CFR §257.90(e) and Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

Submitted to:

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January 31, 2020

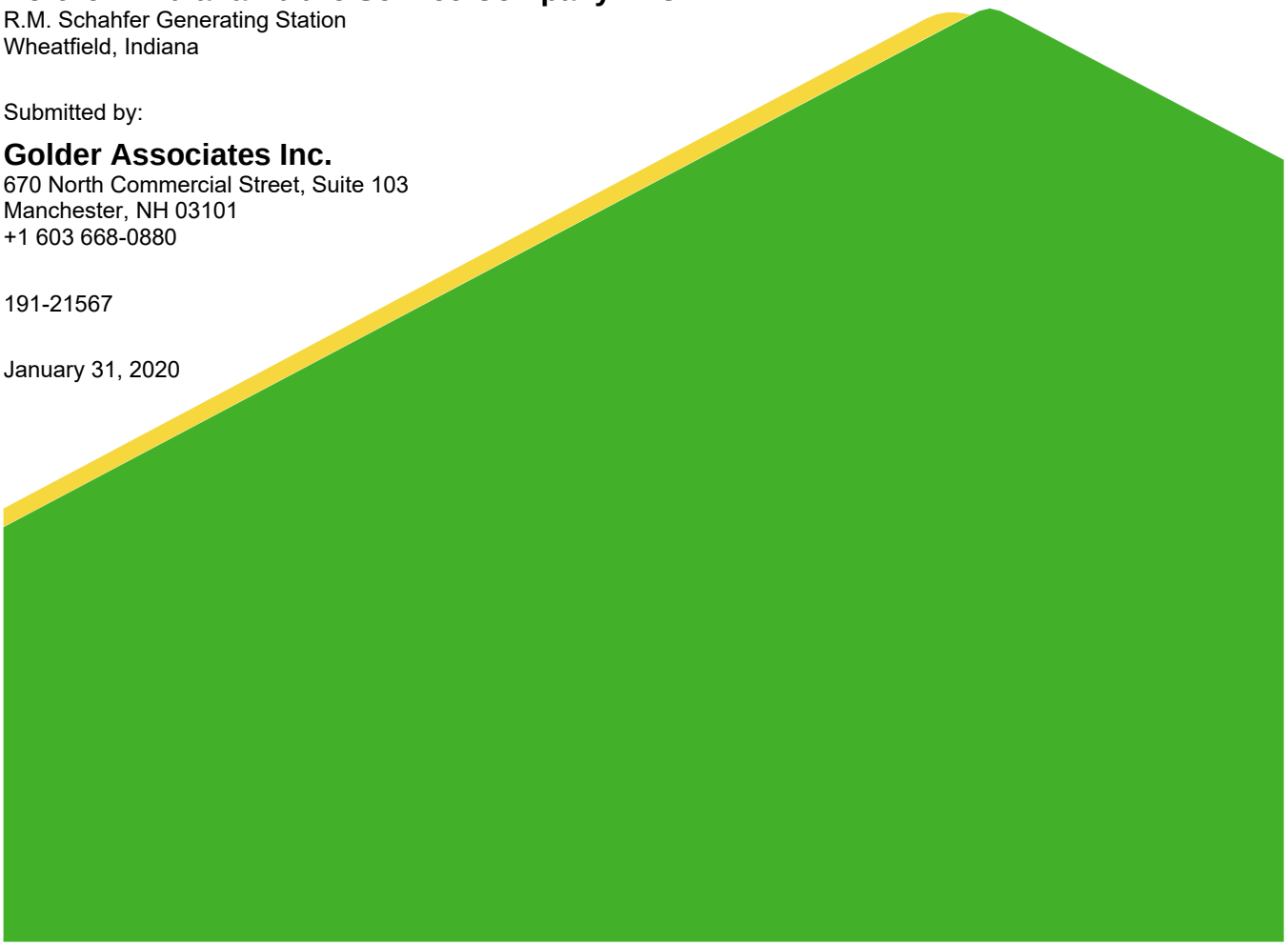


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APPENDIX

Appendix A Extension of 60 Days to Complete Assessment of Corrective Measures

1.0 INTRODUCTION

On behalf of Northern Indiana Public Service Company LLC (NIPSCO LLC), Golder Associates Inc. (Golder) prepared this 2019 Annual Groundwater Monitoring and Corrective Action Report (2019 Annual Report) for the Rollin M. Schahfer Generating Station (RMSGS, Schahfer) Material Storage Runoff Basin (MSRB), Metal Cleaning Waste Basin (MCWB), and the Drying Area (together, the CCR Unit) located at 2723 E 1500 N Road, Wheatfield, Jasper County, Indiana (Latitude 41° 12' 36" and Longitude 87° 01' 48", see Figure 1). As shown in Figure 2, the Drying Area is an approximately 5.5-acre impoundment that has been completely filled with CCR. The MSRB and MCWB consist of two rectangular, approximately 15-acre impoundments, separated by a narrow berm, located adjacent to one another. Golder prepared the 2019 Annual Report in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, “Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule” (CCR Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

To comply with the CCR Rule, NIPSCO LLC and Golder decided to monitor the Drying Area, MCWB, MSRB as one CCR Unit due to the proximity of the MSRB, MCWB, and the Drying Area to one another, and because there are no practical means of monitoring groundwater between the impoundments. Routine monitoring activities performed during the reporting period include inspection of wells for integrity and security, measurement of groundwater levels prior to sample collection to assess groundwater flow direction, and collection of samples for laboratory analysis.

In conformance with the applicable requirements of 40 CFR §257.90(e)(1) through (5) and corresponding State of Indiana requirements, the 2019 Annual Report:

- Documents the status of the groundwater monitoring and corrective action program
- Provides figures showing the CCR Unit and monitoring well locations
- Summarizes key CCR Rule groundwater activities completed during calendar year 2019
- Includes CCR Rule groundwater monitoring data obtained in calendar year 2019
- Describes any problems encountered during the monitoring activities
- Discusses actions taken to resolve the problems, if applicable
- Projects key activities for the upcoming year

2.0 GROUNDWATER MONITORING AND CORRECTIVE MEASURES PROGRAM STATUS

Starting in 2016 following the installation of a groundwater monitoring system and throughout calendar year 2017, Golder collected background groundwater samples and performed Detection Monitoring around the CCR Unit pursuant to the requirements of 40 CFR §257.94. In 2018, Golder performed the first and second Assessment Monitoring sampling events pursuant to the requirements of 40 CFR §257.95. Following the first Assessment Monitoring sampling event, including verification sampling, NIPSCO LLC posted a notification to the publicly-assessible website that there were detections of 40 CFR Part 257 Appendix IV parameters downgradient of the MSRB, MCWB, and Drying Area above applicable groundwater protection standards (GWPS). Consequently, NIPSCO LLC initiated the assessment of corrective measures process. In 2019, Golder completed the third and fourth Assessment Monitoring sampling events. NIPSCO LLC has completed the Assessment of Corrective

Measures Report and is continuing to evaluate the feasibility and design of potential groundwater remedial alternatives in accordance with the provisions of 40 CFR §259.97.

2.1 Key Actions Completed - 2019

NIPSCO LLC completed the following key actions relative to CCR Rule groundwater well installation and monitoring at the MSRB, MCWB, and Drying Area during calendar year 2019:

- Preparation of the 2018 Groundwater Monitoring and Corrective Action Annual Report in January 2019 (2018 Annual Report, 40 CFR §257.90(e))
- Evaluation of the results of the second Assessment Monitoring event in February 2019 (40 CFR §257.95)
- Completed and certified the demonstration that an additional 60 days was needed to complete the Assessment of Corrective Measures in February 2019 (40 CFR §257.96(a), Appendix A)
- Notification that constituents in 40 CFR Part 257 Appendix IV exceeded the GWPS in March 2019 (40 CFR §257.95(g))
- Performance of the third Assessment Monitoring event in April 2019 (40 CFR §257.95)
- Completion of the Assessment of Corrective Measures Report in April 2019 (40 CFR §257.96)
- Evaluation of the results of the third Assessment Monitoring event in August 2019 (40 CFR §257.95)
- Notification that constituents in 40 CFR Part 257 Appendix IV exceeded the GWPS in September 2019 (40 CFR §257.95(g))
- Preparation of the first semi-annual Selection of Remedy Progress Report in October 2019 (40 CFR §257.97)
- Performance of the fourth Assessment Monitoring event in November 2019 (40 CFR §257.95)

2.2 Monitoring System Modifications

In June 2019, Golder decommissioned GAMW-55 due to well casing damage and installed GAMW-55R to replace GAMW-55 (see Section 2.7). GAMW-55R was installed adjacent to GAMW-55 and constructed in the same manner. An overview of the modified groundwater monitoring network is provided in the embedded table below.

Background Monitoring Wells	Downgradient Monitoring Wells	Assessment Monitoring Wells
GAMW-04, GAMW-07, GAMW-07B, GAMW-15 and GAMW-15B	GAMW-08, GAMW-08B, GAMW-09, GAMW-09B, GAMW-16, GAMW-16B, GAMW-17, GAMW-17B, GAMW-18 and GAMW-18B	GAMW-46, GAMW-46B, GAMW-52, GAMW-52B, GAMW-53, GAMW-53B, GAMW-54, GAMW-54B, GAMW-55R, GAMW-55B, GAMW-56, and GAMW-56B

Attached Table 1 provides a summary of the well rationale/purpose and date of installation. Golder decommissioned, installed, developed, and surveyed the wells in accordance with the CCR Groundwater Monitoring Program Implementation Manual prepared by Golder in October 2017.

2.3 Background Monitoring (2016 to 2017)

Per the requirements of 40 CFR §257.94, Golder collected eight independent background groundwater samples from each background and downgradient well between July 2016 and August 2017. Golder used the results of the background monitoring phase to develop appropriate, statistically valid background values for each constituent/monitoring well. Golder submitted the samples to a contract laboratory, in accordance with chain of custody and quality assurance/quality control procedures, for analysis of 40 CFR Part 257 Appendix III and Appendix IV constituents. In addition, Golder personnel measured field water quality parameters including specific conductance, temperature, dissolved oxygen, turbidity, oxidation-reduction potential, and pH. The background data set is included in the 2017 CCR Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2018 (2017 Annual Report).

2.4 Detection Monitoring

Golder performed the first Detection Monitoring event in October 2017, followed by a statistical evaluation and data analysis in January 2018. Golder collected groundwater samples from the CCR Unit background and downgradient monitoring wells for analysis of Appendix III constituents per 40 CFR §257.94 and included the results in the 2017 Annual Report. Following receipt and validation of laboratory results, Golder evaluated the results of the first Detection Monitoring sampling event to compare the concentration of 40 CFR Part 257 Appendix III constituents relative to facility background concentrations. Using Sanitas™ software, Golder pooled the background data to calculate prediction limits and compared the October 2017 results to the calculated prediction limits to identify statistically significant increases (SSIs). Due to the identification of SSIs, NIPSCO LLC established an Assessment Monitoring program in April 2018.

2.5 Assessment Monitoring

Golder performed the first Assessment Monitoring event (i.e. Assessment and Verification sampling) in March and April 2018, followed by a statistical evaluation and data analysis in August 2018. Golder collected groundwater samples from each background and downgradient monitoring well for analysis of Appendix IV constituents per 40 CFR §257.95 in March 2018. In April 2018, groundwater samples were collected at the downgradient monitoring well locations and analyzed for Appendix III and detected Appendix IV constituents per 40 CFR §257.95. Golder developed GWPS to use as a comparison against the Assessment Monitoring results in August 2018. Following receipt and validation of laboratory results, Golder evaluated the 40 CFR Part 257 Appendix IV constituent results relative to CCR Unit-specific GWPS (see Table 4). At the time of the statistical evaluation the GWPS was the higher value of either the Maximum Contaminant Level (MCL) or the CCR Unit-specific background concentration for each analyte calculated using a tolerance/prediction limit procedure in accordance with 40 CFR §257.95(h)(2). Results from the downgradient monitoring wells were evaluated by comparing the lower confidence limit (LCL) to the CCR Unit-specific GWPS for each 40 CFR Part 257 Appendix IV analyte at each well. If the LCL exceeds the GWPS, there is statistical evidence of a statistically significant level (SSL). Golder determined that SSLs existed for the MSRB, MCWB, and Drying Area in August 2018 and initiated the assessment of corrective measures in November 2018.

Golder performed the second Assessment Monitoring event in October 2018 by collecting groundwater samples from each background and downgradient monitoring well, including the new assessment monitoring wells, for analysis of Appendix III and Appendix IV constituents per 40 CFR §257.95. Golder performed the statistical evaluation of the analytical results of the second Assessment Monitoring sampling event in February 2019. Golder identified an SSL for cobalt at well GAMW-08.

Golder performed the third Assessment Monitoring event in April 2019 by collecting groundwater samples from each background and downgradient monitoring well for analysis of Appendix III and Appendix IV constituents per 40 CFR §257.95. Golder performed the statistical evaluation of the analytical results of the third Assessment Monitoring sampling event in August 2019. The results confirmed the SSL for cobalt at well GAMW-08.

Golder performed the fourth Assessment Monitoring event in November 2019 by collecting groundwater samples from each background and downgradient monitoring well for analysis of Appendix III and detected Appendix IV constituents per 40 CFR §257.95. Golder will perform the statistical evaluation of the analytical results of the fourth Assessment Monitoring sampling event in February 2020.

Assessment monitoring wells GAMW-46/46B installed on the property boundary (see Figure 2), were sampled in March, April, June, July, August, October, and November 2019. The validated results to date from these wells indicate that there are no constituents detected at concentrations above health-based standards.

The sampling dates, number of groundwater samples collected from each background and downgradient well, and the purpose of sampling are provided in Table 2. The analytical results are presented in Table 3.

2.6 Corrective Measures

NIPSCO LLC is evaluating the feasibility and design of the potential groundwater remedial alternatives presented in the Assessment of Corrective Measures (ACM) report (Golder, 2019). As discussed in the ACM, NIPSCO LLC plans to close this CCR Unit by removal in accordance with 40 CFR §257.102(C). NIPSCO LLC submitted a Closure Application to the Indiana Department of Environmental Management (IDEM) in April 2019. The closure application is currently under review by IDEM. Concurrently, Golder is performing additional field investigations to collect Site-specific data to aid in the selection of a remedy including:

- Supplemental assessment of the CCR Unit with an emphasis on placement, location, thickness, total depth, and material characteristic of the CCR that will be managed during dewatering and excavation stages of the closure process.
- Aquifer tests to determine aquifer characteristics in the area of the CCR Unit including storage characteristics and hydraulic conductivity values, assess potential boundary conditions (e.g., effects of the perimeter slurry wall), and to support future groundwater modeling efforts.
- Installation of additional piezometers to refine understanding of groundwater flow direction.
- Assessment of the CCR Unit perimeter slurry wall including excavation of shallow pits to locate and observe the presence and performance characteristics of the slurry wall.

In 2020, Golder will continue to perform an engineering review of the eight potential Corrective Measures presented in the ACM, by placing an emphasis on monitoring on-Site plume stability, identifying critical data gaps, understanding and reacting to impacts of newly gathered information on previous assumptions and/or conclusions, identifying and researching applicability of emerging technologies, and monitoring changing groundwater and operational conditions, if any, and future plans for the Site and their impacts on the remedy process.

2.7 Statistical Evaluation

Subsequent to each monitoring event, Golder assessed the analytical data for outliers, anomalies, and trends that might be an indication of a sampling or analytical error. Outliers and anomalies are generally defined as

inconsistently large or small values that can occur as a result of sampling, laboratory, transportation, or transcription errors, or even by chance alone. Significant trends may indicate natural geochemical variability, a source of systematic error, influence of an upgradient/off-site source, or an actual occurrence of CCR Unit influence upon groundwater quality. Appropriate statistical methods are used to remove outliers from the database and manage trends with detrending routines, prior to the calculation of statistical limits. To assess the data for outliers, anomalies, and trends, Golder assessed the data using time vs. concentration graphs, and statistical routines included in the Sanitas™ statistical analysis software package. Golder has not identified any additional outliers since the 2018 Annual Report.

Golder evaluated the background data set for trends using Sanitas™ software. Golder will continue to monitor trends and apply detrending routines, if applicable, before using these data to calculate GWPSs. Golder identified the following 40 CFR Part 257 Appendix IV parameter trends in background monitoring wells:

- Antimony concentrations detected in groundwater samples collected from GAMW-15B show an increasing trend, however, antimony has never been detected above the laboratory reporting limit in this well and all results are below the MCL, therefore, the GWPS is equal to the MCL. No detrending routines are required.
- Arsenic concentrations detected in groundwater samples collected from well GAMW-15B show a decreasing trend, however, arsenic has never been detected above the laboratory reporting limit in this well. No detrending routines are required.
- Barium concentrations detected in groundwater samples collected from well GAMW-15B show an increasing trend, however, all results are below the MCL, therefore, the GWPS is equal to the MCL. No detrending routines are required.
- Cobalt concentrations detected in groundwater samples collected from well GAMW-15B show an increasing trend, however, cobalt has never been detected above the laboratory reporting limit in this well. No detrending routines are required.
- Lithium concentrations detected in groundwater samples collected from well GAMW-15B show an increasing trend, however, all results are below the MCL, therefore, the GWPS is equal to the MCL. No detrending routines are required.
- Selenium concentrations detected in groundwater samples collected from well GAMW-15B show an increasing trend, however, selenium has never been detected above the laboratory reporting limit in this well. No detrending routines are required.

2.8 Problems Encountered and Follow-Up Corrective Actions

During the April 2019 Assessment Monitoring sampling event, well GAMW-55 was unable to be sampled. Surface damage was observed at this time and the tubing above the permanent pump was pinched at less than 10 feet below ground surface (ft bgs). Golder replaced this well with GAMW-55R in June 2019. GAMW-55R is installed approximately 10 feet east of the original GAMW-55 and is also screened from 5-10 ft bgs. GAMW-55R was sampled in October 2019.

During the fourth Assessment Monitoring event (November 2019), groundwater was sampled from GAMW-15 at turbidity level of approximately 6.9 NTUs. According to the CCR Groundwater Monitoring Program Implementation Manual (Golder 2017), groundwater samples are to be collected once a well has achieved a turbidity level below 5 NTUs. Due to time constraints in the field, wells were purged for a minimum of two hours and sampled when

turbidity appeared to stabilize (e.g., no downward or upward trend over three consecutive readings five minutes apart). Evaluation of the analytical results from this well suggests that the slightly elevated turbidity levels had no significant effect on the representativeness of the samples of groundwater quality. Moving forward, wells will be purged for two hours or five well volumes, whichever is shorter. Professional judgement will then be used to determine when the purge water is representative of groundwater for sampling. In the event that an acceptable turbidity level cannot be achieved within a reasonable timeframe (e.g. three hours), Golder will redevelop the affected monitoring wells prior to the next sampling event.

3.0 KEY ACTIVITIES PROJECTED FOR 2020

During calendar year 2020, NIPSCO anticipates conducting the following key CCR Rule groundwater monitoring activities for the MSRB, MCWB, and Drying Area:

- Prepare and submit the appropriate notifications according to the CCR Rule;
- Continue semi-annual Assessment Monitoring groundwater sampling per CCR Rule requirements;
- Continue to evaluate potential remedial alternatives and prepare semi-annual reports describing the progress in selecting and designing the remedy; and
- Inspect and maintain monitoring system including wells, pumps, and equipment.

4.0 REFERENCES

Golder Associates, “2017 Annual Groundwater Monitoring and Corrective Action Report- Material Storage Runoff Basin, Metal Cleaning Waste Basin, and Drying Area NIPSCO R. M. Schahfer Generating Station”, January 31, 2018.

Golder Associates, “2018 Annual Groundwater Monitoring and Corrective Action Report- Material Storage Runoff Basin, Metal Cleaning Waste Basin, and Drying Area NIPSCO R. M. Schahfer Generating Station”, January 31, 2019.

Golder Associates, “CCR Assessment of Corrective Measures,” April 19, 2019.

Golder Associates, “NIPSCO R.M. Schahfer Generating Station, CCR Unit Consisting of MSRB, MCWB, and DA Corrective Measures Selection of Remedy, Semi-Annual Progress Report #19-01” October 16, 2019.

Tables

Table 1 Monitoring Well Network
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

CCR Unit	Well Purpose	Monitoring Well ID	Installation Date	Decommission Date (If Applicable)	Basis For Action
Material Storage Runoff Basin, Metal Cleaning Waste Basin, and Drying Area	Background Monitoring Well	GAMW-04	6/27/2015	-	Installed for groundwater quality monitoring[1]
		GAMW-07	6/29/2015	-	
		GAMW-15	5/25/2016	-	
		GAMW-15B	5/24/2016	-	
		GAMW-07B	7/25/2018	-	Installed to provide additional groundwater quality data
	Downgradient Monitoring Well	GAMW-08	6/28/2015	-	Installed for groundwater quality monitoring[1]
		GAMW-09	6/28/2015	-	
		GAMW-09B	5/24/2016	-	
		GAMW-16	5/26/2016	-	
		GAMW-16B	5/25/2016	-	
		GAMW-17	5/25/2016	-	
		GAMW-17B	5/25/2016	-	
		GAMW-18	5/24/2016	-	
		GAMW-08B	7/25/2018	-	Installed to characterize the nature and extent of a potential release[2]
		GAMW-18B	7/26/2018	-	
		GAMW-52	7/30/2018	-	
		GAMW-52B	7/30/2018	-	
		GAMW-53	7/30/2018	-	
		GAMW-53B	7/30/2018	-	
		GAMW-54	7/30/2018	-	
		GAMW-54B	7/27/2018	-	
		GAMW-55	7/26/2018	6/8/2019	Decommissioned due to well casing damage[4]
		GAMW-55R	6/8/2019	-	Installed to replace GAMW-55[4]
		GAMW-55B	7/26/2018	-	Installed to characterize the nature and extent of a potential release[2]
		GAMW-56	7/27/2018	-	
		GAMW-56B	7/27/2018	-	
		GAMW-46	5/15/2018	-	Installed to monitor groundwater quality at the property boundary[3]
		GAMW-46B	5/15/2018	-	

Notes:

1) Per 40 CFR §257.93, Golder collected eight rounds of background data prior to October 17, 2017.

2) Per 40 CFR §257.95(g)(1)(i) Rule requirements, Golder collected additional data to further characterize the nature and extent of potential groundwater impacts.

3) Per 40 CFR §257.95(g)(1)(iii), Golder collected data to monitor groundwater quality in the direction of flow at the property boundary

4) Golder field personnel were unable to collect a groundwater sample from monitoring well GAMW-55 during the April 2019 Assessment Monitoring sampling event due to surface damage (i.e., tubing above the permanent pump was pinched at less than 10 feet below ground surface). The well was replaced with GAMW-55R in June 2019.

Prepared by: AMH
Checked by: KMC
Reviewed by: MAH

Table 2: Summary of Sampling Events
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Well Purpose	Monitoring Well ID	Supplemental Sampling Event	Sample Event #12	Supplemental Sampling Event	Supplemental Sampling Event	Supplemental Sampling Event	Supplemental Sampling Event	Sample Event #13	Total Number of Samples
Purpose of Sample		Nature and Extent Characterization Sampling	Annual Assessment Monitoring	Nature and Extent Characterization Sampling	Nature and Extent Characterization Sampling	Nature and Extent Characterization Sampling	Nature and Extent Characterization Sampling	Semi-Annual Assessment Monitoring	
Sample Parameters		Appendix III and Appendix IV	Appendix III and Appendix IV	Metals Only	Appendix III and Appendix IV	Appendix III and Appendix IV	Appendix III and Appendix IV	Appendix III and Appendix IV	
Background Monitoring Well	GAMW-04	NS	4/23/2019	NS	NS	NS	NS	11/7/2019	2
	GAMW-07	NS	5/2/2019	NS	NS	NS	NS	11/8/2019	2
	GAMW-07B	NS	5/2/2019	NS	NS	NS	NS	11/12/2019	2
	GAMW-15	NS	5/6/2019	NS	NS	NS	NS	11/8/2019	2
	GAMW-15B	NS	5/8/2019	NS	NS	NS	NS	11/8/2019	2
Downgradient Monitoring Well	GAMW-08	NS	5/8/2019	NS	NS	NS	NS	11/7/2019	2
	GAMW-08B	NS	5/2/2019	NS	NS	NS	NS	11/7/2019	2
	GAMW-09	NS	5/2/2019	NS	NS	NS	NS	11/7/2019	2
	GAMW-09B	NS	5/8/2019	NS	NS	NS	NS	11/7/2019	2
	GAMW-16	NS	5/3/2019	NS	NS	NS	NS	11/8/2019	2
	GAMW-16B	NS	5/6/2019	NS	NS	NS	NS	11/8/2019	2
	GAMW-17	NS	5/9/2019	NS	NS	NS	NS	11/8/2019	2
	GAMW-17B	NS	5/9/2019	NS	NS	NS	NS	11/8/2019	2
	GAMW-18	NS	4/29/2019	NS	NS	NS	NS	11/7/2019	2
	GAMW-18B	NS	4/29/2019	NS	NS	NS	NS	11/7/2019	2
	GAMW-46	3/1/2019	4/17/2019	6/6/2019	7/18/2019	8/26/2019	10/4/2019	11/9/2019	7
	GAMW-46B	3/4/2019	4/17/2019	6/7/2019	7/18/2019	8/26/2019	10/4/2019	11/19/2019	7
	GAMW-52	NS	5/9/2019	NS	NS	NS	NS	11/14/2019	2
	GAMW-52B	NS	5/9/2019	NS	NS	NS	NS	11/14/2019	2
	GAMW-53	NS	4/30/2019	NS	NS	NS	NS	11/14/2019	2
	GAMW-53B	NS	4/30/2019	NS	NS	NS	NS	11/14/2019	2
	GAMW-54	NS	4/30/2019	NS	NS	NS	NS	11/14/2019	2
	GAMW-54B	NS	5/1/2019	NS	NS	NS	NS	11/15/2019	2
	GAMW-55	NS	NS	NI	NI	NI	NI	NI	0
	GAMW-55R	NI	NI	NS	NS	NS	NS	11/15/2019	1
	GAMW-55B	NS	5/1/2019	NS	NS	NS	NS	11/15/2019	2
	GAMW-56	NS	4/29/2019	NS	NS	NS	NS	11/15/2019	2
	GAMW-56B	NS	4/29/2019	NS	NS	NS	NS	11/15/2019	2
Total Number of Samples		2	26	2	2	2	2	27	63

Notes:
Sample counts do not include QA/QC samples.
(1) Sample events #1-#11 were completed prior to 2019. The purpose, sample parameters, and sample dates are included in the 2017 Annual Report and the 2018 Annual Report.
(2) semi-annual assessment monitoring parameters did not include radium
NI= not installed
NS= not sampled

Prepared by: DFS
Checked by: AMH
Reviewed by: MAH

Table 3: Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW04		GAMW07		GAMW07B		GAMW08		GAMW08B		GAMW09			GAMW09B	
		2019-04-23	2019-11-07	2019-05-02	2019-11-08	2019-05-02	2019-11-12	2019-05-08	2019-11-07	2019-05-03	2019-11-07	2019-05-02		2019-11-07	2019-05-08	2019-11-07
		N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N
CCR Appendix III																
Boron	mg/L	0.74	1.3	0.85	0.85	18	15	1.4	2.5	14	13	3	3	2.7	14	8
Calcium	mg/L	130	190	220	180	380	400	250	280	350	340	200	200	150	150	150
Chloride	mg/L	3.7	9.5	6.5	4.8	170	150	49	66	160	180	46	46	39	140	110
Fluoride	mg/L	0.16 J+	0.23	0.97	0.88	1.3	1.2	2.2	1.9	1.9	1.7	0.27	0.27	0.33	1.6	1.5
pH	SU	7	7.14	7.2	7.44	7.58	7.13	7.37	7.5	7.57	7.85		7.1	7.06	7.49	7.56
Sulfate	mg/L	260	490	500	480	1500	1400	540	670	1400	1300	530	530	380	520	440
Total Dissolved Solids	mg/L	600	900	1100	940	920	2300	1300	1300	2300	2200	970	980	770	1200	990
CCR Appendix IV																
Antimony	mg/L	0.00065 J	0.00092 J	0.002 U	0.002 U	0.002 U	0.002 U	0.00076 J	0.00077 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.0023 J	0.0018 J	0.0019 J	0.0011 J	0.0019 J	0.0017 J	0.0015 J	0.0016 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0057	0.0042 J
Barium	mg/L	0.068	0.066	0.053	0.043	0.053	0.043	0.058	0.066	0.025	0.023	0.041	0.041	0.036	0.041	0.029
Beryllium	mg/L	0.00053 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0004 J	0.001 U	0.001 U	0.001 U	0.00058 J	0.00052 J	0.00049 J	0.001 U	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.0012 J	0.0012 J	0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.0011	0.00043 J	0.0074	0.0049	0.001 U	0.001 U	0.0079	0.011	0.001 U	0.001 U	0.00049 J	0.00055 J	0.00035 J	0.00025 J	0.001 U
Fluoride	mg/L	0.16 J+	0.23	0.97	0.88	1.3	1.2	2.2	1.9	1.9	1.7	0.27	0.27	0.33	1.6	1.5
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0045 J	0.0028 J	0.0041 J	0.0033 J	0.004 J	0.0035 J	0.015	0.0091	0.0063 J	0.0058 J	0.008 U	0.008 U	0.008 U	0.0055 J	0.0033 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.024	0.055	0.0097 J	0.0087 J	0.025	0.026	0.08	0.068	0.057	0.044	0.043	0.043	0.035	0.012	0.0096 J
Radium, Total	pci/l	0.591		0.37 U		2.31		0.473		0.704		0.505	0.427 U		1.01	
Radium-226	pci/l	0.311 U		0.305 U		1.17		0.312 U		0.438		0.33	0.355 U		0.449	
Radium-228	pci/l	0.405		0.37 U		1.14		0.456 U		0.518 U		0.428 U	0.427 U		0.564	
Selenium	mg/L	0.0013 J	0.0052	0.0045 J	0.0019 J	0.005 U	0.005 U	0.016	0.0036 J	0.005 U	0.005 U	0.012	0.012	0.0077	0.005 U	0.0011 J
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00045 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0002 J	0.001 U
Sample Parameters																
Dissolved Oxygen	mg/L	7.08	2.55	0.81	0.38	0.19	0.2	0.44	4.2	0.13	2.61		5.82	5.54	0.04	0.35
Oxidation-Reduction Potential	millivolts	19	-60.7	135.1	-131.8	34.9	-196.7	62.2	44.1	7.9	-67		53.6	-25.7	-16.8	-131.8
pH	SU	7	7.14	7.2	7.44	7.58	7.13	7.37	7.5	7.57	7.85		7.1	7.06	7.49	7.56
Specific Conductivity	uS/cm	549	866	975	828	2357	1686	1102	1322	2190	1896		888	685	1165	9.24
Temperature	deg c	4.2	13.2	10.3	15.3	12.4	12.9	11	10.84	12.8	8.05		11.4	15.9	14.2	14.4
Turbidity	NTU	4.48	1.38	2.72	4.58	2.86	1.11	1.81	0.31	1.72	2.89		3.41	1.55	4.7	3.36

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
"-" = Location was dry during time of sample
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated may be biased high.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

Table 3: Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW15		GAMW15B		GAMW16		GAMW16B			GAMW17		GAMW17B		GAMW18		GAMW18B	
		2019-05-06	2019-11-08	2019-05-08	2019-11-08	2019-05-03	2019-11-08	2019-05-06	2019-11-08		2019-05-09	2019-11-08	2019-05-09	2019-11-08	2019-04-29	2019-11-07	2019-04-29	2019-11-07
		N	N	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	N
CCR Appendix III																		
Boron	mg/L	0.71	0.73	10	6.2	1.6	1.9	12	11	10	7.7	4.9	12	9.4	0.95	1.7	14	11
Calcium	mg/L	140	100	280	280	210	210	350	300	280	130	120	180	150	320	360	240	180
Chloride	mg/L	22	28	110	80	28	59	190	220	210	90	92	130	110	12	27	170	140
Fluoride	mg/L	0.52	0.73	0.84 J+	0.89	0.99	1.1	0.76	1	1	1.6	1.7	0.62	0.67	0.074	0.15	0.88	0.99
pH	SU	7.1	7.34	7.43	7.57	7.46	7.8	7.49		7.85	7.53	7.75	7.15	7.66	6.71	7.18	7.15	7.68
Sulfate	mg/L	380	260	1300	940	570	530	940	1500	1500	300	290	270	350	780	920	1100	840
Total Dissolved Solids	mg/L	740	640	2100	1600	1100	1100	1800	2400	2400	800	860	980	990	1400	1500	2100	1500
CCR Appendix IV																		
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.081	0.075	0.00088 J	0.005 U	0.005	0.0082	0.0071	0.0079	0.0076	0.0021 J	0.0028 J	0.0022 J	0.0019 J	0.00079 J	0.005 U	0.0037 J	0.0041 J
Barium	mg/L	0.047	0.037	0.081	0.054	0.034	0.034	0.079	0.055	0.054	0.041	0.052	0.11	0.074	0.039	0.05	0.039	0.024
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00076 J	0.001 U	0.00033 J	0.001 U	0.00094 U	0.001 U	0.00053 U	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.0035	0.0017	0.001 U	0.001 U	0.00066 J	0.00061 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00028 J	0.001 U	0.00024 J	0.00024 J
Fluoride	mg/L	0.52	0.73	0.84 J+	0.89	0.99	1.1	0.76	1	1	1.6	1.7	0.62	0.67	0.074	0.15	0.88	0.99
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.0053 J	0.0027 J	0.012	0.0085	0.008 U	0.008 U	0.007 J	0.0054 J	0.0055 J	0.0035 J	0.0052 J	0.008 U	0.008 U	0.008 U	0.008 U	0.023	0.015
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.017	0.029	0.012	0.01	0.027	0.028	0.014	0.02	0.019	0.017	0.012	0.0073 J	0.01	0.062	0.076	0.026	0.011
Radium, Total	pci/l	0.476 U		1.61		0.685 U		0.984			0.518 U		1.71		0.365 U			
Radium-226	pci/l	0.28 U		1.07		0.277 U		0.753			0.26 U		0.964		0.325 U		0.41	
Radium-228	pci/l	0.476 U		0.544		0.685 U		0.459 U			0.518 U		0.748		0.365 U		0.941	
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0015 J	0.005 U	0.005 U	0.005 U	0.004 J	0.011	0.005 U	0.005 U	0.015	0.012	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.0003 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00063 J	0.001 U	0.00022 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Sample Parameters																		
Dissolved Oxygen	mg/L	0.15	0.12	0.23	0.16	0.29	4.02	0.33		3.41	5.75	6.47	0.23	4.2	7.01	2.95	0.92	0.36
Oxidation-Reduction Potential	millivolts	-27.5	-100	46.3	-189.2	8	-2	21.2		-99.5	53.1	35	11.8	-3.6	129.2	-41.1	109.2	-144.8
pH	SU	7.1	7.34	7.43	7.57	7.46	7.8	7.49		7.85	7.53	7.75	7.15	7.66	6.71	7.18	7.15	7.68
Specific Conductivity	uS/cm	730	598	1798	1384	1001	1014	1692		2340	894	798	1060	890	1060	1338	1902	1475
Temperature	deg c	8.3	15.8	8.1	13.8	10.5	17.52	11.2		14.65	12.1	17.23	13.6	15.05	8.8	14.2	11.8	13.7
Turbidity	NTU	4.9	6.9	3.56	1.49	4.65	3.98	3.72		2.81	0.44	0.86	3.61	2.68	4.55	2.04	3.21	3.14

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
"-" = Location was dry during time of sample
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated may be biased high.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

Table 3: Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW46							GAMW46B						
		2019-03-01	2019-04-17	2019-06-06	2019-07-18	2019-08-26	2019-10-04	2019-11-19	2019-03-04	2019-04-17	2019-06-07	2019-07-18	2019-08-26	2019-10-04	2019-11-19
		N	N	N	N	N	N	N	N	N	N	N	N	N	N
CCR Appendix III															
Boron	mg/L	0.1 U	0.033 J	0.1 U	0.032 J	0.053 J	0.043 J	0.049 J	0.05 J	0.037 J	0.047 J	0.03 J	0.05 J	0.047 J	0.046 J
Calcium	mg/L	14	28	25 J-	25	25	23	27	58	58	56	52	58	49	56
Chloride	mg/L	2.4	1.9		1.8	1.6	1.6	1.6	7.9	7.9		7.2	8	7.1	6.9
Fluoride	mg/L	0.068	0.063		0.065	0.06	0.079 J+	0.062	0.066	0.076		0.072	0.069	0.073 J+	0.072
pH	SU	8.17	8.23	7.52	8.15	7.9	7.81	7.77	7.11	7.99	7.58	8.18	7.62	7.44	7.47
Sulfate	mg/L	34	30		28	29	30	27	64	64		64	68	65	64
Total Dissolved Solids	mg/L	160	150		130	150	140 J+	140	260	290		240	220 J	250	240
CCR Appendix IV															
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.00086 J	0.005 U	0.0012 J	0.00076 J	0.005 U	0.00091 J	0.00095 J	0.0013 J	0.001 J
Barium	mg/L	0.0028 J	0.0059	0.0065	0.0054	0.0054	0.0049 J	0.0059	0.027	0.026	0.025	0.023	0.024	0.021	0.025
Beryllium	mg/L	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00054 J	0.001 U	0.0011	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0011
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.0014 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Fluoride	mg/L	0.068	0.063		0.065	0.06	0.079 J+	0.062	0.066	0.076		0.072	0.069	0.073 J+	0.072
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.04 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.0017 J	0.008 U	0.008 U	0.002 J	0.008 U	0.008 U	0.003 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.01	0.01 U	0.01 U	0.01 U	0.01 U	0.0015 J	0.01 U	0.0024 J	0.0022 J	0.0025 J	0.0028 J	0.0028 J	0.0025 J	0.003 J
Radium, Total	pci/l	0.486 U	0.33 U		0.427 U	0.505 U	0.566		0.402 U	0.308 U		0.427 U	0.609 U	0.408 U	
Radium-226	pci/l	0.103 U	0.0708 U		0.214 U	0.0925 UJ	0.179 J+		0.286	0.108		0.232 U	0.105 UJ	0.192 J+	
Radium-228	pci/l	0.486 U	0.33 U		0.427 U	0.505 UJ	0.481 U		0.402 U	0.308 U		0.427 U	0.609 UJ	0.408 U	
Selenium	mg/L	0.025 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00059 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00068 J
Sample Parameters															
Dissolved Oxygen	mg/L	1.85	4.18	6.44	6.58	4.03	2.44	3.36	0.08	1.9	0.3	1.4	1.25	0.31	0.3
Oxidation-Reduction Potential	millivolts	1.9	7.7	157.6	25.5	40.6	9.16	-141.1	111.9	-111.1	-133.1	-93.9	-119.9	33.7	-229.6
pH	SU	8.17	8.23	7.52	8.15	7.9	7.81	7.77	7.11	7.99	7.58	8.18	7.62	7.44	7.47
Specific Conductivity	uS/cm	155	161	179	153	153	152	132	268	294	282	274	284	260	242
Temperature	deg c	8	9.1	11.1	13.2	14.2	14.8	11.7	9.6	10.8	11	11.9	12.3	12.3	11.3
Turbidity	NTU	1.91	1.33	0.51	0.82	0.69	0.89	0.66	3.26	4.3	3.25	3.11	1.15	4.16	2.84

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
"-" = Location was dry during time of sample
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated may be biased high.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

Table 3: Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Ar ea
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW52		GAMW52B		GAMW53		GAMW53B		GAMW54		GAMW54B		GAMW55R	GAMW55B	
		2019-05-09	2019-11-14	2019-05-09	2019-11-14	2019-04-30	2019-11-14	2019-04-30	2019-11-14	2019-04-30	2019-11-14	2019-05-01	2019-11-15	2019-15-11	2019-05-01	11/15/2019
		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
CCR Appendix III																
Boron	mg/L	0.077 J	0.13	1	1.3	0.056 J	0.13	2.2	0.73	0.39	0.37	5.9	6	1.1	9.1	11
Calcium	mg/L	52	72	110	130	17	25	150	140	93	81	200	240	180	210	210
Chloride	mg/L	5.5	37	380	370	1.9	3.6	81	74	10	4	110	120	61	170	150
Fluoride	mg/L	0.25 J+	0.3	0.21 J+	0.23	0.05 U	0.05 U	0.51	0.7	0.14	0.28	0.59	0.58	0.62	0.31	0.31
pH	SU	7.17	7.59	7.42	7.34	5.93	6.21	7.41	7.52	6.82	7.08	7.27	7.2	7.31	7.31	7.46
Sulfate	mg/L	24	67	220	290	37	36	340	320	190	76	710	720	480	790	750
Total Dissolved Solids	mg/L	240	350	1100	1100	130	160	900	770	470	350	1500	1400	950	1700	1400
CCR Appendix IV																
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.00061 J	0.002 U	0.002 U	0.00078 J	0.001 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.005 U	0.005 U	0.00083 J	0.0012 J	0.00097 J	0.0018 J	0.001 J	0.0016 J	0.0022 J	0.0045 J	0.0045 J	0.005	0.005 U	0.005 U	0.005 U
Barium	mg/L	0.015	0.02	0.25	0.28	0.019	0.026	0.044	0.072	0.031	0.031	0.08	0.084	0.035	0.074	0.067
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00059 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.0012 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Cobalt	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.0005 J	0.001 U	0.001 U	0.001 U	0.00062 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Fluoride	mg/L	0.25 J+	0.3	0.21 J+	0.23	0.05 U	0.05 U	0.51	0.7	0.14	0.28	0.59	0.58	0.62	0.31	0.31
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.00057 J	0.00063 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium	mg/L	0.008 U	0.0025 J	0.0033 J	0.0071 J	0.008 U	0.0021 J	0.005 J	0.0066 J	0.008 U	0.0023 J	0.0048 J	0.0074 J	0.0035 J	0.0055 J	0.0078 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Molybdenum	mg/L	0.0016 J	0.0017 J	0.0095 J	0.0086 J	0.0051 J	0.011	0.0098 J	0.02	0.023	0.03	0.0085 J	0.012	0.024	0.0046 J	0.005 J
Radium, Total	pci/l	0.53 U		2.63		0.344 U		1.26		0.393 U		1.82			2.08	
Radium-226	pci/l	0.436		1.2		0.316 U		0.544		0.337 U		0.956			1.15	
Radium-228	pci/l	0.53 U		1.44		0.344 U		0.719		0.393 U		0.865			0.926	
Selenium	mg/L	0.0014 J	0.0011 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0043 J	0.0035 J	0.005 U	0.005 U	0.0046 J	0.005 U	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00049 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00022 J	0.001 U	0.001 U
Sample Parameters																
Dissolved Oxygen	mg/L	6.42	2.2	0.15	0.19	3.11	0.84	0.36	0.09	0.72	0.26	0.42	0.31	0.72	0.11	0.17
Oxidation-Reduction Potential	millivolts	108.2	-43.2	6.31	-102.9	43.7	-54.8	27.7	-75.3	48.4	-69.5	-23.1	-43.3	-28.9	-57.5	-137.9
pH	SU	7.17	7.59	7.42	7.34	5.93	6.21	7.41	7.52	6.82	7.08	7.27	7.2	7.31	7.31	7.46
Specific Conductivity	uS/cm	308	320	1652	1353	125	155	1160	870	493	374	1636	1310	1017	1967	1491
Temperature	deg c	14.2	15.3	15.3	16.1	11.4	17.5	18.7	19.7	10.5	15.3	15.5	15.8	16.7	18.1	17.9
Turbidity	NTU	0.42	0.74	2.35	1.01	4.76	4.8	3.45	2.5	3.24	2.31	4.49	1.67	2.26	4.77	3.92

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
"-" = Location was dry during time of sample
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated may be biased high.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

Table 3: Analytical Data
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC R. M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW56		GAMW56B	
		2019-04-29	2019-11-15	2019-04-29	2019-11-15
		N	N	N	N
CCR Appendix III					
Boron	mg/L	0.21	0.2	2.3	3.2
Calcium	mg/L	91	120	150	150
Chloride	mg/L	3.2	2.1	55	64
Fluoride	mg/L	0.53	0.71	0.4	0.44
pH	SU	6.83	7.06	7.08	7.21
Sulfate	mg/L	54	56	260	360
Total Dissolved Solids	mg/L	420	440	830	860
CCR Appendix IV					
Antimony	mg/L	0.002 U	0.002 U	0.002	0.002 U
Arsenic	mg/L	0.011	0.0097	0.005	0.005 U
Barium	mg/L	0.044	0.04	0.082	0.076
Beryllium	mg/L	0.001 U	0.001 U	0.001	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001	0.001 U
Chromium	mg/L	0.002 U	0.002 U	0.002	0.002 U
Cobalt	mg/L	0.0084	0.0081	0.001	0.001 U
Fluoride	mg/L	0.53	0.71	0.4	0.44
Lead	mg/L	0.001 U	0.001 U	0.001	0.001 U
Lithium	mg/L	0.0023 J	0.0053 J	0.0044	0.0062 J
Mercury	mg/L	0.0002 U	0.0002 U	0.0002	0.0002 U
Molybdenum	mg/L	0.0072 J	0.0079 J	0.0031	0.0064 J
Radium, Total	pci/l				
Radium-226	pci/l	0.334 U		0.506	
Radium-228	pci/l	0.373 U		0.571	
Selenium	mg/L	0.005 U	0.005 U	0.005	0.005 U
Thallium	mg/L	0.001 U	0.001 U	0.001	0.001 U
Sample Parameters					
Dissolved Oxygen	mg/L	1.3	0.34	0.79	0.18
Oxidation-Reduction Potential	millivolts	64	-86.6	31.8	-105.7
pH	SU	6.83	7.06	7.08	7.21
Specific Conductivity	uS/cm	460	466	856	741
Temperature	deg c	8.7	14	11.6	12.9
Turbidity	NTU	2.31	2.01	4.77	1.4

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
"-" = Location was dry during time of sample
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated may be biased high.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

Prepared by: AMH
Checked by: DFS
Reviewed by: MAH

Table 4: Groundwater Protection Standards
CCR Unit Schahfer MSRB, MCWB, and Drying Area
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

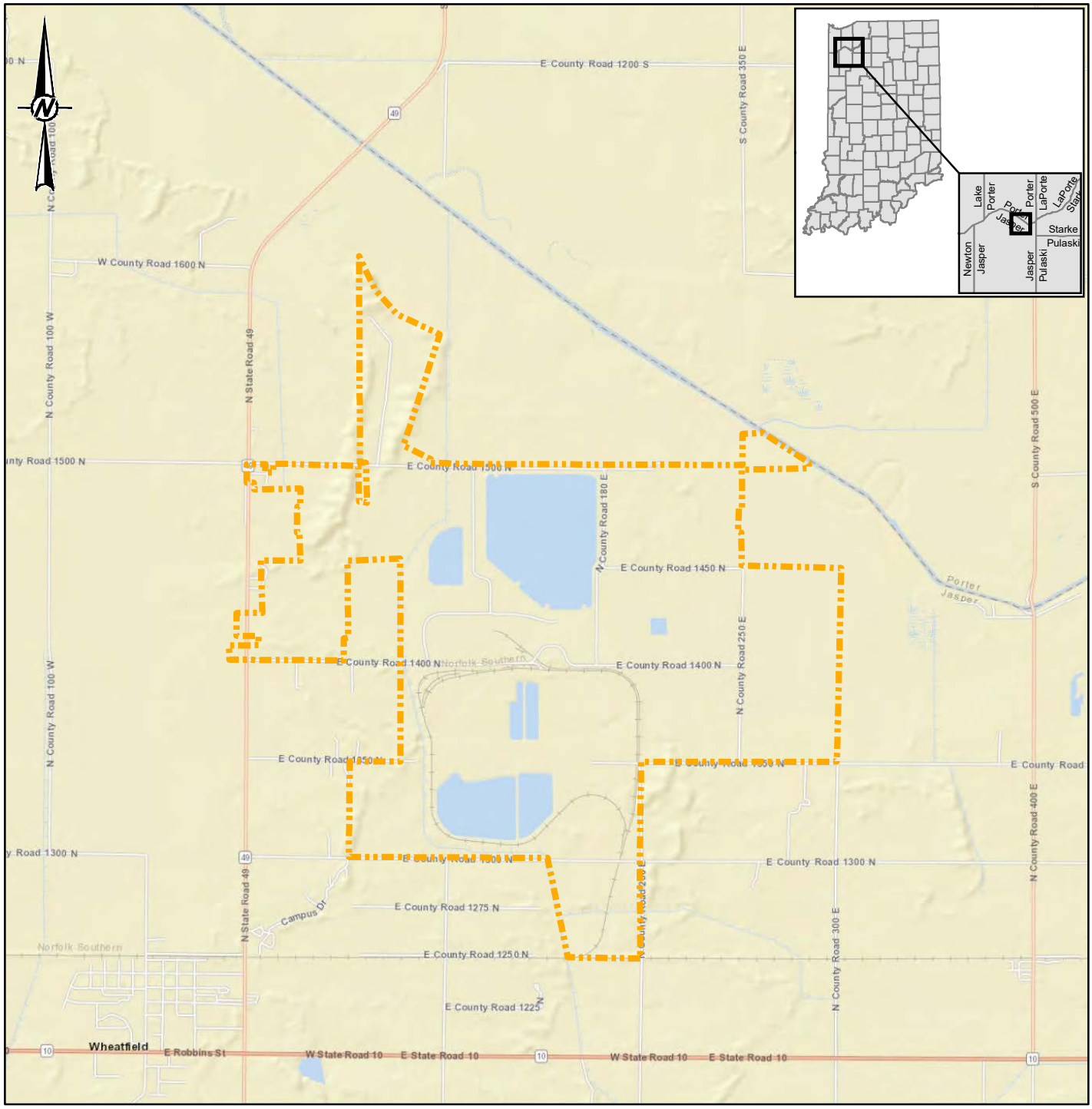
Analyte	MCL (mg/L)	GWPS (mg/L)
Antimony	0.006	0.006
Arsenic	0.01	0.078
Barium	2	2
Beryllium	0.004	0.004
Cadmium	0.005	0.005
Chromium	0.1	0.1
Cobalt(1)	0.006	0.01
Fluoride	4	4
Lead(1)	0.015	0.015
Lithium(1)	0.04	0.04
Mercury	0.002	0.002
Molybdenum(1)	0.1	0.1
Radium 226+228	5	5
Selenium	0.05	0.05
Thallium	0.002	0.002

Notes:
MCL= Environmental Protection Agency Maximum Contaminant Level
GWPS= Groundwater Protection Standard calculated in February 2019
mg/L= milligrams per liter

1) As of August 29, 2018, these four constituents have health-based standards that can be used when calculating the GWPS, these health-based standards are not MCLs but are provided in the MCL column.

Prepared by: DFS
Checked by: KMC
Review by: MAH

Figures



LEGEND

Approximate Property Line

0 0.75 1.5

1 " = 0.75 miles Miles

REFERENCE(S)

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

SITE LOCATION MAP

CONSULTANT

GOLDER

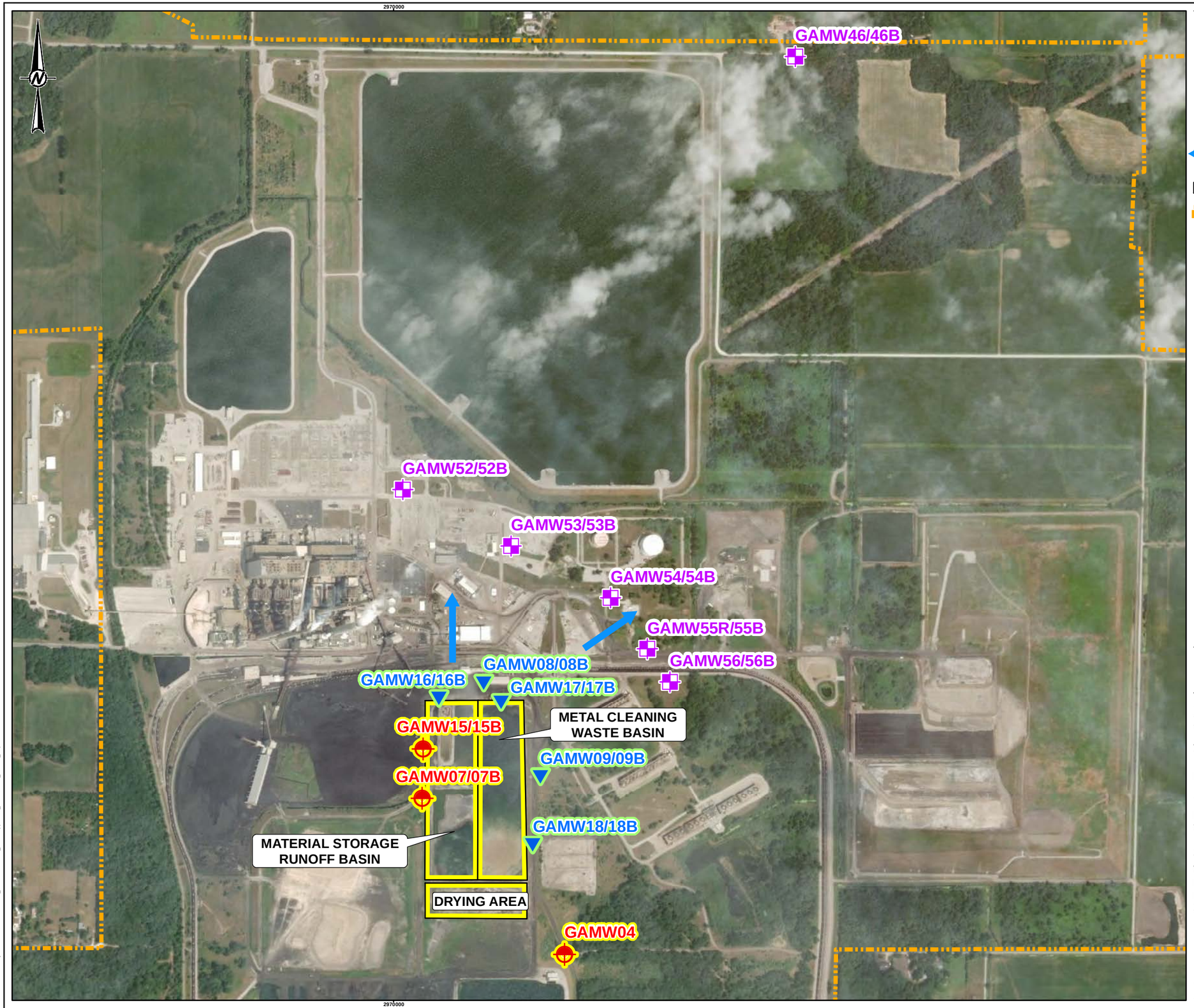
YYYY-MM-DD	12/31/2019
DESIGNED	DFS
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
19121567	A	0	1

PATH: V:\001 GIS Projects\NIPSCO\Schahfer\09_PROJ\19121567_2019Support\40_PROD\0002_Annual_Report\19121567-0002-HS-0001.mxd PRINTED ON: 2019-12-31 AT: 12:30:17 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

1 in
0



LEGEND

- Assessment Monitoring Well
- Background Monitoring Well
- Downgradient Monitoring Well
- Generalized Groundwater Flow Direction
- CCR Units
- Approximate Property Line

0 850 1,700

1 " = 850 feet Feet

NOTE(S)

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

WELL LOCATION MAP
DRYING AREA, MATERIAL STORAGE RUNOFF BASIN, AND METAL CLEANING WASTE BASIN

CONSULTANT

GOLDER

YYYY-MM-DD	1/22/2020
DESIGNED	DFS
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
19121567	A	0	2

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APPENDIX A

Extension of 60 Days to Complete Assessment of Corrective Measures

REPORT

R.M. SCHAHFER GENERATING STATION
Wheatfield, Indiana

EXTENSION OF 60 DAYS TO COMPLETE ASSESSMENT OF CORRECTIVE MEASURES FOR CCR MANAGEMENT UNIT REFERRED TO AS MATERIAL STORAGE RUNOFF BASIN, METAL CLEANING WASTE BASIN, AND DRYING AREA

Pursuant to 40 CFR 257.96(a)

Submitted to:

Northern Indiana Public Service Company
2755 Raystone Drive
Valparaiso, IN 46383

Submitted by:

Golder Associates Inc.
670 North Commercial Street, Suite 103
Manchester, NH 03101
+1 603 668-0880

164817101

February 2019

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ATTACHMENTS

Figure 1 Site Location Map
Exhibit A Statement of Certification

1.0 INTRODUCTION

1.1 Background

The Northern Indiana Public Service Company (NIPSCO) R. M. Schahfer Generating Station (RMSGS or Site) manages coal combustion residuals (CCR) in three active surface impoundments including the Material Storage Runoff Basin (MSRB), Metal Cleaning Waste Basin (MCWB), and Drying Area. These three impoundments, which are surrounded (encircled) as a group by a slurry wall reaching from approximately ground surface to the underlying shale bedrock, are collectively referred to hereinafter as the CCR Management Unit (see Figure 1). Monitoring of groundwater downgradient of the CCR Management Unit per 40 CFR §257.95(g) indicates releases in exceedance of the groundwater protection standard (GWPS), requiring assessment of corrective measures and closure.

1.2 Purpose

Within 90 days of the detection of an Appendix IV constituent at a statistically significant level above the GWPS defined in 40 CFR §257.95(h), 40 CFR §257.96 requires NIPSCO to initiate and 90 days to complete an assessment of corrective measures to prevent further releases, remediate any releases, and restore affected areas to original conditions. However, the regulations allow NIPSCO to demonstrate the need for additional time, not to exceed 60 days, to complete the assessment due to site-specific conditions or circumstances. The purpose of this document is to demonstrate the requirement for the 60-day extension of the initial 90-day corrective measures assessment deadline.

2.0 ASSESSMENT OF CORRECTIVE MEASURES

2.1 Approach

NIPSCO determined the identification and screening of potential corrective measures required CCR Management Unit- and Site-specific data beyond that available from Detection and Assessment Monitoring programs only. Supplemental data needs included the characterization of source materials; the type(s), degree, and extent of groundwater impacts; and the abilities of Site conditions to support various corrective measures alternatives.

2.2 Work-to-Date Encountering Site-Specific Conditions

Prior to the confirmation of exceedances of groundwater protection standards (GWPS), NIPSCO engaged in the design and installation of supplemental source material, soil, pore water, and groundwater sampling programs. Steps in this linear supplemental assessment process included:

- investigation program design/scoping;
- subcontractor driller procurement and scheduling;
- access to and clearance of potential drilling locations within the congested operations areas of the generating station;
- monitoring well installation, development, and stabilization;
- sample collection, laboratory turnaround, and data validation; and
- preliminary evaluation of analytical data

By necessity, due to the stages inherent in the supplemental data collection program, a substantial portion of the initial 90-day assessment period was consumed by data collection and preliminary analysis, leaving insufficient time to complete the assessment of corrective measures within the initial performance period.

2.3 Work-to-Date Encountering Site-Specific Circumstances

NIPSCO is engaged in other ongoing activities for RMSGS which directly support the Assessment of Corrective Measures process including:

- NIPSCO has collected an additional two rounds of monitoring data; however, these data are determined to be insufficient. Additional monitoring is planned to enhance the recently collected datasets;
- NIPSCO intends to close the CCR Management Unit by removal of source materials, with source removal being an integral component of its overall Corrective Measures strategy for groundwater. NIPSCO has been working diligently to meet a May 1, 2019 target date for preparation and submittal of a Closure Application for the combined MSRB/MWCB/Drying Area to Indiana Department of Environmental Management (IDEM); and
- Related to supplemental groundwater investigation work discussed in Section 2.2 and as one of several options, NIPSCO is performing a preliminary evaluation of the feasibility of in-situ as well as ex-situ processes as potential remedial alternatives to be considered in the Corrective Measures alternatives screening process.

Similar to work being conducted as discussed in Section 2.2, activities as described herein are ongoing but could not be completed within the initial 90-day performance period due to inherent complexity, the necessity to understand and respond to requirements of state regulators, or lack of a clear outcome based on results to date.

3.0 CONCLUSION

Due to an exceedance of a GWPS downgradient of the CCR Management Unit, NIPSCO must within 90 days complete an assessment of corrective measures unless a demonstration for an additional 60-day extension of time is made and certification from a qualified professional engineer attests to the accuracy of the demonstration. This document demonstrates that NIPSCO has initiated the assessment of corrective measures process, is taking reasonable steps to complete the process in a timely manner, and provides the basis for the qualified professional engineer's attestation for an additional 60-day extension. Pursuant to 40 CFR §257.96(a), a statement of Certification is appended to this plan and located in Exhibit A.

Golder Associates Inc.

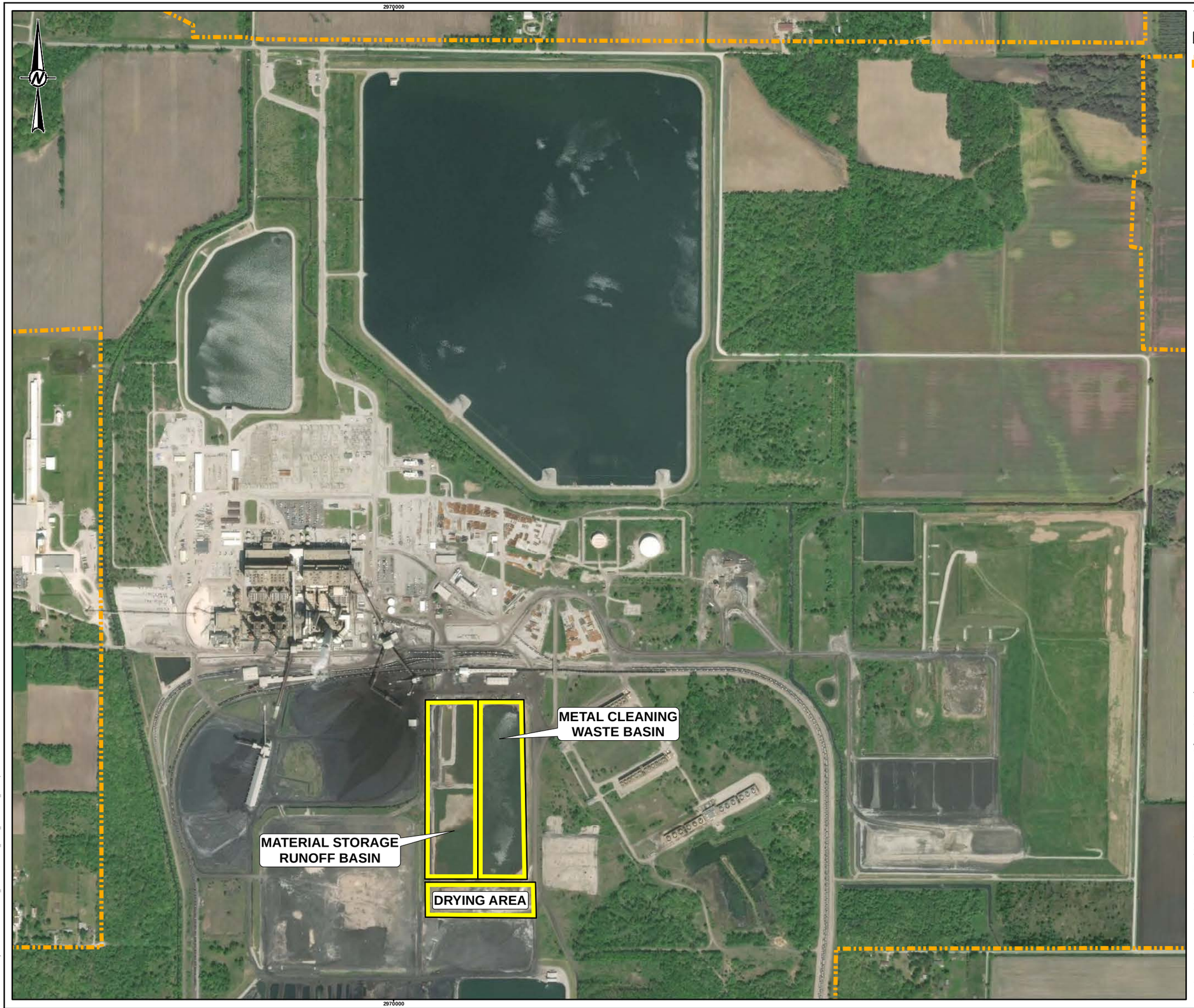


Mark A. Haney
Program Leader and Principal

MAH/drb

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\\manchester\data\projects\2016\1648171 nipsco ccr\01 extender\rmsgs ccr- phase 03\reports and deliverables\60-day cm extension\rmsgs multi-unit 60 day corrective measures extension request 2-15-19_final.docx



LEGEND

CCR Units

Approximate Property Line

0 850 1,700

1 " = 850 feet Feet

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

DRYING AREA, MATERIAL STORAGE RUNOFF BASIN, AND METAL CLEANING WASTE BASIN LOCATIONS MAP

CONSULTANT

GOLDER

YYYY-MM-DD	2/15/2019
DESIGNED	DFS
PREPARED	SHL
REVIEWED	MAH
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
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GOLDER

EXHIBIT A

February 2019

Northern Indiana Public Service Company (NIPSCO) R.M. Schahfer Generating Station (RMSGS)
Wheatfield, Jasper County, Indiana
Material Storage Runoff Basin, Metal Cleaning Waste Basin, and Drying Area

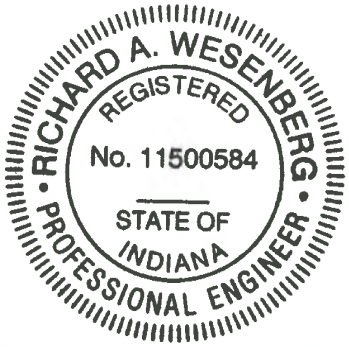
STATEMENT OF CERTIFICATION

NIPSCO RMSGS MATERIAL STORAGE RUNOFF BASIN, METAL CLEANING WASTE BASIN, AND DRYING AREA

ASSESSMENT OF CORRECTIVE MEASURES

40 Code of Federal Regulations (CFR), Part 257.96 (a)

I, Richard Wesenberg, certify that I have personally examined and am familiar with the provisions of Title 40 of the Code of Federal Regulations Part 257.96 and with the information submitted in the NIPSCO Extension of 60 Days to Complete Assessment of Corrective Measures for CCR Management Unit Referred to as Material Storage Runoff Basin, Metal Cleaning Waste Basin, and Drying Area documentation, prepared by Golder Associates Inc., dated February 2019. I believe that the information contained therein is true, accurate and has been prepared in accordance with good engineering practices and that the documentation provided in accordance with 257.96 (a) demonstrates the need for additional time to complete the assessment of corrective measures due to site-specific conditions and circumstances.



2-15-2019

Richard A. Wesenberg, PE
Program Leader and Principal
Registered Professional Engineer
State of Indiana No.: PE11500584

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MCU F Corrective Measures Selection of Remedy, Semi-Annual Progress Report #19-01, October 2019

TECHNICAL MEMORANDUM

DATE October 16, 2019 **Project No.** 19121567

TO Joe Kutch, CCR Program Manager
Northern Indiana Public Service Company (NIPSCO)

CC Marc Okin (NIPSCO), Joe Gormley, Danielle Sylvia, Jim Peace

FROM Mark Haney **EMAIL mhaney@golder.com**

**RE: NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION, CCR UNIT CONSISTING OF MSRB, MCWB AND DA
CORRECTIVE MEASURES SELECTION OF REMEDY, SEMI-ANNUAL PROGRESS REPORT #19-01**

On behalf of Northern Indiana Public Service Company (NIPSCO), Golder Associates Inc. (Golder) prepared a Coal Combustion Residuals (CCR) Assessment of Corrective Measures (ACM) for three impoundments, the Material Storage Runoff Basin (MSRB), the Metal Cleaning Waste Basin (MCWB), and the Drying Area (DA), collectively referred to as the CCR Unit. The CCR Unit is located at the NIPSCO R.M. Schahfer Generating Station, 2723 E 1500 N Road, Wheatfield, Jasper County, Indiana (RMSGS or Site). The ACM, prepared in conformance with applicable requirements of 40 Code of Federal Regulations (CFR) §257.96, was certified by a qualified Indiana-licensed professional engineer April 19, 2019, following which it was placed in the facility operating record and posted to NIPSCO's publicly-accessible CCR website.

As discussed in the ACM, NIPSCO plans to close this CCR Unit by removal in accordance with 40 CFR §257.102(c). NIPSCO submitted a Closure Application to the Indiana Department of Environmental Management (IDEM) in April 2019. The Closure Application is currently under review by IDEM.

The ACM identified eight potential Corrective Measures to be considered for implementation following excavation and closure of the CCR Unit. However, Golder identified that additional data and further evaluation are required to select a remedy from among these options. Concurrent with IDEM review of the Closure Application and further development by NIPSCO of the closure detailed design, Golder is performing additional field investigations to collect Site-specific data. Specific assessments along with their objectives and status are listed below:

- Supplemental assessment of the CCR Unit with emphasis on placement, location, thickness, total depth, and material characteristics of the CCR that will be managed during dewatering and excavation stages of the closure process. The investigation, which took place on top of both free standing water, as well as wet CCRs, required mobilization of specialized, limited-availability equipment with capabilities to access active surface impoundments. Golder performed this field evaluation in summer and fall 2019. These data also may be useful to address questions regarding source contribution to impacts identified in groundwater.

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- Pumping tests to determine aquifer characteristics in the area of the CCR Unit including storage characteristics and hydraulic conductivity values, assess potential boundary conditions (e.g., effects of the perimeter slurry wall), and to support future groundwater modeling efforts. The pumping tests, which were completed in June 2019, included a single-well step-rate pumping test, a long-term constant-rate pumping test (approximately 24 hours), a recovery test, and groundwater level monitoring. Data evaluation should be completed in fall 2019. Ultimately, these data will be used in conjunction with other Site information to determine the feasibility of designing a groundwater extraction system to capture impacted groundwater downgradient of the CCR Unit, if needed.
- Installation of additional piezometers to refine understanding of groundwater flow direction. Groundwater flow has previously been identified and monitored regionally and locally at the Site. However, given factors such as the Site's relative size, proximity of the CCR Unit to other Site features, and the potential effects of slurry walls upon local flow characteristics, additional information is needed. In June 2019 Golder installed two piezometers southeast of the CCR Unit. In fall 2019 and during succeeding monitoring events, Golder will collect groundwater surface elevation data to help refine groundwater flow maps in the near vicinity of the CCR Unit.
- An assessment of the CCR Unit perimeter slurry wall. Preliminary results from the pumping tests indicate a section of the slurry wall may not impact flow to the degree previously thought. Golder personnel excavated shallow pits (using Hydro-Vac techniques) to locate and observe the slurry walls in May 2019. Additional excavations and borings are planned to further assess the slurry wall in fall 2019.

Throughout the fall 2019-spring 2020 timeframe, Golder will continue to perform an engineering review of the eight potential Corrective Measures. For these reviews, Golder will place emphases on identifying critical data gaps, understanding and reacting to impacts of newly gathered information on previous assumptions and/or conclusions, identifying and researching applicability of emerging technologies, and monitoring changing conditions and future plans for the Site and their impacts on the remedy process. In conformance with applicable requirements of 40 CFR §257.97(a) Golder will provide an updated report semi-annually that summarizes NIPSCO's progress and status regarding a selection of remedy.

MCU G Corrective Measures Selection of Remedy, Semi-Annual Progress Report #20-01, April 2020

TECHNICAL MEMORANDUM

DATE April 13, 2020 **Project No.** 19121567

TO Joe Kutch, CCR Program Manager
Northern Indiana Public Service Company (NIPSCO LLC)

CC Marc Okin (NIPSCO LLC), Joe Gormley, Danielle Sylvia Cofelice, Jim Peace

FROM Mark Haney **EMAIL mhaney@golder.com**

**RE: NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC
R.M. SCHAHFER GENERATING STATION, CCR UNIT CONSISTING OF MSRB, MCWB AND DA
CORRECTIVE MEASURES SELECTION OF REMEDY, SEMI-ANNUAL PROGRESS REPORT #20-01**

On behalf of Northern Indiana Public Service Company (NIPSCO LLC), Golder Associates Inc. (Golder) prepared a Coal Combustion Residuals (CCR) Assessment of Corrective Measures (ACM) for three impoundments, the Material Storage Runoff Basin (MSRB), the Metal Cleaning Waste Basin (MCWB), and the Drying Area (DA), collectively referred to as the CCR Unit. The CCR Unit is located at the NIPSCO LLC R.M. Schahfer Generating Station, 2723 E 1500 N Road, Wheatfield, Jasper County, Indiana (RMSGS or Site). The ACM, prepared in conformance with applicable requirements of 40 Code of Federal Regulations (CFR) §257.96, was certified by a qualified Indiana-licensed professional engineer April 19, 2019, following which it was placed in the facility operating record and posted to NIPSCO LLC's publicly-accessible CCR website. This semi-annual progress report summarizes actions completed since the submittal of the first semi-annual progress report on October 16, 2019.

As discussed in the ACM, NIPSCO LLC plans to close this CCR Unit by removal in accordance with 40 CFR §257.102(c). NIPSCO LLC submitted a Closure Application to the Indiana Department of Environmental Management (IDEM) in April 2019. The Closure Application is currently under review by IDEM.

The ACM identified eight potential Corrective Measures to be considered for implementation following excavation and closure of the CCR Unit. However, Golder has determined that additional data and further evaluation are required to select a remedy from among these options. Concurrent with IDEM review of the Closure Application and further development by NIPSCO LLC of the closure detailed design, Golder is performing additional field investigations to collect Site-specific data and conducting analyses of recent and historical information. The following remedy selection-related activities have been performed in the past six months:

- Golder completed a field investigation and supplemental data analysis to further assess the CCR Unit with emphasis on placement, location, thickness, total depth, and material characteristics of the CCR that will be managed during dewatering and excavation stages of the closure process. The investigation, which took place in both free-standing water as well as wet and dry CCRs, required mobilization of specialized, limited-availability equipment with capabilities to access active surface impoundments. Golder completed the investigation in fall 2019 and the analysis of data in spring 2020.

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- Golder evaluated the results from the aquifer tests performed to determine aquifer characteristics in the vicinity of the CCR Unit including storage characteristics and hydraulic conductivity values, assess potential boundary conditions (e.g., effects of the perimeter slurry wall), and to support groundwater modeling efforts. Two individual tests were completed. The first, in June 2019, included the installation of a single extraction well and multiple piezometers hydraulically downgradient of the CCR Unit, and performance of a step-rate aquifer test, a long-term constant-rate aquifer test (approximately 24 hours), a recovery test, and groundwater level monitoring. A second test which included the installation of a single recovery well and multiple piezometers was completed within the Drying Area (inside the slurry walls) in November 2019. Ultimately, these data will be used in conjunction with other Site information to determine the feasibility of, need for, and design criteria of a groundwater extraction system to manage groundwater within or downgradient of the CCR Unit.
- In June 2019, Golder installed two piezometers southeast of the CCR Unit to refine understanding of groundwater flow direction. Golder collected groundwater elevation data from all wells on Site in September and November 2019 and March 2020 and has used these data to refine groundwater flow maps in the near vicinity of the CCR Unit. Golder will continue to collect groundwater surface elevation data during succeeding monitoring events.
- Golder completed an assessment of the CCR Unit perimeter slurry wall. Golder personnel excavated shallow pits (using Hydro-Vac techniques) to locate and observe slurry walls in May and June 2019 followed by additional test pits (using backhoe excavation and repair techniques) in November 2019. In total, 46 slurry wall assessment excavations were completed. Golder also advanced a soil boring within the slurry wall located south of the Drying Area in November 2019. Results were used to confirm the slurry walls' presence and determine the location including the top elevation, the composition, and the current conditions of the slurry walls.
- Golder also set up and began simulations using a groundwater model for the Site to help design the remedial alternatives. The groundwater model will be used to determine particle transport time, extraction well spacing and rate(s) of withdrawal for potential pump and treat alternatives, and to predict changes in groundwater flow conditions after closure.

Throughout the spring-fall 2020 timeframe, Golder will continue to collect and evaluate additional information and perform an engineering review of the eight potential Corrective Measures. For these reviews, Golder will place emphases on identifying critical data gaps, understanding and reacting to impacts of newly gathered information on previous assumptions and/or conclusions, identifying and researching applicability of emerging technologies, and monitoring changing conditions and future plans for the Site and their impacts on the remedy process. In conformance with applicable requirements of 40 CFR §257.97(a) Golder will provide an updated report semi-annually that summarizes NIPSCO LLC's progress and status regarding a selection of remedy.

MCU H Corrective Measures Selection of Remedy, Semi-Annual Progress Report #20-02, October 2020

TECHNICAL MEMORANDUM

DATE October 9, 2020 **Project No.** 19121567

TO Joe Kutch, Team Leader Environmental Compliance
Northern Indiana Public Service Company (NIPSCO LLC)

CC Marc Okin (NIPSCO LLC), Joe Gormley, Danielle Sylvia Cofelice, Jim Peace

FROM Mark Haney **EMAIL mhaney@golder.com**

**RE: NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC
R.M. SCHAHFER GENERATING STATION, CCR UNIT CONSISTING OF MSRB, MCWB AND DA
CORRECTIVE MEASURES SELECTION OF REMEDY, SEMI-ANNUAL PROGRESS REPORT #20-02**

On behalf of Northern Indiana Public Service Company (NIPSCO LLC), Golder Associates Inc. (Golder) prepared a Coal Combustion Residuals (CCR) Assessment of Corrective Measures (ACM) for three impoundments, the Material Storage Runoff Basin (MSRB), the Metal Cleaning Waste Basin (MCWB), and the Drying Area (DA), collectively referred to as the CCR Unit. The CCR Unit is located at the NIPSCO LLC R.M. Schahfer Generating Station, 2723 E 1500 N Road, Wheatfield, Jasper County, Indiana (RMSGS or Site). The ACM, prepared in conformance with applicable requirements of 40 Code of Federal Regulations (CFR) §257.96, was certified by a qualified Indiana-licensed professional engineer April 19, 2019, following which it was placed in the facility operating record and posted to NIPSCO LLC's publicly-accessible CCR website. This semi-annual progress report summarizes actions completed since the submittal of the second semi-annual progress report on April 13, 2020.

As discussed in the ACM, NIPSCO LLC plans to close this CCR Unit by removal in accordance with 40 CFR §257.102(c). NIPSCO LLC submitted a Closure Application to the Indiana Department of Environmental Management (IDEM) in April 2019 and has since provided supplemental information in response to IDEM review comments. NIPSCO LLC continues to refine the Closure Application, which is currently under additional review by IDEM.

The ACM identified eight potential Corrective Measure alternatives to be considered for implementation following excavation and closure of the CCR Unit. However, Golder determined that additional data and further evaluation were required to select a remedy from among these options. Concurrent with IDEM review of the Closure Application and further development by NIPSCO LLC of the closure detailed design, Golder performed additional field investigations to collect Site-specific data and conducting analyses of recent and historical information. The following remedy selection-related activities have been performed in the past six months:

- In June 2019, Golder installed two piezometers southeast of the CCR Unit to refine understanding of groundwater flow direction. Golder collected groundwater elevation data from all wells on Site in September and November 2019 and March and April 2020. In April 2020, Golder installed an additional three piezometers northwest of the CCR Unit and collected groundwater elevation data from these wells in May, July, August, and September 2020. Golder has used these data to refine groundwater flow maps in the near

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vicinity of the CCR Unit. Golder will continue to collect groundwater surface elevation and groundwater quality data during succeeding monitoring events.

- Golder also set up and performed simulations using a groundwater model for the Site to help design the remedial alternatives. The groundwater model was used to estimate particle transport time, to determine appropriate extraction well spacing and withdrawal rate(s) for potential pump and treat alternatives, and to predict changes in groundwater flow conditions after closure.
- Golder began its evaluation of the eight potential Corrective Measure alternatives identified in the ACM for consideration following the excavation and closure of the CCR Unit. These evaluations included developing conceptual designs for each potential corrective measure alternative and then comparing the effectiveness of each alternatives based on their overall performance, reliability, ease of implementation, potential impacts of the remedy, time to complete the remedy, and institutional requirements.
- In September, Golder participated in a conference call with the closure design engineering firm to discuss several CCR Unit closure design (e.g., backfill and capping) and post-closure (e.g., stormwater runoff, detention, and dischargement) implications for construction and operation of potential Corrective Measures.

Throughout the fall 2020-spring 2021 timeframe, Golder will continue to collect and evaluate additional information and perform an engineering review of the eight potential Corrective Measures, consistent with timing and implications of the Closure Application IDEM review and approval processes. For these reviews, Golder will place emphases on identifying critical data gaps, understanding and reacting to impacts of newly gathered information on previous assumptions and/or conclusions, identifying and researching applicability of emerging technologies, and monitoring changing conditions and future plans for the Site and their impacts on the remedy process. In conformance with applicable requirements of 40 CFR §257.97(a) Golder will provide an updated report semi-annually that summarizes NIPSCO LLC's progress and status regarding a selection of remedy.

Attachment 2 Landfill – R.M. Schahfer Generating Station Restricted Waste Site (RWS) Type I

Appendices

LF A	Location Restriction Certification Report, NIPSCO R. M. Schahfer Generating Station Landfill Phase V and Phase VI, 40 CFR Part §257.64, Dated October 17, 2018
LF B	R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- April 2018
LF C	R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- August 2018
LF D	R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- March 2019
LF E	R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- September 2019
LF F	R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- May 2020
LF G	R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- September 2020
LF H	Soil Borings and Monitoring Well Logs 40 CFR Part §257.103(f)(2)(v)(C)(2)(ii)
LF I	Landfill Analytical Data 40 CFR Part §257.103(f)(2)(v)(C)(3)
LF J	2019 Annual Groundwater Monitoring and Corrective Action Report- Landfill Phase V and Phase VI- January 2020

LF A Location Restriction Certification Report, NIPSCO R. M. Schahfer Generating Station Landfill Phase V and Phase VI, 40 CFR Part §257.64, Dated October 17, 2018

Location Restrictions Certification Report

NIPSCO R. M. Schahfer Generating Station Landfill Phase V and Phase VI

Pursuant to: 40 CFR §257.64

Submitted to:

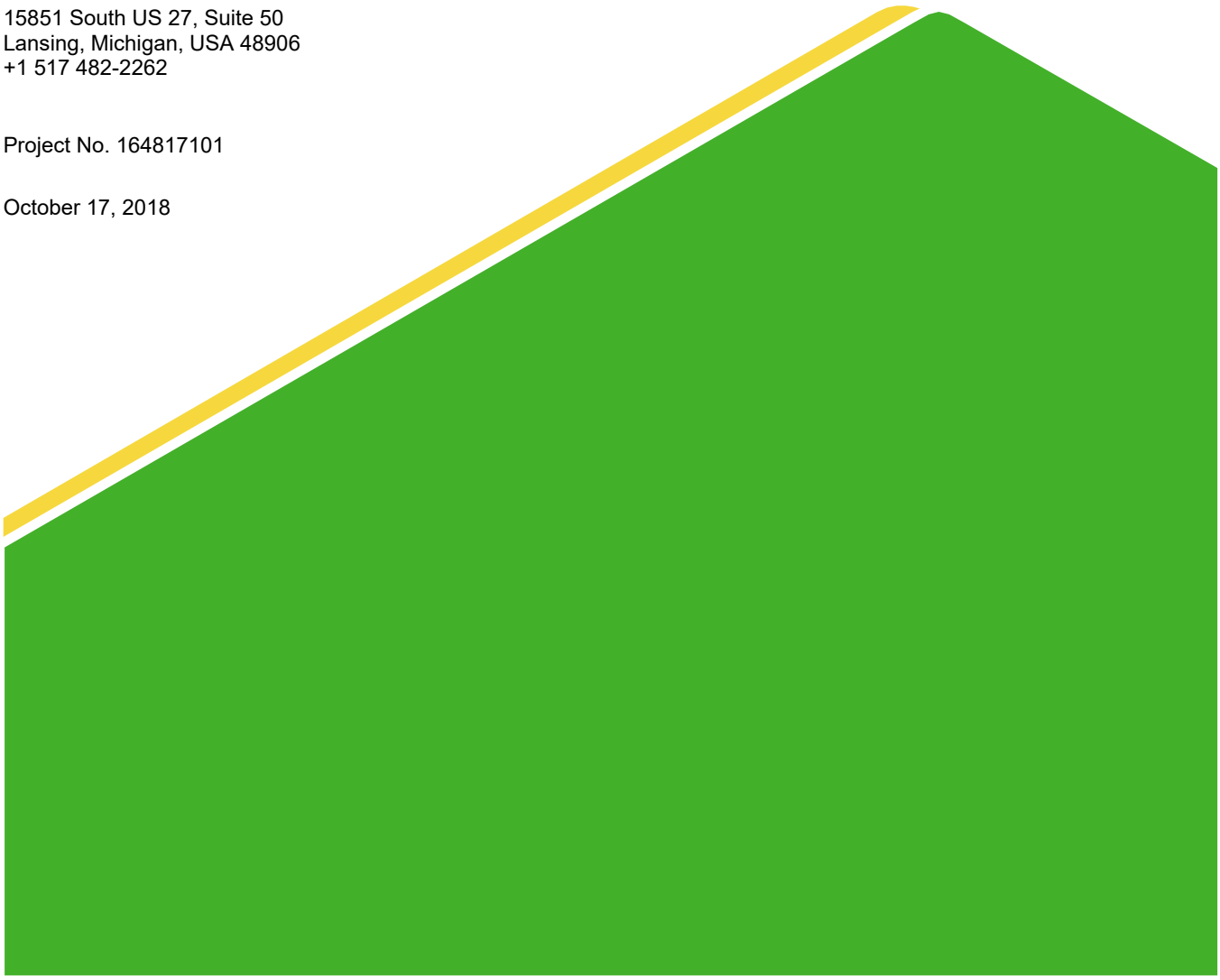
Northern Indiana Public Service Company
R. M. Schahfer Generating Station
Wheatfield, Indiana

Submitted by:

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Project No. 164817101

October 17, 2018



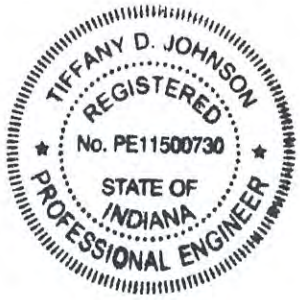
CERTIFICATION

Professional Engineer Certification Statement [40 CFR §257.60-64(b)]

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations, Section 257.64 (40 CFR §257.64), I attest that this RMSGS Landfill Location Restrictions Certification Report is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR §257.64.

Golder Associates Inc.

Signature



10/17/18

Date of Report Certification

Tiffany D. Johnson, P.E.

Name

PE11500730

Indiana Professional Engineer Certification Number

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CERTIFICATION **C-1**

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Figures

Figure 1 - Site Location Map

Figure 2 – CCR Unit Location Map

1.0 INTRODUCTION

1.1 Background

40 Code of Federal Regulations (CFR) Parts 257 and 261, “Hazardous and Soil Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule” (CCR Final Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1 place requirements on the location of CCR management units. Golder Associates Inc. (Golder) on behalf of Northern Indiana Public Service Company (NIPSCO) evaluated the location criteria and prepared this Location Restrictions Certification Report for the R. M. Schahfer (RMSGS) Landfill Phase V and Phase VI (RMSGS Landfill; together, the CCR Unit) located in Wheatfield, Indiana. RMSGS occupies an area of approximately four-square miles located at 2723 E 1500 N Road, Wheatfield, Jasper County, Indiana (Latitude 41° 12' 36" and Longitude 87° 01' 48", see Figure 1). Phase V is an approximately 18-acre cell that closed April 1, 2017. Phase VI is an approximately 15-acre cell located due north of Phase V, which began receiving CCR on August 1, 2016 (see Figure 2).

1.2 Purpose

The purpose of this Location Restrictions Certification Report is to provide demonstrations for the certification required by 40 CFR §257.64. Location Restrictions criteria for existing CCR landfills include:

- §257.64 Unstable areas

2.0 LOCATION RESTRICTIONS

The following sections outline NIPSCO’s (“owner’”) requirements as presented in the 40 CFR §257 Subpart D, Location Restrictions regulations.

2.1 Unstable Areas [40 CFR §257.64]

Based on research conducted through the Indiana Geological Survey information website (http://igs.indiana.edu/), the USGS, and historical reports prepared by Golder and others for the RMSGS site, the following unstable areas information was identified.

2.1.1 Petroleum Fields/Wells

There is a 400 feet deep petroleum well identified 0.5 miles north and west of the Site.

2.1.2 Sand and Gravel Pit

The closest identified pit is located approximately two miles east of the Site.

2.1.3 Active Mineral

There are no active industrial minerals sites identified within three miles of the Site.

2.1.4 Karst

There are no karst terrain locations mapped near the Site.

2.1.5 Liquefaction Potential

NIPSCO subcontracted an Indiana-licensed engineer to design and oversee construction of the Landfill CCR Unit in accordance with IDEM Solid Waste Management Division regulations 329 Indiana Administrative Code (IAC) 10, following which an operating permit would be issued by IDEM. The Indiana Solid Waste Management

regulations are as stringent as the CCR Final Rule requirements. Therefore, foundation soils for the RMSGS Landfill are not likely susceptible to seismically induced liquefaction.

2.1.6 Surface Mine

There are no surface coal mines identified near the Site.

2.1.7 Underground Mine

There are no underground coal mines identified near the Site.

2.1.8 Steep Slope

Per the IDEM-approved permit application prepared by NIPSCO's third-party engineer, the slopes of the landfill are not anticipated to have slope stability issues.

2.1.9 Abandoned Quarries

There are no abandoned quarries identified near the Site.

2.1.10 Differential Settlement

Per the Indiana Solid Waste Management Division requirements for landfill design (329 IAC 10-15-08), NIPSCO's third-party engineer had to assess the potential for differential settlement in the design of the Landfill CCR Unit. Based on this requirement, differential settlement is not expected in the foundation soils for the RMSGS Landfill CCR Unit and thus it meets the stability requirements under 40 CFR §257.64.

3.0 CONCLUSION AND SUMMARY

This report has been prepared in general accordance with normally accepted civil engineering practices to fulfill the reporting requirements of 40 CFR §257.64. Based on the review of the available information provided by NIPSCO, including IDEM Type I, Restricted Waste Landfill (RWS I) Operating Permit 37-01 issued January 1984, the Schahfer Landfill Phase V and VI meets the requirements of 40 CFR §257.64.

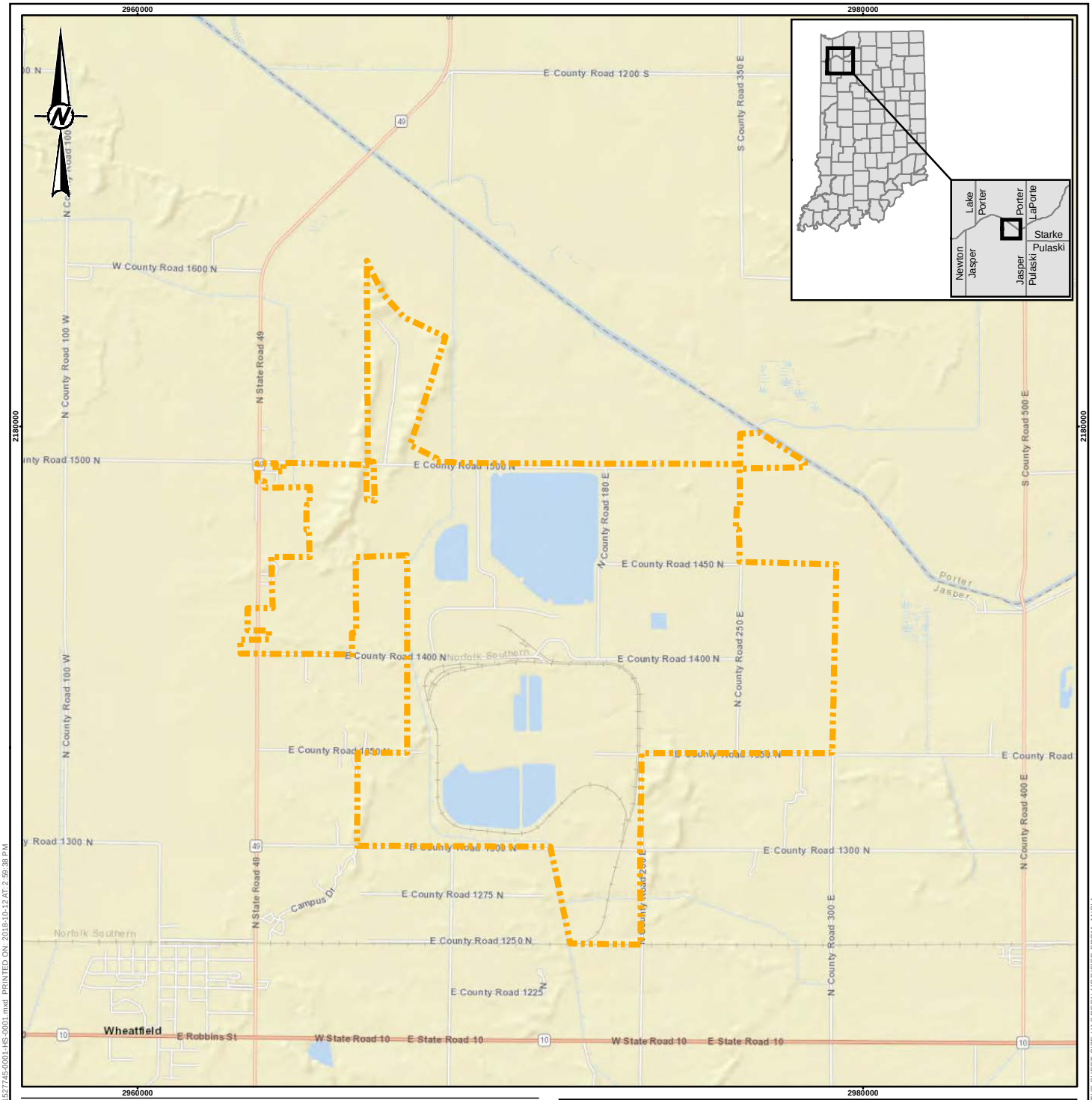
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LEGEND

Approximate Property Line

0 0.75 1.5

1 " = 0.75 miles Miles

NOTE(S)

REFERENCE(S)

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CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

SITE LOCATION MAP

CONSULTANT

GOLDER

YYYY-MM-DD	10/12/2018
DESIGNED	DFS
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
164817101	A	0	1

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LEGEND

- CCR Units
- Approximate Property Line

0 500 1,000

1 " = 500 feet Feet

NOTE(S)

REFERENCE(S)

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CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

CCR UNIT LOCATION MAP

CONSULTANT

GOLDER

YYYY-MM-DD	10/12/2018
DESIGNED	JSP
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
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LF B R. M. Schahfer Landfill
Phase V and Phase VI
Alternative Source
Demonstration- April 2018

Northern Indiana Public Service Company

R. M. Schahfer Generating Station

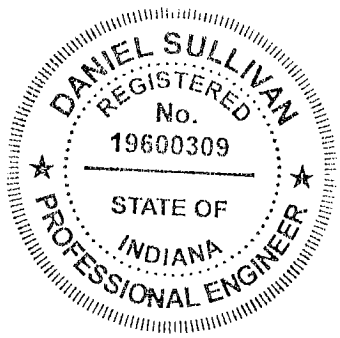
Wheatfield, Indiana

Schahfer Landfill Phase V and Phase VI

Certification of Alternative Source Demonstration

40 CFR §257.94(e)(2) & Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

I, Daniel Sullivan, being a Professional Engineer in accordance with the laws of the State of Indiana, and having experience in the design, construction, and operation of restricted waste landfills and groundwater monitoring systems for them, do hereby state that I am qualified in the subject matter of CCR management, groundwater monitoring, data interpretation, and groundwater impacts. I have personally examined and am familiar with this alternative source demonstration (ASD), the subject of which is non-CCR regulated landfill cells located at the NIPSCO R. M. Schahfer Generating Station, prepared by Golder, and dated March 2018. Based on an inquiry of those individuals immediately responsible, and on supporting data which I understand to be true, accurate and complete, I verify the information in this ASD is accurate and meets the applicable requirements of the CCR Final Rule. In consideration of the above, I certify to the best of my knowledge, information, and belief, that the ASD for the regulated CCR management unit referred to as Phase V and Phase VI has been prepared and meets the applicable requirements of 40 CFR §257.94(e)(2) and corresponding State of Indiana requirements.



Daniel Sullivan
Indiana Professional Engineer
License # 19600309

4.13.18
Date

GOLDER

REPORT

NORTHERN INDIANA PUBLIC SERVICE COMPANY R.M. SCHAHFER GENERATING STATION WHEATFIELD, INDIANA

Schahfer Landfill Phase V and Phase VI

ALTERNATIVE SOURCE DEMONSTRATION

Prepared Pursuant to 40 CFR 40 CFR §257.94(e)(2) and Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

April 13, 2018

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1.0 INTRODUCTION

On behalf of Northern Indiana Public Service Company (NIPSCO), Golder Associates Inc. (Golder) performed a statistical evaluation of groundwater analytical results from the first (October 2017) groundwater Detection Monitoring event at the Rollin M. Schahfer Generating Station (RMSGS) Landfill Phase V and Phase VI (together, the CCR unit), located at 2723 E 1500 N Road, in Wheatfield, Jasper County, Indiana (see Figure 1), in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, "Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule" (CCR Final Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

The statistical analyses of Appendix III groundwater Detection Monitoring results indicated statistically significant increases (SSIs) for seven analytes in downgradient wells compared to background levels. Although determination of an SSI generally indicates that the groundwater monitoring program should transition from Detection Monitoring to Assessment Monitoring, 40 CFR §257.94(e)(2) allows the owner or operator (i.e., NIPSCO) 90 days from the date of determination (January 15, 2018) to demonstrate that a source other than the CCR unit or another condition caused the apparent SSI(s).

Golder's initial review of the Site history and operations indicated the potential for SSIs to result from a source other than the CCR unit. Exploring this possibility further, Golder worked with NIPSCO representatives to better understand details of the history and progression of landfilling operations at RMSGS, especially the design, construction, and operation of cells in the vicinity of but preceding the operations of CCR Final Rule regulated Phases V and VI. As discussed in Section 2, a series of factors relative to the siting, design, and operation of specific historical landfill cells appear to have influenced groundwater quality, including that monitored by wells downgradient of Phases V and VI pursuant to the CCR Final Rule. In response to these findings and in accordance with provisions of the CCR Final Rule, Golder prepared this Alternative Source Demonstration (ASD) for Phases V and VI.

RMSGS includes multiple CCR management units, each or each grouping of which, features a separate groundwater monitoring system, as appropriate for specific conditions. The subject of this ASD is Schahfer Landfill Phases V and VI, which is geographically distant from other RMSGS CCR units. The ASD includes a review of information about groundwater monitoring wells designed and installed to monitor one or more Phases of the Landfill, and historical operational and groundwater quality data that are limited to the Landfill and its immediate proximity. Based upon the data review and research associated with this ASD, NIPSCO has not detected CCR impacts off-site associated with the RMSGS Landfill.

The ASD conforms to the requirements of 40 CFR §257.94(e)(2) and provides the basis for concluding that the apparent SSIs are not a result of a release from the CCR Unit. The following sections provide a summary of RMSGS history and landfill operations, a Conceptual Site Model, and lines of evidence demonstrating an alternative source is responsible for the SSIs in wells monitoring Phases V and VI.

2.0 HISTORICAL LANDFILL OPERATIONS AND GROUNDWATER MONITORING NETWORK

Understanding historical site conditions and local influences relative to them is crucial to determining whether a potential alternative source is present and affecting groundwater quality at the CCR regulated unit(s). In this section of the ASD, Golder researched landfill operations and groundwater monitoring results, with an emphasis on activities and data preceding the existence of Phases V and VI.

2.1 Historical Landfill Operations

Golder considered the possibility that current conditions – namely, apparent groundwater SSIs downgradient of Phases V and VI, might instead be the result of conditions caused by the historical design, construction, operation, and waste materials managed in nearby, 1980s- and 1990s-era, non-CCR regulated landfill cells rather than CCR Final Rule regulated units, Phases V and VI. To evaluate this possibility further, Golder worked with NIPSCO personnel to assemble and review historical information about the landfill prior to the development, construction, and operation of Phases V and VI. This section of the ASD briefly summarizes the history of RMSGS Phases I through VI from sources including information available on the Indiana Department of Environmental Management (IDEM) Virtual File Cabinet, NIPSCO internal environmental compliance files, commercially available historical imagery, and discussions with various NIPSCO personnel with historical knowledge of and experience with Schahfer landfill operations.

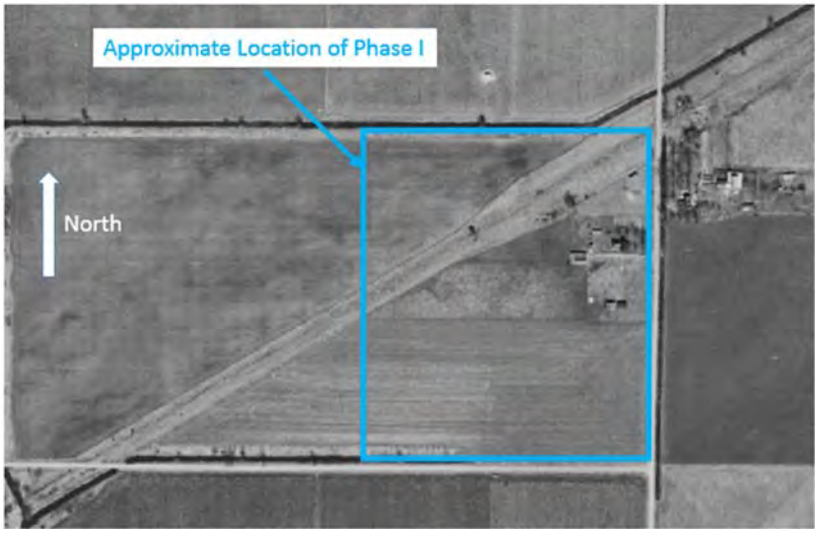
NIPSCO constructed and operated the landfill cells adjacent to one another in a phased approach as shown in Figure 2. A general summary of the landfill phase operations is provided in the table below.

Phase	CCR Rule Regulated (Y/N)	Dates of Operations	Size (acres)	Waste Received	Lined/Unlined	Capped Date
I	N	1984 – 1991	20	FGD/Fly Ash	Unlined	1999 (re-closure)
II	N	1991 - 1998	42	FGD/Fly Ash	Unlined	1998
III	N	1998 - 2008	16	Fly Ash	Lined	2008
IV	N	2005 - 2013	20	Fly Ash	Lined	2013
V	Y	2012-2017	18	Fly Ash	Lined	2017
VI	Y	2016 - present	15	Fly Ash	Lined	NA

In January 1984, NIPSCO received an operating permit from IDEM to operate a Type I, Restricted Waste Landfill. Phase I was permitted to accept an approximately 50/50 mixture of flue gas desulfurization (FGD) filter cake sludge and fly ash (hereafter referred to as ash mix) from generating Units 17/18. FGD sludge is a waste product of the Units 17/18 dual-alkali system which used an alkaline sodium solution for emissions gas scrubbing, after which the scrubbing liquor was pumped into a holding tank where slaked lime was added. FGD sludge is primarily composed of varying amounts of calcium sulfite hemihydrate and calcium sulfate dihydrate (and added slaked lime). The FGD has a greater concentration of sulfate as compared to fly ash, the major chemical components of which include silica dioxide, aluminum trioxide, iron oxide and varying amounts of lime. The self-cementing properties of fly ash and its ready availability made it a good additive to FGD sludge to create a stable ash mix for landfilling purposes. Although similar permit documents for Phase II were unavailable, based on

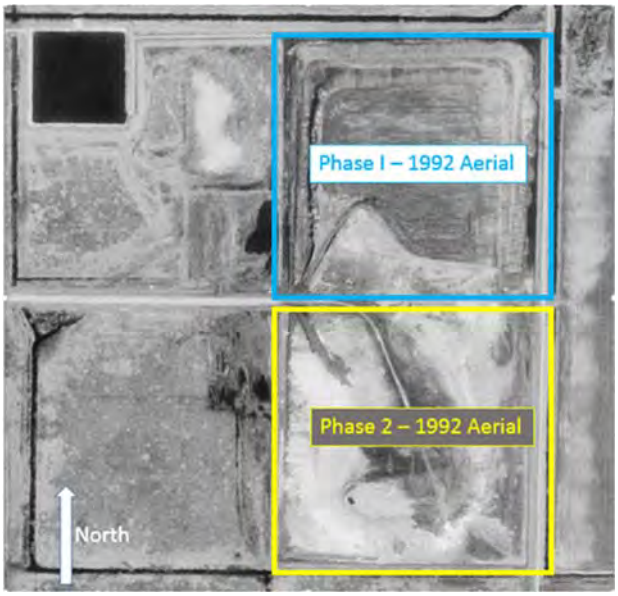
historical research and discussions with NIPSCO personnel, Golder believes that Phase II construction and operations were similar to those for Phase I.

Prior to construction of Phase I, the land was used for agricultural purposes including several ditches for surface drainage. A farm (i.e., residential, barn, and related outbuilding structures) was formerly located in the future Phase I landfill area as shown in the figure below.





Placement of ash mix in unlined Phase I began in 1984 and in unlined Phase II in 1991. Phase II was located immediately south of Phase I as shown in the figure below.



A summary of historical operations of Phases I and II based on interviews with NIPSCO personnel and information gathered during literature reviews is provided below:

- As much as three feet of topsoil/uppermost sand was removed from the base of each landfill phase prior to initiation of operations (per NIPSCO representatives)
- Following soil removal, receipt and landfilling directly into unlined cells of co-mingled FGD and fly ash material (i.e., ash mix)
- Precipitation falling on the landfill side slopes prior to capping flowed to low-lying areas east and west of Phases I and II where ash mix-impacted surface water would have infiltrated into groundwater
- Use of drainage ditches to capture and manage leachate and stormwater surface run-off from the landfill impacted groundwater (NIPSCO, 1994 – provided in Appendix B). Sedimentation of waste materials from erosion of the landfill slopes also partially filled the ditches, which in turn would have contributed to groundwater impacts
- Phases I and II ceased receiving ash mix in 1991 and 1998, respectively, but were not capped until 1999 and 1998, respectively. Recapping of Phase I was required due to erosion of the first cap constructed in 1998. Construction drawings from Burns & McDonnell indicate that Phase I and II were final capped by installing a 40 mil LDPE liner, placing 12-18” protective cover clay liner, and 6” of topsoil.

Design and construction of subsequent Phases (i.e., III, IV, V, and VI) included a liner and leachate collection systems. According to NIPSCO representatives, the four lined landfill phases only received fly ash (i.e., not the FGD waste component).

2.2 Groundwater Monitoring Network

To support the permitting process prior to landfill construction, NIPSCO installed eight well pairs in the area of the proposed landfill (MW-1/1D through MW-8/8D) in September 1981 (see Figure 2). Shallow wells were screened to intersect the water table and deep wells were installed to the top bedrock (approximately 32 to 37 feet below ground surface (ft. bgs)). NIPSCO installed additional well pairs to assess groundwater quality including:

- In 1983, MW-9S/9D and background well pair (MW-10S/10D)
- In 1994, MW-11S/11D and MW-12S/12D
- In 1998, MW13S/13D and MW-14S/14D

The boring logs for monitoring wells MW-1S/1D through MW-8S/8D are included in Appendix A. In accordance with its operating permit, NIPSCO implemented a routine Phase I groundwater monitoring program which included indicator parameters boron and sulfate, among others to assess groundwater quality in 1984. Historical groundwater monitoring results are provided in Table 1 and presented and discussed in Section 3.

As reported in the quarterly groundwater reports submitted to IDEM, NIPSCO detected groundwater impacts in samples collected from monitoring wells near the Phase I landfill within approximately two years of initiating landfilling activities in 1984. Prior to 1992, NIPSCO only provided the analytical data to IDEM; no comparisons were made to background or regulatory standards. On behalf of NIPSCO, Radian Inc. developed background groundwater concentrations based on a statistical analysis of the groundwater data in a June 1, 1993 report. Radian identified SSIs for multiple parameters including sodium, boron, chloride, fluoride, sulfate, pH, and specific

conductance. These SSIs encompass all of the current SSIs with the exception of calcium and total dissolved solids which were not part of the parameter list in 1993. In May 2005, 10 years prior to the opening of phase V, IDEM required a Phase II assessment groundwater monitoring program based on the identified SSIs (sodium, barium, boron, chloride, fluoride, selenium, silver, sulfate, pH, and specific conductance) following the agency's review of the October 2000 to November 2004 Semi-Annual Groundwater Monitoring Reports (IDEM, 2005 – provided in Appendix B). IDEM required NIPSCO to implement a Phase II groundwater assessment monitoring program under 329 IAC 10-29-7, which included an expanded parameter list (26 total) and surface water monitoring from two locations in Stahlbaum Ditch.

In accordance with the CCR Final Rule, Golder installed six background (only five used) and 12 downgradient monitoring wells around landfill Phases V and VI in 2016 (see Figure 2). Golder installed these well pairs in a similar manner as the original IDEM Solid Waste permit wells (e.g., intersecting the water table and to top of bedrock). Golder has performed the required eight background monitoring events and one Detection Monitoring event in accordance with the CCR Final Rule.

3.0 CONCEPTUAL SITE MODEL

Golder developed a conceptual site model (CSM) based on interpretations of historical boring logs advanced prior to construction of the generating station, location and operation of historical ash management units at the Site, historical semi-annual groundwater monitoring reports for the landfill, literature review, and boring logs and monitoring data obtained to meet the requirements of the CCR Final Rule. Select information from these resources is summarized in the following sections.

3.1 Site Geology and Hydrogeology

According to Fraser and Bleur (1991), during the late Pleistocene, the Site was occupied by a post-glacial lake followed by a broad, low-gradient outwash stream that deposited sand uniformly across the basin to form the Kankakee-Valparaiso Formation. This is consistent with soil boring logs described by Sargent and Lundy during construction of RMSGS and borings advanced by Golder in 2016 as part of the CCR program. Golder's interpretation of the Site geology is as follows:

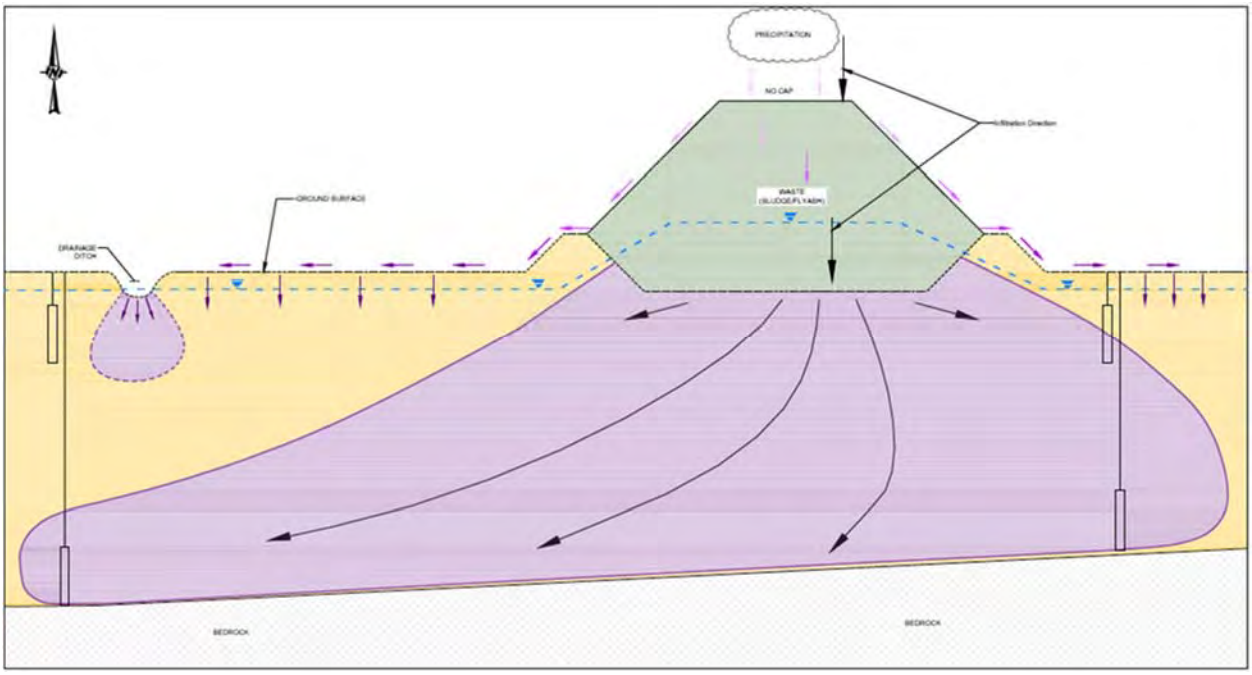
- Brown fine to medium-gained sand from the ground surface to approximately 14 ft. bgs
- Grayish-brown fine to coarse-grained sand from approximately 14 ft. bgs to 34 ft. bgs (coarsens with depth)
- Black to dark gray shale with planar cleavage (i.e., bedrock). Depth to bedrock is approximately 32 to 37 ft. bgs in the area of the landfill. Top of bedrock is variable near the landfill with a trough-like feature running approximately northeast to southwest as shown in Figure 3. The bedrock topography may influence groundwater flow in the deeper portion of the aquifer (reduce hydraulic gradient to the northeast – predominant groundwater flow direction)

Groundwater flow in the alluvial aquifer underlying the landfill is generally toward the north/northeast (i.e., toward the Kankakee River) as shown in Figure 3. The fine to coarse-grained sands do not restrict horizontal and/or vertical groundwater flow (i.e., no aquitards or other confining units to reduce groundwater flow) near the landfill. Based upon its review of information, Golder believes that the groundwater flow regime in the landfill area is affected by Stahlbaum Ditch (i.e., potential localized groundwater discharge point for the upper portion of the alluvial aquifer), which is located and flows along the northern, western, and southern perimeters of the landfill (flows south to north – then west based on flow observations and data from two staff gauges).

The calculated horizontal hydraulic gradient across the Site ranges from approximately 0.00018 ft/ft to 0.00031 ft/ft. The hydraulic gradients beneath the landfill are shallower (i.e., lower) than at the periphery of the landfill (i.e., southwest and northeast), which may be due to bedrock topography and/or historical groundwater mounding beneath Phases I and II. A review of the groundwater elevation data indicates that groundwater flow in the shallow unconfined aquifer is primarily horizontal, and that there is not a significant vertical component of groundwater flow.

3.2 Groundwater Impacts Due to Historical Landfilling Operations

Golder's conceptual model of how the high moisture content ash mix behaved under the mass of additional material being landfilled and compacted, and interacted with infiltration from precipitation events (shown in violet arrows below) to produce leachate that, in turn, dispersed into drainage features and underlying and surrounding groundwater, is provided below (i.e., pre-capping of Phase I).



Because Phases I and II were unlined and lacked a leachate collection system, groundwater mounding was expected as the ash mix and precipitation events increased the liquid levels within the landfill. The hydraulic head difference between the groundwater elevations beneath the landfill and static groundwater levels outside the landfill would have increased the migration of inorganic-laden groundwater radially beyond the above-grade, working limits of the landfill. The head difference in the landfill would have been strong enough to overcome the weak horizontal hydraulic gradients observed around the perimeter of the landfill. In addition to the hydraulic head difference, leachate generated in the landfill has a higher density (i.e., similar to salt water) than groundwater which tends to increase the vertical migration of inorganic-impacted groundwater downward and outward from the landfill as shown in the cross section provided above. Under current conditions, because the area of the landfill is not subject to a strong horizontal gradient and Phases I, II, III, IV have been capped and Phases III, IV, V, and VI are lined, recharge is limited, which likely creates a groundwater stagnant zone under the landfill, limiting the dissipation and migration of groundwater impacts.

4.0 ASD LINES OF EVIDENCE

Golder developed this ASD following research of the historical landfill operations and documentation, CSM, and historical analytical data. Based upon multiple lines of evidence as outlined in the following subsections, Golder believes that the existence of an alternative source is responsible for the SSIs determined as a result of the first groundwater Detection Monitoring event conducted for Phases V and VI.

4.1 Trend Charts and Iso-concentration Maps – Pre-Phase V and VI Construction

NIPSCO has been collecting groundwater data from landfill monitoring wells since 1982, approximately 2.5 years before Phase I began accepting the ash mix. To evaluate groundwater impacts potentially associated with operations of the landfill, Golder selected boron and sulfate as key groundwater indicator parameters because both of these inorganics have been included in the analytical suite of parameters from the beginning of monitoring activities and are recognized indicators of potential groundwater impacts from fly ash landfills. Golder developed time-series graphs for boron and sulfate, which are provided in Figures 4 through 7. Available Appendix III/IV analytical data from 1982 to present are presented in Table 1.

NIPSCO collected groundwater data from monitoring wells MW-01S/01D through MW-08S/08D prior to landfilling operations, which began in 1984. Groundwater data support Golder's conclusion that groundwater flow direction prior to landfill construction was generally north/northeast (or towards the Kankakee River) with low horizontal gradients.

Prior to 1985, the trend charts indicate very few, if any, detections of inorganics in the groundwater monitoring wells located downgradient of the landfill. However, starting in 1986, approximately two years after the landfill became operational, inorganic parameters began to be detected in the nearest downgradient monitoring wells (i.e., MW-3S/3D). As shown in Table 1 and Figures 4 through 7, boron and sulfate concentrations in monitoring wells MW-3S and MW-3D (located immediately north of Phase I – see Figure 2) trended progressively higher as described below:

- Boron (MW-3S): From June 1982 to April 1986 – boron concentrations were less than 1 mg/l; by October 1986 (approximately two years after landfilling began in Phase I), boron concentrations in the shallow well had increased to 2.4 mg/l and by January 1990 (next sampling event that included boron), boron was detected at a concentration of 8.2 mg/l
- Boron (MW-3D): From June 1982 to July 1986 – boron concentrations were typically less than 1 mg/l; by October 1986, boron concentrations in the deep well had increased to 4.74 mg/l and by January 1990 (next sampling event that included boron), boron was detected at a concentration of 6.99 mg/l
- Sulfate (MW-3S): From June 1982 to April 1986 – sulfate concentrations were less than 100 mg/l; by April 1985 (approximately one year after landfilling began in Phase I), sulfate concentrations in the shallow well had increased to 390 mg/l and by October 1988 increased to over 1,000 mg/l
- Sulfate (MW-3D): From June 1982 to July 1985 – sulfate concentrations were less than 100 mg/l; by October 1985, sulfate concentrations in the deep well had increased to 120 mg/l and by January 1988 increased to over 1,000 mg/l

As shown in Figures 4 through 7, prior to capping Phase I and Phase II (late 1990's), boron and sulfate concentrations increased in wells MW-2S/MW-2D, MW-4S/MW-4D, and MW-5S/MW-5D (in addition to MW-3S/MW-3D). Two lines of evidence that explain these groundwater impacts in the vicinity of Phases I and II are:

- Surface water contribution: All of these well pairs are located adjacent to a perimeter drainage ditch and/or Stahlbaum Ditch, which confirms NIPSCO's contention that sediment-laden leachate/stormwater run-off flowing from the landfill to the stormwater pond was deposited in the ditches and likely contributed to the shallow groundwater impacts detected in these wells (NIPSCO, 1994).
- Density-driven migration of groundwater impacts: About the same time as capping Phase II and approximately one year prior to capping Phase I, boron concentrations are highest in monitoring well pair MW-02S/MW-02D (located east of Phase II), with a boron concentration in the shallow monitoring well much lower than the boron concentration in the deep monitoring well, 6.3 mg/L and 20 mg/L (November 1998), respectively (similar to relative shallow/deep concentrations in other well pairs). November 1998 boron iso-concentration contours for the shallow and deep monitoring wells are provided in Figures 8 and 9, respectively. The boron iso-concentration contours support Golder's interpretation that prior to capping Phases I and II, groundwater mounding beneath these phases created an increase in hydraulic head that generated radial flow of density-driven impacted groundwater away from the landfill.

In a likely response to closing and capping of Phase I and Phase II, concentrations of boron and sulfate detected in the shallow wells decreased as compared to concentrations measured during active landfilling in these cells (see Figures 8 and 9). However, boron and sulfate concentrations in deep monitoring wells MW-02D and MW-03D have generally remained consistent with pre-capping concentrations, and concentrations in deep wells farther from the landfill (MW-05D, MW-11D, and MW-13D) generally increased for several years post-capping. These boron and sulfate concentrations shown in the deep well trend plots are consistent with expectations that a stagnant groundwater zone beneath the unlined landfills is still affecting overall groundwater quality.

Figures 10 and 11 show the September 2011 boron isoconcentration contours in the shallow and deep monitoring wells, respectively, prior to the construction of Phase V. Boron concentrations in the shallow wells are relatively low when compared to the 1998 concentrations (the highest concentration was detected in monitoring well MW-03S, 2.2 ug/L). However, concentrations in the deep monitoring wells remain elevated, with higher concentrations west of Phase II (MW-05D) then north/northeast (MW-13D and MW-14D). This supports Golder's interpretation that capping of Phase I and Phase II reduced groundwater recharge in this area, reducing horizontal groundwater flow beneath the landfill in which migration of impacts is almost entirely density driven.

4.2 Trend Charts and Iso-Concentration Maps – Post Phase V and VI Construction

As shown in Table 2, groundwater impacts were detected in the CCR Final Rule-compliant monitoring wells installed around Phase V and VI (both lined landfill cells). These wells are located in areas where the historical drainage ditches carried the inorganic-laden runoff water generated from Phase I and II. Phase V started to receive fly ash in 2012 and Phase VI did not begin to receive fly ash until 2016 (i.e., after initiating background sampling). Figures 12 and 13 show the current (March/April 2017) boron iso-concentration contours in the shallow and deep monitoring wells, respectively. Boron concentrations are similar to those displayed in the September 2011 contour maps; however, recently installed wells along the western edge of Phase II indicate that concentrations above background levels still exist in shallow groundwater immediately adjacent to Phase II, further suggesting that groundwater flow in this area is stagnant. Boron concentrations decrease north of

Stahlbaum Ditch and are consistent with background concentrations closer to the RMSGS property boundary to the north and east (i.e., groundwater impacts do not extend off Site).

As stated above, inorganics associated with the ash mix have been detected in groundwater samples at concentrations well above background levels in monitoring wells installed near the landfill since shortly after landfilling operations began in 1984. These groundwater impacts have been detected consistently for over 30 years prior to construction of Phases V and VI. NIPSCO has submitted quarterly or semi-annual groundwater monitoring reports from 1981 to 2017 to IDEM, which have documented groundwater impacts associated with Phases I and II. In addition, although inorganics were detected in groundwater samples collected from monitoring wells located downgradient of Phase VI, a lined cell, it hadn't yet become operational or started to receive wastes until after apparent groundwater impacts were detected.

The historical data displayed in the trend charts and boron isoconcentration contour maps support Golder's historical CSM and demonstrate that the inorganic-impacted groundwater resulted from an alternative source, Phases I and II. Groundwater conditions related to Phases I and II existed decades prior to, and concentrations have not increased since, the construction and operation of Phase V and Phase VI.

5.0 CONCLUSION

The preceding information serves as the ASD prepared in accordance with 40 CFR 257.94(e)(2) and supports the finding that the SSIs determined on January 15, 2018 are not due to release from the CCR unit. As described above, the CSM, historical groundwater data, and landfill design indicate that a release from the non-regulated, unlined portion of the landfill, Phases I and II, is the source of the identified SSIs. Therefore, no further action (i.e., Assessment Monitoring) is warranted, and the Schahfer Landfill Phases V and VI will remain in Detection Monitoring.

6.0 REFERENCES

NIPSCO Letter to IDEM, "Response to December 14, 1993 Letter Concerning a Corrective Action Plan for the Schahfer Generating Station, Jasper County, Indiana", March 18, 1994

IDEM Letter to NIPSCO, "Review Letter for Semi-Annual Groundwater Schahfer Station Reports October 2000 to November 2004 – RWS 1, FP# 37-01, Jasper County", March 17, 2005

TABLES

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-01D	6/3/82	ND	19	13	2.8	0.18	130	7.6	ND	ND	ND	ND	0.014	ND		ND	242
	9/16/82	0.28	24	31	ND	0.18	230	7.3	ND	ND	ND	ND	0.028	ND		ND	261
	12/28/82	0.05	29	30	1.5	0.17	150	7.3	ND	ND	ND	ND	ND	ND		ND	270
	4/5/83	0.13	82	45	4.4	0.14	260	7.5	ND	ND	ND	ND	ND	ND		ND	420
	10/17/83	0.61	220	76	11	0.12	570	7.9	ND	0.22	ND	ND	ND	ND		ND	690
	2/7/84	5.4	150	130	4.1	ND	620	7.2	ND	ND	ND	ND	ND	ND		ND	940
	4/23/84	1.9	245	173			731	6.8		0.19	ND	ND	0.17	0.0003		ND	930
	7/31/84	2.5	130	125			534	7.6		0.4	ND	ND	ND	ND		ND	750
	10/18/84	9.5	85	56.8			383	7.5		ND	ND	ND	ND	ND		ND	550
	1/28/85	6.1	170	103			683	7.05		ND	ND	ND	ND	ND		ND	1050
	4/25/85	6.1	130	132			16	7.1		ND	ND	ND	ND	ND		ND	800
	7/25/85	4.8	290	141			809	6.8		ND	ND	ND	ND	ND		ND	1100
	10/29/85	11	160	130			620	7.2		ND	ND	ND	ND	ND		ND	910
	1/15/86	9.1	140	139			650	7		ND	ND	ND	ND	ND		ND	1000
	4/25/86	12.6	160	141			625	6.8		ND	ND	ND	ND	ND		ND	895
	7/29/86	1.4	112	154			626	6.6		ND	ND	ND	ND	ND		ND	1000
	10/28/86	9.58	103	163			727	6.6		ND	ND	ND	ND	ND		ND	710
	1/27/87		70					6.7									1100
	4/17/87		128					6.6									1200
	7/16/87		95					6.4									990
	10/15/87		110					6.5									965
	1/19/88		125					6.8									1100
	4/27/88		92					6.7									1240
	7/26/88		100					6.7									820
	10/13/88		118					6.8		0.06	0.0025	ND	ND	ND		0.005	1030
	1/17/89		120					7		0.086	0.005	ND	ND	ND		0.005	860
	4/20/89		76					6.5		0.06	0.0025	ND	0.012	ND		0.005	845
	7/26/89		63					6.7		0.061	0.0025	ND	ND	ND		0.001	760
	10/19/89		70					5.85		0.06	0.0025	ND	ND	ND		0.001	780
	1/24/90	3.1	58		7			6.61		0.05	0.001	ND	0.1	ND		0.005	800
	4/27/90	8.68	79					6.49		0.068	0.001	ND	0.0045	ND		0.005	920
	7/19/90	16.9	115					6.81		0.025	0.001	ND	0.0045	ND		0.005	882
	10/19/90	11.12	107					6.36		0.145	0.001	ND	0.0045	ND		0.005	860
	1/23/91	10.17	138		ND			6.37	0.01	0.091	0.002	ND	0.01	ND		0.01	754
	4/19/91	0.009	172		13			6.58	ND	0.092	0.002	0.01	ND	ND		ND	820
	7/31/91	10.3	138		1			6.93	0.01	0.84	ND	ND	0.028	ND		0.01	820
	10/29/91	52	137.1		3.91			7.07	ND	0.093	0.002	0.011	ND	ND		ND	856
	2/13/92	8.28	164		4.82			6.8	ND	0.078	0.002	ND	0.01	ND		0.01	717
	6/30/92	64.9	136		9			6.95		0.071	ND	ND	ND			ND	781
	1/27/93	28	72		8.2	0.21		6.89	ND	0.073	ND	ND	ND	ND		ND	658
	8/21/93	28	120		7			7.04	0.01	0.02	0.04	0.04	0.01	ND		0.02	1010
	1/5/94	49	100		2.4	0.26		6.88	ND	0.05	ND	ND	ND	ND		ND	680
	7/21/94	28	74		3.5	0.22		6.88	ND	0.06	ND	0.02	0.003J	ND		ND	820
	1/24/95	3.5	52		2.8	0.2		6.8	ND	0.07	ND	ND	ND	ND		ND	740
	7/24/95	23	550		4.1	0.17		6.87	ND	0.05	ND	ND	ND	ND		ND	800
	1/22/96	9.3	71		3.6	0.19		6.85	ND	0.07	ND	ND	ND	ND		ND	899
	7/18/96	0.37	420		5.7	ND		5.55	ND	0.06		ND	ND	ND		ND	947
	1/23/97	0.56	150		2.6	ND		6.46	ND	0.028	ND	ND	0.033	ND		ND	475
	10/7/97	49	93		2.5	0.22		6.97	ND	0.037	0.0002	0.01	ND	ND		ND	853
	3/25/98	18	76		4.1	0.25		6.94	ND	0.054	ND	ND	ND	ND		ND	822
	11/23/98	29	86		4.3	0.34		7.31	ND	0.045	ND	ND	ND	ND		ND	743
	3/24/99	36	120		4.4	0.3		7.3	ND	0.046	0.00037	ND	ND	ND		ND	812
	9/27/99	28	100		4.1	0.35		7.3	ND	0.048	ND	ND	ND	ND		ND	766
	3/29/00	50	100		2.5	0.39		7.4	ND	0.082	ND	ND	ND	ND		ND	862
	10/4/00	30	130		3.8	0.27		7.4	ND	0.058	ND	ND	ND	ND		ND	731
	4/11/01	36	64		3.2	0.22		7.4	ND	0.073	ND	ND	ND	ND		ND	925
	10/1/01	36	190		4	0.24		7.4	ND	0.095	ND	ND	ND	ND		ND	833
	3/19/02	28.2	82		4.8	0.19		7.19	ND	0.064	ND	ND	ND	ND		ND	826
	9/17/02	20.9	120		6	0.2		6.94	ND	ND	ND	ND	ND	ND		ND	893
	3/17/03	12.7	130		5.3	0.15		6.6	ND	0.067	ND	ND	ND	ND		ND	891
	9/15/03	22.2	150		7.4	0.2		7.13	ND	0.064	ND	ND	ND	ND		ND	801
	3/8/04	20.3	130		6.7	0.16		7.15	ND	0.052	ND	ND	ND	ND		ND	860
	9/21/05	3.6	99		16	0.13	530	6.69	ND	0.049	ND	ND	ND	ND	ND	ND	628
	3/21/06	3.4	120		19	0.13	540	7.68	ND	0.06	ND	ND	ND	ND	ND	ND	929
	9/26/06	33.4	119		26.2	0.14	619	7.08	ND	0.06	ND	ND	ND	ND	ND	ND	90
	3/28/07	35	120		14	0.11	620	7.27	ND	0.055	ND	ND	ND	ND	ND	ND	765
	9/12/07	12	120		25	ND	590	7.07	ND	0.057	ND	ND	ND	ND	ND	ND	1251
	3/12/08	16	120		26	ND	580	7.37	ND	0.054	ND	ND	ND	ND	ND	ND	1596
	9/24/08	3.8	100		24	ND	550	7.52	ND	0.051	ND	ND	ND	ND	ND	ND	717
	9/30/09	0.72	83		18	ND	410	7.14	ND	0.041	ND	ND	ND	ND	ND	ND	607
	3/24/10	0.16	98		11	ND	450	7.32	ND	0.048	ND	ND	ND	ND	ND	ND	657
	9/8/10	9.6	100		8.2	ND	510	8.33	ND	0.049	ND	ND	ND	ND	ND	ND	694
	3/22/11	1.3	89		7.2	ND	410	6.84	ND	0.052	ND	ND	ND	ND	ND	ND	629
	9/27/11	0.64	76		6.8	ND	400	7.27	ND	0.045	ND	ND	ND	ND	ND	ND	637
	3/27/12	0.97	74		7.9	ND	400	7.43	ND	0.044	ND	ND	ND	ND	ND	ND	557
	9/18/12	1.3	84		6.4	ND	460	6.57	ND	0.046	ND	ND	ND	ND	ND	ND	656
	3/13/13	2	80		6.2	0.24	390	7	0.00058	0.047	ND	ND	ND	ND	0.0011	0.00041	435
	9/18/13	0.91	77		4.6	ND	450	6.75	ND	0.045	ND	ND	ND	ND	ND	ND	730
	3/19/14	2.3	63		8.6	0.2	390	7.16	ND	0.04	ND	ND	ND	ND	ND	ND	539
	9/24/14	0.47	66		6.5	ND	370	7.33	ND	0.04	ND	ND	ND	ND	ND	ND	562
	3/18/15	0.67	68		5.7	ND	390	7.41	ND	0.039	ND	ND	ND	ND	ND	ND	602
	9/30/15	0.7	59		9.8	0.2	360	7.23	ND	0.03	ND	ND	ND	ND	ND	ND	435
	4/5/16	2.5	70		9.7	ND	380	7.27	ND	0.035	ND	ND	ND	ND	ND	ND	340
	10/18/16	0.25	64		9.8	ND	370	7.49	ND	0.033	ND	ND	ND	ND	ND	ND	388
	4/4/17	0.27	63		11	ND	410	7.99	ND	0.03	ND	ND	ND	ND	ND	ND	724
	10/6/17	0.22	57		7.3	0.44	410	7.9	ND	0.029	ND	ND	ND	ND	ND	ND	671

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-01S	6/3/82	ND	18	3.9	0.5	0.18	650	6.9	ND	ND	ND	ND	ND	ND		ND	1020
	9/16/82	0.079	21	3.4	ND	0.11	86	4.9	ND	ND	0.005	ND	ND	ND		ND	86
	12/28/82	0.05	21	2.2	ND	ND	66	4.2	ND	0.28	ND	ND	ND	ND		ND	130
	4/5/83	0.1	29	8.3	1	ND	120	5	ND	0.17	ND	ND	ND	ND		ND	160
	10/17/83	0.14	46	9.1	5	ND	200	5.4	ND	0.17	ND	ND	ND	ND		0.009	660
	2/7/84	0.13	190	27	3.2	0.3	280	4.6	ND	ND	ND	ND	ND	ND		ND	430
	4/23/84	ND	82.3	19.4			161	6.6		0.19	ND	ND	0.12	0.0019		ND	200
	7/31/84	ND	48	12.6			98	7.4		ND	ND	ND	ND	ND		ND	150
	10/18/84	0.29	210	55.8			393	5.32		ND	ND	ND	ND	ND		ND	530
	1/28/85	0.44	240	33.5			486	4.9		ND	ND	ND	ND	ND		ND	775
	4/25/85	0.22	110	30.8			222	4.9		ND	ND	ND	ND	ND		ND	265
	7/25/85	0.23	74	20.5			182	4.6		ND	ND	ND	ND	ND		ND	270
	10/29/85	0.5	210	37.7			333	4.8		ND	ND	ND	ND	ND		ND	498
	1/15/86	0.4	180	35.7			320	5.2		ND	ND	ND	ND	ND		ND	445
	4/25/86	0.26	150	32.6			255	4.8		ND	ND	ND	ND	ND		ND	375
	7/29/86	0.22	147	33			255	4.4		ND	ND	ND	ND	ND		ND	355
	10/28/86	0.2	90	26.8			205	4.8		ND	ND	ND	ND	ND		ND	295
	1/27/87		28					5.7									315
	4/17/87		95					5.8									300
	7/16/87		120					5.2									315
	10/15/87		160					6.2									375
	1/19/88		130					6									365
	4/27/88		143					6.6									352
	7/26/88		115					5.8									300
	10/13/88		160					6.2		0.03	0.0025	ND	ND	ND		0.005	416
	1/17/89		160					6.6		0.028	0.0025	ND	ND	ND		0.005	320
	4/20/89		140					5.9		0.019	0.0025	ND	0.015	ND		0.01	390
	7/26/89		85					4.85		0.048	0.0025	ND	ND	ND		0.001	220
	10/19/89		120					6.25		0.05	0.0025	ND	ND	ND		0.003	330
	1/24/90	0.225	158		8			5.05		0.058	0.001	ND	0.0045	ND		0.005	380
	4/27/90	0.136	59					4.9		0.067	0.001	0.011	0.0045	ND		0.005	250
	7/19/90	0.166	64					5.19		0.025	0.001	ND	0.0045	ND		0.005	206
	10/19/90	0.023	54					5.45		0.07	0.001	ND	0.0045	ND		0.005	195
	1/23/91	0.046	52		10			5.7	0.01	0.05	0.002	ND	0.01	ND		0.01	224
	4/19/91	0.013	62		7.8			5.88	ND	ND	0.002	ND	ND	ND		ND	252
	7/31/91	0.7	94		1			5.32	0.01	0.02	0	ND	0.01	ND		0.01	430
	10/29/91	0.304	116.8		1.96			5.28	ND	ND	0.002	ND	ND	ND		ND	360
	2/13/92	0.16	137		28.9			5.69	ND	0.05	0.002	ND	0.01	ND		0.01	310
	6/30/92	0.221	274		11			5.78		ND	ND	ND	ND			ND	531
	1/27/93	ND	79		1.5	0.056		5.75	ND	0.017	ND	ND	ND	ND		ND	194
	8/21/93	0.16	150		4.8			6.01	0.05	1	0.01	0.05	0.05	ND		0.01	500
	1/5/94	0.28	150		1.8	0.18		6.02	ND	0.02	ND	ND	ND	ND		ND	310
	7/21/94	0.2	144		1.1	ND		5.7	ND	0.03	ND	0.01J	ND	ND		ND	400
	1/24/95	0.23	140		ND	ND		6.2	ND	0.02	ND	ND	ND	ND		ND	330
	7/24/95	0.3	460		6.5	ND		5.14	ND	0.08	ND	ND	ND	ND		ND	1100
	1/22/96	0.27	330		3.7	ND		5.59	ND	0.03	ND	ND	ND	ND		ND	664
	7/18/96	0.4	410		6	ND		5.48	ND	0.058		ND	ND	ND		ND	865
	1/23/97	33	87		3.5	0.32		7.24	ND	0.062	ND	ND	0.018	ND		ND	922
	10/7/97	0.36	210		5.2	ND		5.53	ND	ND	0.0005	ND	ND	ND		ND	545
	3/25/98	0.18	160		8.8	ND		5.73	ND	ND	ND	ND	ND	ND		ND	365
	11/23/98	0.18	97		1.9	ND		5.78	ND	ND	0.0002	ND	ND	ND		ND	315
	3/24/99	0.16	94		4.6	ND		6	ND	ND	ND	ND	ND	ND		ND	315
	9/27/99	0.21	110		7.4	ND		6	ND	ND	ND	ND	ND	ND		ND	383
	3/29/00	0.2	87		4.7	ND		6.4	ND	0.039	ND	ND	0.15	ND		ND	329
	10/4/00	0.32	140		5.6	ND		6	ND	ND	ND	ND	ND	ND		ND	426
	4/11/01	0.32	140		4.7	ND		6.4	ND	ND	ND	ND	ND	ND		ND	305
	10/1/01	0.38	320		4.7	ND		6.1	ND	0.034	ND	ND	ND	ND		ND	534
	3/19/02	0.222	94		4.6	ND		6.56	ND	ND	ND	ND	ND	ND		ND	336
	9/17/02	0.42	100		2.3	ND		6.73	ND	ND	ND	ND	ND	ND		ND	348
	3/17/03	0.219	59		1.4	ND		5.9	ND	ND	ND	ND	ND	ND		ND	223
	9/15/03	0.323	93		3.1	ND		6.15	ND	ND	ND	ND	ND	ND		ND	322.4
	3/8/04	0.225	84		10	ND		7.18	ND	ND	ND	ND	ND	ND		ND	371
	9/21/05	0.24	35		3.5	ND	160	6.35	ND	0.0073	ND	ND	ND	ND	0.036	ND	236
	3/21/06	0.16	43		4.5	ND	180	5.89	ND	0.0065	ND	ND	ND	ND	0.032	ND	280
	9/26/06	0.3	71.5		5.4	ND	257	6.4	ND	0.012	ND	ND	ND	ND	0.02	ND	370
	3/28/07	0.14	55		16	ND	200	7.29	ND	ND	ND	ND	ND	ND	ND	ND	293
	9/12/07	0.22	60		6.2	ND	200	6.94	ND	ND	ND	ND	ND	ND	ND	ND	259
	3/12/08	0.14	51		6.9	ND	150	7.32	ND	ND	ND	ND	ND	ND	ND	ND	156
	9/24/08	0.35	99		18	ND	340	6.91	ND	0.016	ND	ND	ND	ND	ND	ND	399
	9/30/09	0.24	63		7.2	ND	230	6.64	ND	0.01	ND	ND	ND	ND	ND	ND	474
	3/24/10	15	33		3.4	ND	130	7.14	ND	ND	ND	ND	ND	ND	2.4	ND	285
	9/8/10	0.24	170		8.8	ND	350	7.29	ND	0.015	ND	ND	ND	ND	ND	ND	491
	3/22/11	0.13	56		5.5	ND	170	7.02	ND	ND	ND	ND	ND	ND	ND	ND	279
	9/27/11	0.23	150		5.4	ND	340	6.44	ND	0.017	ND	ND	ND	ND	ND	ND	532
	3/27/12	0.31	33		4.3	ND	146	5.4	ND	0.0059	ND	ND	ND	ND	0.013	0.0026	204
	9/18/12	0.2	56		6.6	ND	260	5.96	ND	0.0082	ND	ND	ND	ND	0.017	ND	258
	3/13/13	0.095	12		0.94	0.15	97	6.81	ND	0.0026	ND	ND	ND	ND	0.011	0.0013	85
	9/18/13	0.12	87		3	ND	260	6.92	ND	0.011	ND	ND	ND	ND	0.01	0.00815	345
	3/19/14	0.15	42		1.2	ND	200	6.87	ND	0.0064	ND	ND	ND	ND	0.011	0.00463	156
	9/24/14	0.14	32		1.9	ND	130	6.84	ND	0.006	ND	ND	ND	ND	0.0083	0.003	210
	3/18/15	0.15	51		2	ND	200	7.28	ND	0.0065	ND	ND	ND	ND	0.0078	0.0064	207
	9/30/15	0.31	62		12	ND	270	6.84	ND	0.01	ND	ND	ND	ND	0.011	0.0056	354
	4/5/16	0.2	48		8.2	ND	160	8.46	ND	0.0067	ND	ND	ND	ND	0.014	0.003	272
	10/18/16	0.16	13		0.62	ND	72	6.62	ND	0.0039	ND	ND	ND	ND	0.012	ND	138
	4/4/17	0.092	16		0.45	ND	112	8.68	ND	ND	ND	ND	ND	ND	0.011	ND	95
	10/6/17	0.093	31		0.82	ND	170	7.01	ND	0.0052	ND	ND	ND	ND	0.0099	0.0027	205

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-02D	6/3/82	ND	83	76	21	0.23	330	7.4	ND	ND	ND	ND	0.02	ND		ND	544
	9/16/82	0.12	100	66	18	0.29	520	7.3	ND	ND	ND	ND	0.045	ND		ND	560
	12/28/82	0.07	103	73	22	0.24	350	7.4	ND	ND	ND	ND	ND	ND		ND	570
	4/5/83	0.05	93	79	22	0.24	350	7.4	ND	ND	0.005	ND	ND	ND		ND	590
	10/17/83	0.12	92	53	20	0.22	370	7.7	ND	0.17	ND	ND	ND	ND		ND	500
	2/7/84	0.11	91	72	17	0.25	370	7.5	ND	ND	ND	ND	ND	ND		ND	590
	4/23/84	ND	97.7	138			520	6.7		0.19	ND	ND	0.17	0.0025		ND	760
	7/31/84	ND	95.1	123			487	7.7		0.5	ND	ND	ND	ND		ND	740
	10/18/84	0.16	108	111			457	7.33		ND	ND	ND	ND	ND		ND	720
	1/28/85	0.34	100	79.6			452	7.05		ND	ND	ND	ND	ND		ND	790
	4/25/85	0.23	120	126			499	7.3		ND	ND	ND	ND	ND		ND	725
	7/25/85	0.25	100	98.1			467	7.4		ND	ND	ND	ND	ND		ND	760
	10/29/85	0.4	110	131			482	7.2		ND	ND	ND	ND	ND		ND	760
	1/15/86	0.3	110	110			490	7.2		ND	ND	ND	ND	ND		ND	740
	4/25/86	ND	110	117			464	7		ND	ND	ND	ND	ND		ND	710
	7/29/86	ND	100	112			446	6.8		ND	ND	ND	ND	ND		ND	710
	10/28/86	ND	80	108			423	7		ND	ND	ND	ND	ND		ND	680
	1/27/87		68					7.2									690
	4/17/87		69					7.1									710
	7/16/87		92					7									655
	10/15/87		100					6.9									705
	1/19/88		95					7.2									685
	4/27/88		92					7.2									781
	7/26/88		105					7.1									620
	10/13/88		110					7.4		0.04	0.0025	ND	ND	ND		0.005	669
	1/17/89		98					7.6		0.042	0.0025	ND	ND	ND		0.005	540
	4/20/89		83					7.1		0.035	0.0025	ND	ND	ND		0.005	610
	7/26/89		80					7.2		0.047	0.0025	ND	0.007	ND		0.001	500
	10/19/89		80					7.34		0.03	0.0025	ND	ND	ND		0.001	600
	1/24/90	0.05	68		15			6.98		0.025	0.006	ND	0.0045	ND		0.005	550
	4/27/90	0.076	67.6					7.28		0.025	0.001	ND	0.0045	ND		0.005	560
	7/19/90	0.056	73					7.2		0.025	0.001	ND	0.0045	ND		0.005	593
	10/19/90	0.109	70					7.1		0.089	0.002	ND	0.0045	ND		0.005	537
	1/23/91	0.301	88		5			6.98	ND	0.052	0.001	0.01	ND	ND		0.005	496
	4/19/91																
	7/31/91	0.58	372		8			7.07	ND	0.12	0.001	ND	ND	ND		0.005	995
	10/29/91																
	2/13/92	0.96	544		22.7			6.9	ND	0.162	0.002	ND	0.01	ND		0.01	1063
	6/30/92	3.25	1016		34			7.11	ND	0.182	ND	0.013	ND	ND		ND	1607
	1/27/93	5.8	1400		64	0.14		7.12	ND	0.071	ND	ND	ND	ND		ND	2520
	8/21/93	6.4	1800		97			7.13	ND	0.05	ND	ND	ND	ND		ND	4400
	1/5/94	9.2	6000		400	0.13		6.75	ND	0.04	ND	0.03J	ND	ND		ND	10800
	7/21/94	14	11978		543	0.15		6.94	ND	0.05	ND	0.18	ND	ND		ND	16440
	1/24/95	20	8900		710	0.2		6.83	ND	0.05	ND	ND	ND	ND		ND	18480
	7/24/95	18	15000		930	0.18		7.3	ND	0.03	ND	ND	ND	ND		ND	23000
	1/22/96	22	17000		1000	0.21		7.53	ND	0.05	ND	ND	ND	ND		ND	25600
	7/18/96	22	20000		1100	0.23		7.15	ND	0.043		ND	ND	ND		ND	28600
	1/23/97	24	20000		1200	0.33		7.47	0.01	0.043	ND	ND	ND	ND		0.033	31200
	10/7/97	25	19000		1300	0.45		7.69	ND	0.029	ND	0.031	ND	ND		ND	33200
	3/25/98	20	27000		1400	0.62		7.76	ND	0.042	ND	ND	ND	ND		0.17	34000
	11/23/98	20	21000		1300	1.3		7.78	ND	0.045	ND	ND	ND	ND		ND	34300
	3/24/99	20	27000		1600	1.3		7.7	0.18	0.045	ND	ND	ND	ND		ND	30000
	9/27/99	22	25000		1700	1.5		7.6	ND	0.044	ND	ND	ND	ND		ND	25600
	3/29/00	23	19000		1500	1.7		7.8	ND	0.086	ND	ND	ND	ND		ND	25900
	10/4/00	25	18000		1500	1.6		7.8	ND	0.054	ND	ND	ND	ND		ND	32300
	4/11/01	20	15000		1500	1.4		7.9	ND	0.051	0.00034	ND	0.027	ND		ND	7260
	10/1/01	24	13000		1500	1.5		7.7	ND	0.041	ND	ND	ND	ND		ND	33000
	3/19/02	27.2	16000		1900	1.6		7.75	ND	ND	0.00282	ND	ND	ND		ND	22500
	9/17/02	26.7	23000		1500	1.5		7.84	ND	ND	ND	ND	0.0056	ND		ND	34600
	3/17/03	20.2	24000		1500	1.5		8	ND	ND	0.0108	ND	0.011	ND		ND	33600
	9/15/03	21.1	23000		1500	1.4		7.78	ND	ND	ND	ND	ND	ND		ND	31220
	3/8/04	13.8	24000		1500	1.3		7.87	ND	ND	0.0019	ND	0.0208	ND		ND	34060
	9/21/05	23	25000		1500	1.4	30000	6.9	ND	0.061	ND	ND	ND	ND	5.8	ND	24640
	3/22/06	23	21000		1600	1.5	32000	9.39	ND	0.081	0.004	ND	ND	ND	4.9	ND	29000
	9/27/06	25	20600		1470	1.5	37700	7.7	ND	0.048	ND	ND	ND	ND	5.8	ND	33000
	3/28/07	27	19000		1800	1.5	31000	7.97	ND	0.042	ND	ND	ND	ND	8	ND	27700
	9/11/07	26	27000		1100	3.4	27000	7.78	ND	0.041	ND	ND	ND	ND	6.9	ND	20090
	3/12/08	23	19000		1100	3.9	27000	8.33	ND	0.04	ND	ND	ND	ND	6.7	ND	19100
	9/23/08	24	19000		1300	3.6	31000	8.33	ND	0.044	ND	ND	ND	ND	5.1	ND	21430
	9/30/09	30	15000		960	4.4	21000	7.85	ND	0.031	ND	ND	ND	ND	5.3	ND	40691
	3/24/10	1.2	11000		750	2.6	18000	8.69	ND	2.4	ND	0.94	ND	ND	1	ND	19054
	9/8/10	28	6900		1000	1.7	18000	7.84	ND	0.03	ND	ND	ND	ND	4.8	ND	19274
	3/23/11	26	16000		1400	4	26000	7.74	ND	0.031	ND	ND	ND	ND	3.7	ND	24853
	9/28/11	24	8800		620	3.7	14000	8.36	ND	0.054	ND	ND	ND	ND	5.6	ND	15323
	3/28/12	9	3900		230	0.74	5800	7.69	0.002	0.044	ND	ND	ND	ND	0.84	0.0056	7464
	9/20/12	16	6300		500	3.8	9800	8.35	ND	0.019	ND	ND	ND	ND	1.8	ND	11044
	3/12/13	7.9	1100		120	2.1	3300	8.65	ND	0.044	ND	ND	ND	ND	0.24	ND	3225
	9/18/13	12	5000		300	0.67	7300	7.44	0.001	0.066	ND	ND	ND	ND	0.84	0.004	9046
	3/19/14	7.5	2500		140	0.55	4300	6.19	ND	0.029	ND	ND	ND	ND	0.48	0.0094	3464
	9/23/14	16	6400		380	ND	9800	7.83	ND	0.058	ND	ND	0.0053	ND	1.4	ND	10371
	3/18/15	16	7400		440	ND*	12000	6.89	ND	0.059	ND	ND	ND	ND	2.5	0.028	11533
	9/30/15	16	7100		430	ND	11000	7.77	ND	0.067	ND	ND	ND	ND	3.1	ND	9803
	4/6/16	17	5300		290	ND	9800	7.35	ND	0.05	ND	ND	ND	ND	3.1	ND	7623
	10/18/16	23	13000		960	ND	22000	7.4	0.002	0.031	ND	ND	ND	ND	4.3	0.0045	9670
	4/6/17	12	4100		180	ND	6500	6.61	ND	0.04	ND	ND	ND	ND	1.3	ND	4638
	10/6/17	14	5300		280	ND	8300	6.36	ND	0.052	ND	ND	ND	ND	1.6	ND	111

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-02S	6/3/82	ND	45	100	6.6	0.17	370	7.2	ND	ND	ND	ND	ND	ND		ND	680
	9/16/82	0.16	56	78	3.2	0.22	640	7.1	ND	ND	0.004	ND	ND	ND		ND	640
	12/28/82	0.08	71	85	3.9	0.18	370	7.1	ND	ND	0.005	ND	ND	ND		ND	620
	4/5/83	0.1	50	67	3.9	0.16	300	7.4	0.003	0.05	ND	ND	ND	ND		0.005	510
	10/17/83	0.13	43	50	5	0.19	320	7.3	0.002	0.16	ND	ND	ND	ND		ND	410
	2/7/84	0.12	60	87	8.9	0.17	380	7.4	ND	ND	ND	ND	ND	ND		ND	620
	4/23/84	ND	86	138			546	6.6		0.19	ND	ND	0.17	0.0019		ND	750
	7/31/84	ND	61.7	111			457	7.4		ND	ND	ND	ND	ND		ND	700
	10/18/84	0.15	70	110			419	7.24		ND	ND	ND	ND	ND		ND	630
	1/28/85	0.36	70	68.3			379	7.05		ND	ND	ND	ND	ND		ND	665
	4/25/85	0.25	72	110			417	7.2		ND	ND	ND	ND	ND		ND	620
	7/25/85	0.23	78	91.2			398	7.4		ND	ND	ND	ND	ND		ND	640
	10/29/85	0.3	75	112			376	7.2		ND	ND	ND	ND	ND		ND	640
	1/15/86	0.2	66	97			360	7.2		ND	ND	ND	ND	ND		ND	575
	4/25/86	ND	68	96.6			366	7.1		ND	ND	ND	ND	ND		ND	555
	7/29/86	ND	66	96.2			374	6.9		ND	ND	ND	ND	ND		ND	610
	10/28/86	0.12	60	90.6			375	7		ND	ND	ND	ND	ND		ND	585
	1/27/87		57					7.2									595
	4/17/87		52					7.2									620
	7/16/87		78					7									660
	10/15/87		60					7									650
	1/19/88		42					7.2									585
	4/27/88		74					7.2									681
	7/26/88		62					7.1									560
	10/13/88		100					7.5		0.05	0.0025	ND	ND	ND		0.005	719
	1/17/89		72					7.6		0.042	0.0025	ND	ND	ND		0.005	510
	4/20/89		83					7.1		0.035	0.0025	ND	ND	ND		0.005	555
	7/26/89		90					7.15		0.047	0.0025	ND	ND	ND		0.001	520
	10/19/89		60					7.32		0.05	0.0025	ND	ND	ND		0.001	550
	1/24/90	0.079	55		1			7.01		0.082	0.001	ND	0.015	ND		0.005	540
	4/27/90	0.132	66.1					7.38		0.025	0.001	0.02	0.0045	ND		0.005	530
	7/19/90	0.093	75					7.22		0.025	0.001	ND	0.0045	ND		0.005	586
	10/19/90	0.043	82					6.98		0.101	0.001	ND	0.0045	ND		0.005	675
	1/23/91	0.113	66		0.5			7.01	ND	0.025	0.001	ND	ND	ND		0.005	498
	4/19/91																
	7/31/91	0.199	229		1			7.04	ND	0.059	0.003	ND	ND	ND		0.005	881
	10/29/91																
	2/13/92	0.52	502		9.64			6.91	ND	0.131	0.002	ND	0.01	ND		0.01	1002
	6/30/92	0.682	791		22			7.26	ND	0.093	ND	0.012	ND	ND		ND	1325
	1/27/93	1	650		20	0.16		7.09	ND	0.056	ND	ND	ND	ND		ND	1182
	8/21/93	2.2	860		25			7.3	ND	0.02	ND	ND	ND	ND		ND	2180
	1/5/94	5.4	1100		30	0.16		6.97	ND	0.04	ND	ND	ND	ND		ND	2390
	7/21/94	6.1	1884		77	0.19		6.83	ND	0.04	ND	0.03	ND	ND		ND	3360
	1/24/95	5.9	1800		78	0.2		6.39	ND	0.04	ND	ND	ND	ND		ND	3360
	7/24/95	8.1	2400		110	0.19		7.18	ND	0.03	ND	ND	ND	ND		ND	5400
	1/22/96	8.6	4100		180	0.15		7.32	ND	0.03	0.002	0.041	ND	ND		ND	6500
	7/18/96	7.5	4000		200	0.16		6.31	ND	0.065		ND	ND	ND		ND	6830
	1/23/97	17	8300		590	0.2		7.14	ND	0.037	ND	ND	0.006	ND		ND	13800
	10/7/97	18	6400		420	0.85		7.36	ND	0.032	0.0011	0.037	ND	ND		ND	12700
	3/25/98	15	6200		300	0.83		7.47	ND	0.025	ND	ND	ND	ND		ND	9800
	11/23/98	6.3	2000		70	1.3		7.26	ND	0.021	ND	ND	ND	ND		ND	3770
	3/24/99	8.6	2800		140	1		7.2	ND	0.022	0.00025	ND	ND	ND		ND	5970
	9/27/99	2.8	970		23	1.1		7	ND	0.021	ND	ND	ND	ND		ND	1620
	3/29/00	6	1300		34	1		7.3	ND	0.068	ND	ND	ND	ND		ND	2710
	10/4/00	2.6	880		20	0.94		7	ND	0.023	ND	ND	ND	ND		ND	1886
	4/11/01	1.9	920		23	0.98		7.4	ND	0.04	ND	ND	ND	ND		ND	310
	10/1/01	2	760		12	0.89		7.2	ND	0.029	ND	ND	ND	ND		ND	1543
	3/19/02	2.38	980		18	0.53		7.57	ND	ND	ND	ND	ND	ND		ND	1662
	9/17/02	2.36	630		5.1	0.56		7.37	ND	ND	0.00132	ND	ND	ND		ND	1470
	3/17/03	2.18	880		8.4	0.45		7.1	ND	0.02	ND	ND	ND	ND		ND	1640
	9/15/03	2.31	500		3.9	0.5		7.19	ND	ND	ND	ND	ND	ND		ND	1151
	3/8/04	3.13	1200		36	0.3		7.31	ND	0.043	ND	ND	ND	ND		ND	2400
	9/21/05	1.8	590		5	0.41	1100	7.21	ND	0.035	ND	ND	ND	ND	0.038	ND	1205
	3/22/06	3.9	1000		52	0.33	2200	7.78	ND	0.047	ND	ND	ND	ND	0.3	ND	2800
	9/27/06	2.7	550		5.7	0.33	1260	7.45	ND	0.034	ND	ND	ND	ND	0.055	ND	2000
	3/28/07	1.8	490		4.5	0.22	1000	7.39	ND	0.023	ND	ND	ND	ND	ND	ND	1113
	9/11/07	1.7	410		4.9	0.51	890	7.23	ND	0.029	ND	ND	ND	ND	0.055	ND	2093
	3/12/08	0.96	360		3.8	ND	640	7.57	ND	0.021	ND	ND	ND	ND	ND	ND	550
	9/23/08	1	310		3.6	ND	740	7.68	ND	0.054	ND	ND	ND	ND	ND	ND	725
	9/30/09	0.93	330		1.8	ND	670	7.28	ND	0.04	ND	ND	ND	ND	ND	ND	861
	3/24/10	ND	290		2.2	ND	640	7.38	ND	0.037	ND	ND	ND	ND	ND	ND	818
	9/8/10	0.87	220		4.9	ND	470	7.93	ND	0.045	ND	ND	ND	ND	ND	ND	811
	3/23/11	0.66	150		2.1	ND	420	6.55	ND	0.05	ND	ND	ND	ND	ND	ND	647
	9/28/11	0.79	180		ND	ND	450	7.62	ND	0.052	ND	ND	ND	ND	ND	ND	639
	3/28/12	1	220		1.9	ND	540	6.76	ND	0.055	ND	ND	ND	ND	0.015	ND	680
	9/20/12	0.49	100		2.2	ND	460	6.18	ND	0.063	ND	ND	ND	ND	0.017	ND	613
	3/12/13	0.33	130		2	ND	390	7.42	ND	0.045	ND	ND	ND	ND	0.013	ND	308
	9/18/13	0.79	240		1.5	0.23	530	7.28	0.0017	0.09	ND	ND	ND	ND	0.021	ND	707
	3/19/14	1.2	200		1.8	ND	580	6.76	0.0016	0.066	ND	ND	ND	ND	0.018	ND	378
	9/23/14	1.3	130		1.7	0.25	540	7.16	ND	0.092	ND	ND	ND	ND	0.023	ND	775
	3/18/15	1.2	200		2.5	ND	630	7.02	0.0017	0.09	ND	ND	ND	ND	0.017	ND	536
	9/30/15	0.87	170		1.1	ND	510	7.13	0.0024	0.073	ND	ND	ND	ND	0.022	ND	583
	4/6/16	1.1	96		1.5	ND	570	7.99	0.0017	0.083	ND	ND	ND	ND	0.025	ND	571
	10/18/16	0.72	170		2.2	ND	470	7.38	0.0023	0.08	ND	ND	ND	ND	0.02	ND	463
	4/7/17	0.37	140		2.1	ND	512	8.49	ND	0.056	ND	ND	ND	ND	0.007	ND	409
	10/6/17	0.88	190		1.1	ND	790	7.75	0.002	0.09	ND	ND	ND	ND	0.021	ND	661

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-03D	6/3/82	ND	52	63	15	0.38	370	7.8	ND	ND	ND	ND	ND	ND		ND	520
	9/16/82	0.13	63	48	9.1	0.38	440	7.4	ND	ND	0.004	ND	ND	ND		ND	450
	12/28/82	0.09	73	65	14	0.4	320	7.4	ND	ND	ND	ND	ND	ND		ND	540
	4/5/83	0.07	71	68	16	0.35	330	7.4	ND	ND	ND	ND	ND	ND		ND	520
	10/17/83	0.08	130	51	16	0.41	390	7.4	ND	0.15	ND	ND	ND	ND		ND	500
	2/7/84	0.094	50	50	13	0.48	260	7.5	ND	ND	ND	ND	ND	ND		ND	480
	4/23/84	ND	50	95.7			383	6.2		ND	ND	ND	0.15	0.0016		ND	550
	7/31/84	ND	58	67.5			339	8.2		ND	ND	ND	ND	ND		ND	450
	10/18/84	ND	59	60.7			262	7.78		ND	ND	ND	ND	ND		ND	380
	1/28/85	0.21	65	46.2			302	7.5		ND	ND	ND	ND	ND		ND	510
	4/25/85	0.28	80	86.8			380	7.4		ND	ND	ND	ND	ND		ND	545
	7/25/85	ND	78	78.8			358	7.8		ND	ND	ND	ND	ND		ND	575
	10/29/85	1.1	120	88.5			566	7.4		ND	ND	ND	ND	ND		ND	820
	1/15/86	0.3	170	87.4			460	7.4		ND	ND	ND	ND	ND		ND	650
	4/25/86	0.74	520	140			890	7.5		ND	ND	ND	ND	ND		ND	1100
	7/29/86	0.89	350	118			671	7.2		ND	ND	ND	ND	ND		ND	920
	10/28/86	4.74	660	355			2330	7.3		ND	ND	ND	ND	ND		ND	2520
	1/27/87		700					7.4									1500
	4/17/87		700					7.2									1500
	7/16/87		962					7.2									1700
	10/15/87		760					6.9									1800
	1/19/88		1980					7.4									4150
	4/27/88		2450					7.5									4620
	7/26/88		1350					7.2									3100
	10/13/88		1550					7.6		0.04	0.0025	ND	ND	ND		0.005	2620
	1/17/89		1920					7.6		0.082	0.0025	ND	ND	ND		0.005	2900
	4/20/89		1570					7.1		0.055	0.0025	ND	ND	ND		0.005	2750
	7/26/89		1250					7.05		0.054	0.0025	ND	ND	ND		0.001	2200
	10/19/89		1950					7		0.08	0.0025	ND	ND	ND		0.003	4650
	1/24/90	6.99	2272		102			7.03		0.025	0.001	0.015	0.047	ND		0.005	3460
	4/27/90	0.497	1380					7.41		0.025	0.001	0.013	0.0045	ND		0.005	3010
	7/19/90	3.11	1680					6.97		0.085	0.001	0.024	0.0045	ND		0.005	3690
	10/19/90	4.09	2212					7.09		0.156	0.001	0.015	0.0045	ND		0.005	4440
	1/23/91	1.14	2791		249.9			6.9	ND	0.067	0.001	0.024	ND	ND		0.014	3970
	4/19/91																
	7/31/91	1.39	4164		272			7.08	0.033	0.222	0.003	0.027	ND	ND		0.005	10200
	10/29/91																
	2/13/92	5	6760		482			6.84	0.079	0.101	0.002	0.041	0.01	ND		0.064	7440
	6/30/92	4.9	7698		750			7.02	ND	0.658	0.002	0.037	ND	ND		0.087	11560
	1/27/93	3.2	6700		550	0.39		7.1	ND	0.052	ND	ND	ND	ND		ND	11080
	8/21/93		10000		800			7.14	ND	0.04	ND	ND	ND	ND		ND	19700
	1/5/94	2.3	9900		840	0.23		6.64	ND	0.03	ND	0.03	ND	ND		ND	15000
	7/21/94	2.4	10767		740	0.27		7.03	ND	0.04	ND	0.05	ND	ND		ND	17930
	1/24/95	2.7	6400		670	0.3		7.16	ND	0.04	ND	ND	ND	ND		0.01	13790
	7/24/95	2.9	14000		920	0.26		7.04	ND	0.03	ND	ND	ND	ND		ND	18000
	1/22/96	3	12000		840	0.24		7.18	ND	0.04	ND	0.025	ND	ND		ND	18100
	7/18/96	3.4	16000		1100	0.27		7.18	ND	0.04		ND	ND	ND		ND	18100
	1/23/97	4.2	14000		1100	0.36		7.43	0.01	0.047	ND	ND	ND	ND		0.018	24900
	10/7/97	5.2	16000		1100	0.29		7.27	ND	0.028	0.0002	0.028	ND	ND		ND	26200
	3/25/98	4.7	17000		1200	0.34		7.27	ND	0.044	ND	ND	ND	ND		ND	28500
	11/23/98	3.4	12000		1000	0.28		7.16	ND	0.035	ND	ND	ND	ND		ND	23900
	3/24/99	4.4	22000		1300	0.26		7.1	ND	0.041	ND	ND	ND	ND		0.089	22800
	9/27/99	4.4	15000		1300	0.28		7	ND	0.04	ND	ND	ND	ND		ND	5580
	3/29/00	4.4	17000		960	0.28		7.1	ND	0.034	ND	ND	ND	ND		ND	18490
	10/4/00	4.2	12000		960	0.27		7.2	ND	0.043	ND	ND	ND	ND		ND	24200
	4/11/01	4	15000		1300	0.26		7.3	ND	0.05	0.00035	ND	0.028	ND		ND	5980
	10/1/01	4.6	9500		850	0.24		7.2	ND	0.035	ND	ND	ND	ND		ND	23700
	3/19/02	6.83	15000		1500	0.3		7.2	ND	ND	0.00257	ND	ND	ND		ND	21600
	9/17/02	5.66	17000		1200	0.27		7.29	ND	ND	ND	ND	ND	ND		ND	27700
	3/17/03	3.51	9900		650	0.54		7.6	ND	ND	ND	ND	ND	ND		ND	16820
	9/15/03	6.12	23000		1300	0.31		7.38	ND	ND	ND	ND	ND	ND		ND	28660
	3/8/04	5.59	20000		1300	0.27		7.37	ND	0.043	ND	ND	0.0181	ND		ND	30200
	9/21/05	7.1	16000		2200	0.19	29000	7	ND	0.068	ND	ND	ND	ND	0.4	ND	22450
	3/22/06	7.7	20000		1400	0.28	30000	7.73	ND	0.065	ND	ND	ND	ND	0.26	ND	31000
	9/27/06	7.5	18700		1320	0.26	30700	7.95	ND	0.042	ND	ND	ND	ND	0.071	ND	32000
	3/27/07	11	23000		3300	0.31	37000	7.45	ND	0.049	ND	ND	ND	ND	ND	ND	32186
	9/11/07	8	35000		1300	ND	34000	7.28	ND	0.038	ND	ND	ND	ND	ND	0.022	32365
	3/12/08	10	25000		1600	2.8	37000	7.67	ND	0.049	ND	ND	ND	ND	ND	0.026	12884
	9/23/08	11	22000		1500	3.1	37000	7.7	ND	0.052	ND	ND	ND	ND	ND	ND	24908
	9/29/09	9.4	22000		1500	ND	34000	7.35	ND	0.037	ND	ND	ND	ND	ND	ND	30988
	3/23/10	10	22000		1400	ND	36000	7.52	ND	0.046	ND	ND	ND	ND	ND	0.033	32791
	9/8/10	9.5	16000		2000	ND	31000	8.51	ND	0.033	ND	ND	ND	ND	0.094	ND	29648
	3/23/11	9.4	19000		1400	ND	32000	7.08	ND	0.042	ND	ND	ND	ND	ND	ND	29061
	9/28/11	10	19000		1600	ND	31000	7.67	ND	0.038	ND	ND	ND	ND	0.073	ND	29220
	3/28/12	8.9	20000		1700	3.7	27000	7.28	0.0063	0.05	ND	ND	ND	ND	0.025	0.034	33071
	9/19/12	9.2	18000		1000	ND	29000	6.8	ND	0.029	ND	ND	ND	ND	0.09	ND	27855
	3/13/13	6.8	18000		980	ND	27000	7.5	0.0015	0.035	ND	ND	ND	ND	0.11	0.00094	19760
	9/17/13	7.7	19000		1300	ND	31000	6.82	0.0015	0.036	ND	ND	ND	ND	0.048	0.013	29861
	3/18/14	8	19000		1300	ND	30000	6.57	ND	0.038	ND	ND	ND	ND	0.062	ND	19989
	9/23/14	7.6	22000		1300	ND	31000	7.58	ND	0.054	ND	ND	ND	ND	0.027	ND	28002
	3/17/15	1.1	20000		1200	ND	33000	7.16	ND	0.036	ND	ND	ND	ND	0.039	0.083	24295
	9/30/15	7.9	20000		1200	ND	29000	7.48	0.0018	0.036	ND	ND	ND	ND	0.026	0.0073	23726
	4/6/16	8.8	18000		1200	ND	34000	7.4	ND	0.041	ND	ND	ND	ND	0.012	0.009	22385
	10/20/16	9.4	17000		1000	ND	27000	7.47	0.0027	0.031	ND	ND	ND	ND	0.046	0.011	27060
	4/8/17	9.4	20000		1300	ND	31000	5.96	0.0027	0.037	ND	ND	ND	ND	0.053	0.009	28350
	10/6/17	9.4	19000		1200	ND	29000	5.93	0.003	0.028	ND	ND	ND	ND	0.089	0.023	93

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		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-03S	6/3/82	ND	47	93	9.6	0.2	430	7.3	ND	ND	ND	ND	0.024	ND		ND	690
	9/16/82	0.17	91	82	9.1	0.18	650	7.3	ND	ND	ND	ND	ND	ND		ND	730
	12/28/82	0.09	73	56	7.8	0.28	310	7.4	ND	ND	ND	ND	0.07	ND		ND	520
	4/5/83	0.13	54	66	5.6	0.24	300	7.1	ND	ND	ND	ND	ND	ND		ND	530
	10/17/83	0.16	95	78	17	0.24	470	7.8	ND	0.23	ND	ND	ND	ND		ND	670
	2/7/84	0.083	50	47	2.8	0.32	200	7.5	ND	ND	ND	ND	ND	ND		ND	430
	4/23/84	ND	99.4	42.4			183	6.6		ND	ND	ND	0.13	0.0022		ND	280
	7/31/84	ND	32.7	50.4			266	8.3		0.2	ND	ND	ND	ND		ND	400
	10/18/84	ND	45	49.5			232	7.66		ND	ND	ND	ND	ND		ND	350
	1/28/85	ND	39	29.7			217	7.55		ND	ND	ND	ND	ND		ND	390
	4/25/85	0.87	390	73.6			677	7.6		ND	ND	ND	ND	ND		ND	885
	7/25/85	0.82	260	73.6			569	7.8		ND	ND	ND	ND	ND		ND	815
	10/29/85	0.7	280	106			650	7.4		ND	ND	ND	ND	ND		ND	900
	1/15/86	0.6	460	108			780	7.4		ND	ND	ND	ND	ND		ND	1000
	4/25/86	0.48	580	128			980	7.7		ND	ND	ND	ND	ND		ND	1150
	7/29/86	1	980	230			1410	7		ND	ND	ND	ND	ND		ND	1650
	10/28/86	2.4	1090	329			2020	7		ND	ND	ND	ND	ND		ND	2150
	1/27/87		920					7.4									1700
	4/17/87		825					7.2									1700
	7/16/87		775					7.1									1550
	10/15/87		390					7									1400
	1/19/88		975					7.2									2350
	4/27/88		2150					7.7									3730
	7/26/88		600					7.4									1800
	10/13/88		788					7.6		0.08	0.0025	ND	ND	ND		0.005	1620
	1/17/89		1000					7.8		0.08	0.0025	ND	ND	ND		0.005	2000
	4/20/89		1370					7.1		0.035	0.0025	ND	ND	ND		0.005	2350
	7/26/89		2850					7.2		0.08	0.0025	ND	ND	ND		0.001	3400
	10/19/89		2380					7.2		0.04	0.0025	ND	ND	ND		0.002	4150
	1/24/90	8.2	2229		65			7.28		0.121	0.001	0.012	0.051	ND		0.032	3350
	4/27/90	6.59	1410					7.84		0.025	0.001	0.011	0.0045	ND		0.005	2640
	7/19/90	7.32	1130					7.39		0.055	0.001	0.024	0.0045	ND		0.005	2960
	10/19/90	5.05	1493					7.24		0.187	0.001	0.02	0.0045	ND		0.005	3100
	1/23/91	6.06	1963		74.9			7.47	ND	0.025	0.001	0.024	ND	ND		0.04	2970
	4/19/91																
	7/31/91	4.9	2275		1			7.39	ND	0.06	0.002	0.015	0.025	ND		0.005	4655
	10/29/91																
	2/13/92	4.01	3730		135			7.3	ND	0.086	0.002	0.022	0.01	ND		0.04301	3850
	6/30/92	12.3	4822		150			7.41	ND	0.224	ND	0.02	ND	ND		0.043	5050
	1/27/93	5.6	2400		73	1.1		7.45	ND	0.038	ND	ND	ND	ND		ND	2870
	8/21/93	4.7	1900		110			7.29	ND	0.03	ND	ND	ND	ND		ND	5380
	1/5/94	6.3	3200		210	0.92		6.88	ND	0.03	ND	0.02J	ND	ND		ND	5570
	7/21/94	6.4	2665		104	0.95		7.12	ND	0.03	ND	0.02	0.003J	ND		ND	4950
	1/24/95	3.8	670		27	1.1		7.41	ND	0.1	ND	ND	ND	ND		ND	1470
	7/24/95	4.4	3000		180	0.84		7.38	ND	0.04	ND	ND	ND	ND		ND	5900
	1/22/96	4.2	1200		32	0.78		7.67	ND	0.05	ND	0.024	ND	ND		ND	2430
	7/18/96	2.9	1900		110	0.67		7.51	ND	0.056		ND	ND	ND		ND	3800
	1/23/97	2.6	4200		380	0.66		7.52	ND	0.047	ND	ND	0.026	ND		ND	8000
	10/7/97	7.3	3800		200	0.49		7.15	ND	0.026	ND	0.03	ND	ND		0.16	7070
	3/25/98	2.8	4300		210	0.6		7.24	ND	0.026	ND	ND	ND	ND		ND	7000
	11/23/98	4	1100		22	0.63		7.43	ND	0.03	ND	ND	ND	ND		ND	2110
	3/24/99	3.1	3100		200	0.56		7.1	ND	0.042	0.00029	ND	ND	ND		ND	6760
	9/27/99	1.5	660		19	0.65		7.1	ND	0.055	ND	ND	ND	ND		ND	1460
	3/29/00	1.5	530		5.1	0.63		7.3	ND	0.08	ND	ND	ND	ND		ND	1091
	10/4/00	1.4	460		17	0.65		7.2	ND	0.041	ND	ND	ND	ND		ND	1238
	4/11/01	2.2	2200		110	0.52		7.3	ND	0.044	ND	ND	ND	ND		ND	944
	10/1/01	0.54	250		50	0.63		7.3	ND	0.058	ND	ND	ND	ND		ND	1027
	3/19/02	1.93	1500		64	0.65		7.67	ND	0.034	ND	ND	ND	ND		ND	2890
	9/17/02	1.02	160		16	0.7		7.51	ND	ND	ND	ND	0.0067	ND		ND	716
	3/17/03	0.174	170		19	0.32		7.2	ND	ND	ND	ND	ND	ND		ND	690
	9/15/03	1.24	440		2.8	0.5		7.11	ND	0.043	ND	ND	ND	ND		ND	1042
	3/8/04	0.896	680		40	0.34		7.3	ND	0.053	ND	ND	ND	ND		ND	1578
	9/21/05	1.5	780		38	0.37	1300	3.53	ND	0.062	ND	ND	ND	ND	0.068	ND	1486
	3/22/06	0.88	270		4.5	0.39	660	8.9	ND	0.11	ND	ND	ND	ND	0.078	ND	6820
	9/27/06	5	19000		604	0.31	11900	7.1	ND	0.042	ND	ND	ND	ND	0.12	ND	1700
	3/27/07	1.7	4200		260	0.2	7200	7.37	ND	0.042	ND	ND	ND	ND	ND	ND	7919
	9/11/07	3.5	1900		88	ND	3400	7.43	ND	0.037	ND	ND	ND	ND	ND	ND	3092
	3/12/08	2.7	6100		420	0.8	9800	7.68	ND	0.029	ND	ND	ND	ND	0.051	ND	7629
	9/23/08	4.4	6100		310	0.83	9600	7.38	ND	0.073	ND	ND	ND	ND	ND	ND	8527
	9/29/09	0.88	270		4.5	ND	580	7.25	ND	0.047	ND	ND	ND	ND	ND	ND	773
	3/23/10	4.2	3600		180	ND	5700	7.23	ND	0.057	ND	ND	ND	ND	ND	ND	4959
	9/8/10	3.9	2900		130	ND	3800	7.6	ND	0.042	ND	ND	ND	ND	ND	ND	4623
	3/23/11	2.4	1700		82	ND	2800	7.24	ND	0.078	ND	ND	ND	ND	ND	ND	3415
	9/28/11	2.2	970		39	ND	1730	7.51	ND	0.051	ND	ND	ND	ND	ND	ND	1880
	3/28/12	3.9	6400		350	1.8	9500	7.35	0.0034	0.051	ND	ND	ND	ND	0.023	0.015	10189
	9/19/12	4.3	2400		110	ND	4100	7.7	ND	0.026	ND	ND	ND	ND	0.029	ND	4756
	3/13/13	0.3	74		3.1	0.28	370	7.44	ND	0.028	ND	ND	ND	ND	0.018	0.0052	290
	9/17/13	2.3	2700		130	ND	4500	7.11	0.0012	0.045	ND	ND	ND	ND	0.034	ND	4620
	3/18/14	0.72	290		11	ND	720	7.11	ND	0.058	ND	ND	ND	ND	0.027	0.0046	345
	9/23/14	0.34	110		2.5	ND	500	7	ND	0.051	ND	ND	ND	ND	0.016	ND	757
	3/17/15	0.34	150		2.6	ND	540	7.3	ND	0.042	ND	ND	ND	ND	0.018	0.0026	408
	9/30/15	0.56	140		1.4	ND	500	7.05	ND	0.05	ND	ND	ND	ND	0.023	ND	644
	4/6/16	0.44	150		3.5	0.2	480	7.77	ND	0.068	ND	ND	ND	ND	0.024	ND	497
	10/20/16	1	330		3.4	ND	780	7.05	ND	0.092	ND	ND	ND	ND	0.029	ND	951
	4/9/17	0.34	120		3.2	ND	450	8.7	ND	0.045	ND	ND	ND	ND	0.026	0.0044	366
	10/6/17	1	250		2.4	0.22	690	7.82	ND	0.088	ND	ND	ND	ND	0.036	ND	711

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		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-04D	6/3/82	ND	85	82	17	0.24	300	7.3	ND	ND	ND	ND	0.026	0.003		ND	542
	9/16/82	0.17	56	57	14	0.22	310	7.2	ND	ND	ND	ND	0.044	ND		ND	480
	12/28/82	0.08	46	71	15	0.31	310	7.4	ND	ND	ND	ND	ND	ND		ND	490
	4/5/83	0.13	110	89	15	0.26	390	7.3	ND	0.05	ND	ND	ND	ND		ND	610
	10/17/83	0.042	100	70	38	0.18	230	7.1	0.001	0.18	ND	ND	ND	ND		ND	260
	2/7/84	0.14	95	75	14	0.35	310	7.4	ND	ND	ND	ND	ND	ND		ND	620
	4/23/84	ND	86.9	128			385	6.6		0.24	ND	ND	0.2	0.0024		ND	560
	7/31/84	ND	80.4	65.2			299	8.1		ND	ND	ND	ND	ND		ND	430
	10/18/84	0.17	114	84.2			350	7.38		ND	ND	ND	ND	ND		ND	482
	1/28/85	0.15	120	44.1			319	7.4		ND	ND	ND	ND	ND		ND	555
	4/25/85	0.12	64	61.7			259	7.5		ND	ND	ND	ND	ND		ND	390
	7/25/85	ND	60	50.8			220	7.4		ND	ND	ND	ND	ND		ND	380
	10/29/85	0.3	61	55			236	7.6		ND	ND	ND	ND	ND		ND	390
	1/15/86	0.2	62	48			250	7.6		ND	ND	ND	ND	ND		ND	375
	4/25/86	ND	84	59.8			276	7.4		ND	ND	ND	ND	ND		ND	400
	7/29/86	0.33	69	61.7			292	7.1		ND	ND	ND	ND	ND		ND	455
	10/28/86	ND	85	65			316	7.5		ND	ND	ND	ND	ND		ND	500
	1/27/87		130					7.4									605
	4/17/87		338					7.2									920
	7/16/87		400					7.2									1000
	10/15/87		380					7									1050
	1/19/88		500					7.4									1300
	4/27/88		1140					7.6									2620
	7/26/88		1280					7.3									2100
	10/13/88		1000					7.5		0.14	0.0025	ND	ND	ND		0.005	1930
	1/17/89		890					7.9		0.184	0.0025	ND	ND	ND		0.005	1800
	4/20/89		1900					7.3		0.157	0.0025	ND	ND	ND		0.005	2500
	7/26/89		1350					7.55		0.12	0.0025	ND	ND	ND		0.001	2200
	10/19/89		1230					6.85		0.13	0.0025	ND	ND	ND		0.003	2350
	1/24/90	5.83	1016		45			7.41		0.106	0.001	ND	0.06	ND		0.005	2370
	4/27/90	0.401	1170					7.34		0.225	0.001	ND	0.0045	ND		0.005	2120
	7/19/90	2.52	1160					7.54		0.085	0.001	0.015	0.0045	ND		0.005	2330
	10/19/90	2.33	903					7.52		0.139	0.002	0.019	0.0045	ND		0.005	2060
	1/23/91	3.57	665		35			6.93	ND	0.071	0.001	ND	ND	ND		0.005	1357
	4/19/91																
	7/31/91	1.99	1010		24			7.48	ND	0.092	0.002	ND	ND	ND		0.005	1590
	10/29/91																
	2/13/92	1.42	1227		33.7			7.21	ND	0.116	0.002	ND	0.01	ND		0.01	1441
	6/30/92	10.7	1269		65			7.55	0.156	0.119	ND	ND	ND	ND		ND	1814
	1/27/93	3	730		27	0.68		7.52	ND	0.092	ND	ND	ND	ND		ND	1451
	8/21/93	2.8	960		34			7.31	ND	0.04	ND	ND	ND	ND		ND	2040
	1/5/94	4.2	830		36	0.53		6.62	ND	0.08	ND	ND	ND	ND		ND	1710
	7/21/94	3.5	787		35	0.6		7.08	ND	0.09	ND	0.03	ND	ND		ND	1940
	1/24/95	1.2	320		36	0.6		7.6	ND	0.06	ND	ND	ND	ND		ND	930
	7/24/95	2.2	640		35	0.43		7.24	ND	0.07	ND	ND	ND	ND		ND	1900
	1/22/96	4.4	960		40	0.44		7.43	ND	0.1	ND	ND	ND	ND		ND	1990
	7/18/96	5	1000		42	0.53		7.25	ND	0.078		ND	ND	ND		ND	2210
	1/23/97	5.4	990		48	0.58		7.32	ND	0.089	ND	ND	0.029	ND		ND	2100
	10/7/97	4.74	570		23	0.62		7.52	ND	0.044	ND	ND	ND	ND		ND	1533
	3/25/98	4.2	730		20	0.6		7.38	ND	0.053	0.00037	ND	ND	ND		ND	1500
	11/23/98	2.5	530		25	0.68		7.38	ND	0.062	ND	ND	ND	ND		ND	1401
	3/24/99	2.4	590		24	0.54		7.2	ND	0.058	ND	ND	ND	ND		ND	1364
	9/27/99	1.5	610		58	0.67		7.1	ND	0.06	ND	ND	ND	ND		ND	1589
	3/29/00	3.5	580		26	0.59		7.6	ND	0.1	ND	ND	ND	ND		ND	1374
	10/4/00	2.9	490		18	0.58		7.3	ND	0.08	ND	ND	ND	ND		ND	1275
	4/11/01	2.7	650		2.2	0.53		7.5	ND	0.095	ND	ND	ND	ND		ND	1320
	10/1/01	2.7	450		14	0.49		7.5	ND	0.078	ND	ND	ND	ND		ND	1231
	3/19/02	2.99	610		9.6	0.58		7.45	ND	0.081	ND	ND	ND	ND		ND	1148
	9/17/02	2.7	450		6.9	0.52		7.44	ND	ND	ND	ND	ND	ND		ND	1184
	3/17/03	2.15	510		10	0.5		7.6	ND	0.072	ND	ND	ND	ND		ND	1180
	9/15/03	2.8	450		6.4	0.64		7.42	ND	ND	ND	ND	ND	ND		ND	963
	3/8/04	2.35	430		8	0.55		7.33	ND	0.048	ND	ND	ND	ND		ND	983
	9/21/05	2.1	220		7	0.6	680	6.26	ND	0.05	ND	ND	ND	ND	0.1	ND	735
	3/21/06	2.1	290		10	0.59	710	7.38	ND	0.055	ND	ND	ND	ND	0.09	ND	990
	9/26/06	1.9	316		7.7	0.6	658	7.52	ND	0.052	ND	ND	ND	ND	0.068	ND	1000
	3/28/07	2.1	300		9.2	0.46	730	7.7	ND	0.048	ND	ND	ND	ND	ND	ND	823
	9/12/07	2.1	340		9.3	0.73	720	7.45	ND	0.047	ND	ND	ND	ND	ND	ND	1350
	3/12/08	1.8	420		12	0.64	780	7.57	ND	0.048	ND	ND	ND	ND	ND	ND	778
	9/24/08	1.9	400		13	0.73	820	7.6	ND	0.053	ND	ND	ND	ND	ND	ND	769
	9/30/09	2.3	280		9.5	0.68	620	7.21	ND	0.037	ND	ND	ND	ND	ND	ND	1382
	3/24/10	ND	280		9.4	0.55	680	7.49	ND	0.042	ND	ND	ND	ND	ND	ND	985
	9/8/10	1.8	190		7.3	0.63	510	8.22	ND	0.037	ND	ND	ND	ND	ND	0.029	732
	3/22/11	1.9	290		10	0.7	680	6.98	ND	0.054	ND	ND	ND	ND	ND	ND	861
	9/27/11	1.8	230		8.2	0.67	590	7.02	ND	0.045	ND	ND	ND	ND	ND	ND	825
	3/27/12	1.5	320		11	ND	690	5.37	ND	0.059	ND	ND	ND	ND	0.035	ND	857
	9/18/12	1.2	190		6.7	0.5	540	6.65	ND	0.045	ND	ND	ND	ND	0.048	ND	706
	3/13/13	1.6	750		28	0.59	1300	7.18	ND	0.096	ND	ND	ND	ND	0.025	ND	1277
	9/18/13	ND	ND		34	ND	26	7.13	ND	0.086	ND	ND	ND	ND	0.03	0.0092	1310
	3/19/14	1.9	ND		44	ND	24	6.98	ND	0.086	ND	ND	ND	ND	ND	ND	1255
	9/24/14	1.2	460		23	0.22	1000	7.2	ND	0.042	ND	ND	ND	ND	0.039	ND	1109
	3/18/15	3.1	1600		82	ND	2700	7.04	ND	0.086	ND	ND	ND	ND	0.12	ND	2451
	9/30/15	1.3	500		27	0.32	1000	7.28	ND	0.064	ND	ND	ND	ND	0.063	ND	1050
	4/7/16	2.3	1500		81	ND	2700	7.48	ND	0.1	ND	ND	ND	ND	0.19	ND	1962
	10/18/16	3.8	2800		160	ND	4400	6.97	ND	0.083	ND	ND	ND	ND	0.13	0.0057	4925
	4/4/17	2.5	2200		120	ND	3400	10.69	ND	0.013	ND	ND	ND	ND	0.13	ND	3065
	10/6/17	2.4	1400		91	ND	2500	6.92	ND	0.065	ND	ND	ND	ND	0.54	ND	889

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-04S	6/3/82	ND	83	110	14	0.27	390	7.7	ND	ND	ND	ND	0.022	ND		ND	648
	9/16/82	0.17	85	76	14	0.29	540	7	ND	ND	0.002	ND	0.02	ND		ND	600
	12/28/82	0.14	87	97	13	0.38	360	7.4	ND	ND	ND	ND	ND	ND		ND	600
	4/5/83	0.14	94	99	21	0.33	370	7.4	ND	ND	ND	ND	ND	ND		ND	610
	10/17/83	0.13	180	50	20	0.36	460	7.2	0.001	0.23	0.005	ND	ND	ND		ND	710
	2/7/84	0.17	140	120	11	0.35	470	7.4	ND	ND	ND	ND	ND	ND		ND	660
	4/23/84	ND	86	149			524	7.2		0.19	ND	ND	0.18	0.0014		ND	760
	7/31/84	ND	93.8	158			594	7.4		0.3	ND	0.02	0.02	ND		ND	840
	10/18/84	0.18	137	143			535	7.12		ND	ND	ND	ND	ND		ND	725
	1/28/85	0.25	180	104			552	7.1		ND	ND	ND	ND	ND		ND	870
	4/25/85	0.24	130	131			488	7.1		ND	ND	ND	ND	ND		ND	725
	7/25/85	0.27	120	131			495	6.9		ND	ND	ND	ND	ND		ND	785
	10/29/85	0.4	110	138			456	7.2		ND	ND	ND	ND	ND		ND	740
	1/15/86	0.2	100	115			450	7.2		ND	ND	ND	ND	ND		ND	655
	4/25/86	ND	110	141			517	6.9		ND	ND	ND	ND	ND		ND	725
	7/29/86	ND	125	142			522	6.9		ND	ND	ND	ND	ND		ND	805
	10/28/86	ND	98	134			546	7		ND	ND	ND	ND	ND		ND	800
	1/27/87		130					7.2									725
	4/17/87		118					7.1									720
	7/16/87		122					7									740
	10/15/87		150					7									790
	1/19/88		158					7.2									840
	4/27/88		162					7.3									1029
	7/26/88		230					7									880
	10/13/88		175					7.4		0.07	0.0025	ND	ND	ND		0.005	990
	1/17/89		180					7.4		0.066	0.0025	ND	ND	ND		0.005	760
	4/20/89		250					6.9		0.06	0.0025	ND	ND	ND		0.005	885
	7/26/89		230					7.25		0.076	0.0025	ND	ND	ND		0.001	860
	10/19/89		270					7.05		0.08	0.0025	ND	ND	ND		0.001	1000
	1/24/90	2.22	451		15			6.92		0.025	0.001	ND	0.064	ND		0.005	1270
	4/27/90	0.281	351					6.84		0.147	0.001	ND	0.0045	ND		0.005	1320
	7/19/90	1.07	386					7.06		0.067	0.001	0.013	0.0045	ND		0.005	1373
	10/19/90	1.07	378					6.54		0.114	0.001	0.013	0.0045	ND		0.005	1150
	1/23/91	1.17	461		17.5			7.52	ND	0.063	0.001	ND	ND	ND		0.005	1032
	4/19/91																
	7/31/91	1.32	767		6			7.02	ND	0.025	0.002	ND	0.024	ND		0.005	1151
	10/29/91																
	2/13/92	2.98	556		12.1			7.11	ND	0.071	0.002	ND	0.01	ND		0.01	946
	6/30/92	3.87	575		25			6.56	0.021	0.192	0.003	ND	ND	ND		ND	1131
	1/27/93	0.83	250		6.3	0.36		7.02	ND	0.047	ND	ND	ND	ND		ND	798
	8/21/93	0.91	260		11			7.16	ND	0.02	ND	ND	ND	ND		ND	1120
	1/5/94	3.2	670		30	0.46		6.89	ND	0.05	ND	ND	ND	ND		ND	1540
	7/21/94	3	639		26	0.51		6.96	ND	0.04	ND	0.03	ND	ND		ND	1710
	1/24/95	0.9	160		22	0.8		8	ND	0.02	ND	ND	ND	ND		ND	583
	7/24/95	0.75	66		17	0.79		7.5	ND	0.04	ND	ND	ND	ND		ND	680
	1/22/96	0.92	170		9.1	0.5		7.35	ND	0.07	ND	ND	ND	0.0002		ND	784
	7/18/96	0.39	190		3.4	0.3		7.12	ND	0.056		ND	ND	ND		ND	930
	1/23/97	1.4	300		3	0.34		7.15	ND	0.097	ND	ND	0.022	ND		ND	1020
	10/7/97	1.3	320		13	0.54		7.23	ND	0.029	ND	ND	ND	ND		ND	983
	3/25/98	0.88	550		15	0.51		7.13	ND	0.049	ND	ND	ND	ND		ND	1060
	11/23/98	1.3	350		9.8	0.5		7	ND	0.053	ND	ND	ND	ND		ND	1087
	3/24/99	2.2	510		12	0.53		7.1	ND	0.042	0.00017	ND	ND	ND		ND	1066
	9/27/99	0.68	240		35	0.78		7.1	ND	0.028	ND	ND	ND	ND		ND	973
	3/29/00	1.2	280		7.7	0.5		7.4	ND	0.063	ND	ND	ND	ND		ND	869
	10/4/00	1.4	360		3.9	0.46		6.9	ND	0.042	ND	ND	ND	ND		ND	903
	4/11/01	1.4	480		1.2	0.32		7.3	ND	0.044	ND	ND	ND	ND		ND	1117
	10/1/01	1.6	270		4.1	0.34		7.1	ND	0.046	ND	ND	ND	ND		ND	882
	3/19/02	2	380		4.3	0.4		7.43	ND	ND	ND	ND	ND	ND		ND	739
	9/17/02	1.36	280		4.9	0.44		7.34	ND	ND	ND	ND	ND	ND		ND	846
	3/17/03	1.02	250		4	0.33		6.9	ND	0.025	ND	ND	ND	ND		ND	795
	9/15/03	1.75	360		4.7	0.41		7.17	ND	0.034	ND	ND	ND	ND		ND	875
	3/8/04	1.26	340		5.6	0.3		7.3	ND	0.034	ND	ND	ND	ND		ND	952
	9/21/05	1.6	190		7	0.41	700	6.83	ND	0.047	ND	ND	ND	ND	0.083	ND	902
	3/21/06	1.2	190		5	0.3	600	8.33	ND	0.038	ND	ND	ND	ND	0.051	ND	980
	9/26/06	1.7	281		8.2	0.47	655	7.2	ND	0.041	ND	ND	ND	ND	0.095	ND	900
	3/28/07	1.6	240		7.7	0.3	600	7.35	ND	0.038	ND	ND	ND	ND	0.065	ND	794
	9/12/07	1.3	190		6.9	0.56	550	7.3	ND	0.04	ND	ND	ND	ND	0.059	ND	621
	3/12/08	0.83	190		6.3	ND	420	7.57	ND	0.027	ND	ND	ND	ND	0.057	ND	4900
	9/24/08	0.56	110		3.9	0.55	360	7.61	ND	0.035	ND	ND	ND	ND	0.079	ND	545
	9/30/09	0.92	140		2.6	ND	400	7.42	ND	0.032	ND	ND	ND	ND	0.052	ND	582
	3/24/10	ND	120		2.3	ND	350	7.8	ND	0.024	ND	ND	ND	ND	ND	ND	10.1
	9/8/10	0.77	110		2.4	ND	310	7.33	ND	0.028	ND	ND	ND	ND	0.075	ND	433
	3/22/11	0.6	140		3.1	ND	470	6.99	ND	0.041	ND	ND	ND	ND	ND	ND	672
	9/27/11	0.41	150		2.2	ND	560	7.26	ND	0.049	ND	ND	ND	ND	ND	ND	809
	3/27/12	0.75	76		2.1	ND	390	6.85	ND	0.034	ND	ND	ND	ND	0.045	ND	520
	9/18/12	0.54	98		2.2	ND	470	6.07	ND	0.047	ND	ND	ND	ND	0.056	ND	582
	3/13/13	0.49	78		1.9	0.32	400	7.34	0.0013	0.035	ND	ND	ND	ND	0.036	0.0012	459
	9/18/13	0.57	99		2.4	0.2	460	7.1	0.0047	0.053	ND	ND	ND	ND	0.049	ND	535
	3/19/14	0.36	51		1.6	0.28	390	6.9	0.002	0.029	ND	ND	ND	ND	0.029	ND	261
	9/24/14	0.36	63		2.5	ND	360	7.37	0.0038	0.041	ND	ND	ND	ND	0.037	ND	537
	3/18/15	2	76		ND	ND	420	7.45	0.0033	0.031	ND	ND	ND	ND	ND	ND	642
	9/30/15	0.48	ND		ND	ND	690	7	ND	0.051	ND	ND	ND	ND	ND	ND	874
	4/7/16	0.52	270		16	ND	760	7.38	0.0036	0.054	ND	ND	ND	ND	0.018	ND	700
	10/18/16	1.4	470		37	ND	1100	7.26	0.0066	0.073	ND	ND	ND	ND	0.28	ND	864
	4/4/17	1	520		41	ND	1200	7.34	0.0042	0.061	ND	ND	ND	ND	0.13	ND	1783
	10/6/17	1.9	780		60	ND	1500	6.04	0.0089	0.083	ND	ND	ND	ND	0.2	ND	1473

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-05D	6/3/82	ND	86	99	27	0.18	380	7.3	ND	ND	ND	ND	0.028	ND		ND	660
	9/16/82	0.21	120	73	21	0.16	520	7.2	ND	ND	ND	ND	0.03	ND		ND	610
	12/28/82	0.1	101	73	19	0.23	380	7.4	ND	ND	ND	ND	ND	ND		ND	650
	4/5/83	0.12	90	85	19	0.2	450	7.3	ND	ND	ND	ND	0.025	ND		ND	630
	10/17/83	0.08	87	77	16	0.21	300	7.1	ND	0.17	ND	ND	ND	ND		ND	570
	2/7/84	0.12	90	91	25	0.26	390	7.3	ND	ND	ND	ND	ND	ND		ND	660
	4/23/84	ND	89.4	114			439	7.4		0.19	ND	ND	ND	0.0023		ND	610
	7/31/84	ND	98.1	105			451	7.9		0.4	ND	ND	ND	ND		ND	630
	10/18/84	0.18	103	95.2			425	7.27		ND	ND	ND	ND	ND		ND	580
	1/28/85	0.17	110	66.9			403	7.2		ND	ND	ND	ND	ND		ND	690
	4/25/85	0.22	130	109			439	7.3		ND	ND	ND	ND	ND		ND	635
	7/25/85	ND	100	84.4			418	7		ND	ND	ND	ND	ND		ND	670
	10/29/85	0.4	120	107			462	7.2		ND	ND	ND	ND	ND		ND	770
	1/15/86	0.3	120	94.1			440	7.2		ND	ND	ND	ND	ND		ND	675
	4/25/86	ND	130	102			443	7.2		ND	ND	ND	ND	ND		ND	645
	7/29/86	ND	128	104			435	6.9		ND	ND	ND	ND	ND		ND	705
	10/28/86	ND	110	102			447	7.3		ND	ND	ND	ND	ND		ND	690
	1/27/87		100					7									710
	4/17/87		110					7.2									690
	7/16/87		108					7									720
	10/15/87		120					6.8									725
	1/19/88		110					7.2									730
	4/27/88		118					7.4									742
	7/26/88		127					7.1									630
	10/13/88		140					7.3		0.02	0.0025	ND	ND	ND		0.005	794
	1/17/89		110					7.8		0.024	0.0025	ND	ND	ND		0.005	570
	4/20/89		100					7		0.021	0.0025	ND	ND	ND		0.005	670
	7/26/89		110					7.25		0.019	0.0025	ND	ND	ND		0.001	870
	10/19/89		110					6.9		0.02	0.0025	ND	ND	ND		0.001	650
	1/24/90	0.124	83		22			7.18		0.025	0.001	ND	0.0045	ND		0.01	690
	4/27/90	0.098	90					6.95		0.025	0.001	ND	0.0045	ND		0.005	640
	7/19/90	0.103	98					7.22		0.025	0.001	ND	0.0045	ND		0.005	715
	10/19/90	0.02	92					7.31		0.068	0.001	0.012	0.0045	ND		0.005	640
	1/23/91	0.117	94		17			7.32	ND	0.076	0	ND	ND	ND		ND	583
	4/19/91	0.096	121		28.7			6.95	0.01	0.05	0	0.01	0.01	ND		0.01	599
	7/31/91	0.5	106		17.5			7.16	ND	ND	0.002	ND	0.008	ND		ND	680
	10/29/91	0.136	96		18.6			7.16	0.01	0.05	0	0.014	0.01	ND		0.01	682
	2/13/92	0.17	157		21.7			7.1	ND	0.05	0.002	ND	0.01	ND		0.01	514
	6/30/92	0.07	140		25			7.28	ND	0.057	ND	ND	ND	ND		ND	577
	1/27/93	ND	75		14	0.14		6.73	ND	0.019	ND	ND	ND	ND		ND	434
	8/21/93	ND	86		15			7.11	ND	0.1	ND	ND	ND	ND		ND	610
	1/5/94	0.1	86		14	0.13		6.62	ND	0.02	ND	ND	ND	ND		ND	420
	7/21/94	ND	74		12	0.17		7.15	ND	0.02	ND	0.02	0.009	ND		ND	580
	1/24/95	0.19	130		12	0.2		6.71	ND	0.03	ND	ND	ND	ND		ND	580
	7/24/95	ND	85		8.2	0.17		7.03	ND	ND	ND	ND	ND	ND		ND	680
	1/22/96	ND	100		7.9	0.18		7.37	ND	0.02	0.002	ND	ND	ND		ND	555
	7/18/96	0.085	140		7.4	0.21		7.31	ND	0.022		ND	ND	ND		ND	620
	1/23/97	0.15	180		11	ND		7.64	ND	0.032	ND	ND	0.097	ND		ND	765
	10/7/97	0.69	330		13	0.19		7.24	ND	ND	ND	0.011	ND	ND		ND	948
	3/25/98	1	570		14	0.21		7.11	ND	0.064	ND	ND	ND	ND		ND	1160
	11/23/98	1.1	590		21	0.19		7.08	ND	0.081	ND	ND	ND	ND		ND	1332
	3/24/99	1.2	640		29	0.15		7	ND	0.086	ND	ND	ND	ND		ND	1371
	9/27/99	1.2	600		38	0.19		6.9	ND	0.082	0.0007	ND	ND	ND		ND	1119
	3/29/00	1.2	720		34	0.19		7.2	ND	0.12	ND	ND	ND	ND		ND	1369
	10/4/00	1.4	510		40	0.19		7.2	ND	0.1	ND	ND	ND	ND		ND	1238
	4/11/01	1.3	380		46	0.16		7.3	ND	0.12	ND	ND	ND	ND		ND	1491
	10/1/01	1.3	820		41	0.18		7.3	ND	0.1	ND	ND	ND	ND		ND	1328
	3/19/02	1.54	630		47	0.19		7.29	ND	0.116	ND	ND	ND	ND		ND	1395
	9/17/02	1.37	520		44	0.18		7.2	ND	ND	ND	ND	ND	ND		ND	1440
	3/17/03	1.35	600		44	0.16		6.7	ND	0.114	ND	ND	ND	ND		ND	1461
	9/15/03	1.75	670		46	0.19		7.19	ND	0.128	ND	ND	ND	ND		ND	1450
	3/8/04	1.46	760		47	0.17		7.13	ND	0.115	ND	ND	ND	ND		ND	1639
	9/21/05	2.5	960		60	0.17	1800	6.83	ND	0.12	ND	ND	ND	ND	0.047	ND	1823
	3/21/06	2.8	1200		69	0.17	2000	8.19	ND	0.13	ND	ND	ND	ND	0.073	ND	407
	9/26/06	3.2	1270		73.1	0.16	2120	7	ND	0.1	ND	ND	ND	ND	0.11	ND	270
	3/28/07	5.3	1700		76	0.11	2600	7.02	ND	0.11	ND	ND	ND	ND	0.73	ND	2673
	9/12/07	5.3	1400		73	ND	2500	7.27	ND	0.11	ND	ND	ND	ND	1.1	ND	2022
	3/12/08	9.9	1700		71	ND	2600	7.58	ND	0.1	ND	ND	ND	ND	3.8	ND	2281
	9/24/08	11	1700		75	ND	2900	7.48	ND	0.12	ND	ND	ND	ND	3.1	ND	2206
	9/30/09	12	2100		93	ND	3400	7.31	ND	0.09	ND	ND	ND	ND	2.8	ND	3808
	3/24/10	9.5	2400		110	ND	4100	7.52	ND	0.011	ND	0.011	ND	ND	2	0.025	4199
	9/8/10	8.6	3000		97	ND	3200	7.99	ND	0.12	ND	ND	ND	ND	2	ND	1121
	3/22/11	11	3000		150	ND	4600	7.26	ND	0.13	ND	ND	ND	ND	2.5	ND	4936
	9/27/11	16	4600		240	0.63	6900	7.39	ND	0.056	ND	ND	ND	ND	2.6	ND	7492
	3/27/12	11	2800		130	ND	4000	7.5	ND	0.086	ND	ND	ND	ND	1.6	0.0035	4318
	9/18/12	17	4700		250	ND	7500	7.28	ND	0.064	ND	ND	ND	ND	2.6	ND	8625
	3/13/13	18	ND		150	0.45	4600	7.22	ND	0.087	ND	ND	ND	ND	2	0.00048	3724
	9/18/13	18	5500		290	ND*	8600	7.13	ND	0.053	ND	ND	ND	ND	2.1	ND	7052
	3/19/14	17	4500		260	ND	7800	6.74	ND	0.055	ND	ND	ND	ND	2.1	ND	7977
	9/24/14	14	3600		210	ND	6000	7.24	ND	0.067	ND	ND	ND	ND	1	ND	5369
	3/18/15	17	2800		130	ND	4800	6.93	ND	0.042	ND	ND	ND	ND	0.92	ND	4950
	9/30/15	16	2500		120	ND	4200	7.23	ND	0.027	ND	ND	ND	ND	0.63	ND	3999
	4/7/16	9.9	1900		110	ND	3200	7.19	ND	0.032	ND	ND	ND	ND	0.59	ND	1055
	10/18/16	10	2800		180	ND	4700	7.37	ND	0.027	ND	ND	ND	ND	0.52	ND	2981
	4/4/17	9.2	1900		210	ND	5600	6.29	ND	0.033	ND	ND	ND	ND	0.39	ND	6796
	10/6/17	4.8	1200		76	ND	3000	6.08	ND	0.054	ND	ND	ND	ND	0.15	ND	1126

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-05S	6/3/82	ND	82	76	15	0.19	310	7.2	ND	ND	ND	ND	0.018	ND		ND	536
	9/16/82	0.13	89	50	12	0.16	520	7.1	0.006	ND	0.003	ND	0.018	ND		ND	560
	12/28/82	0.1	101	73	19	0.23	380	7.4	ND	ND	ND	ND	ND	ND		ND	650
	4/5/83	0.12	90	85	19	0.2	450	7.3	ND	ND	ND	ND	ND	ND		ND	630
	10/17/83	0.08	49	51	3	0.25	300	7.2	0.008	0.17	0.005	ND	ND	ND		ND	520
	2/7/84	0.13	69	26	11	0.26	360	7.4	ND	ND	ND	ND	ND	ND		ND	590
	4/23/84	ND	61.7	119			396	6.9		0.19	ND	ND	0.17	0.0013		ND	600
	7/31/84	ND	44.8	108			448	7.6		0.6	ND	ND	ND	ND		ND	650
	10/18/84	0.19	81	109			462	7.07		ND	ND	ND	ND	ND		ND	630
	1/28/85	0.14	130	70.8			424	7.15		ND	ND	ND	ND	ND		ND	700
	4/25/85	0.15	120	102			436	7.2		ND	ND	ND	ND	ND		ND	620
	7/25/85	ND	110	83.2			408	7		ND	ND	ND	ND	ND		ND	650
	10/29/85	0.4	110	104			466	7.1		ND	ND	ND	ND	ND		ND	740
	1/15/86	0.3	120	98.7			480	6.9		ND	ND	ND	ND	ND		ND	710
	4/25/86	ND	130	122			530	6.8		ND	ND	ND	ND	ND		ND	740
	7/29/86	ND	164	116			512	6.8		ND	ND	ND	ND	ND		ND	800
	10/28/86	0.11	150	130			556	7		ND	ND	ND	ND	ND		ND	840
	1/27/87		100					7									710
	4/17/87		65					7.1									700
	7/16/87		119					6.8									790
	10/15/87		130					6.8									825
	1/19/88		122					7									840
	4/27/88		112					7.3									729
	7/26/88		122					6.8									660
	10/13/88		145					7.2		0.04	0.0025	ND	ND	ND		0.005	775
	1/17/89		120					7.8		0.044	0.0025	ND	ND	ND		0.005	560
	4/20/89		130					7		0.04	0.0025	ND	ND	ND		0.005	670
	7/26/89		63					6.8		0.06	0.0025	ND	ND	ND		0.001	650
	10/19/89		140					6.7		0.06	0.0025	ND	ND	ND		0.001	740
	1/24/90	0.099	97		8			6.88		0.025	0.001	ND	0.0045	ND		0.005	770
	4/27/90	0.076	80					6.88		0.025	0.001	ND	0.0045	ND		0.005	640
	7/19/90	0.063	152					6.93		0.094	0.001	0.01	0.0045	ND		0.005	884
	10/19/90	0.118	110					6.51		0.107	0.002	ND	0.0045	ND		0.005	643
	1/23/91	0.04	59		ND			6.72	ND	ND	0.002	ND	ND	ND		ND	508
	4/19/91	0.09	47		7.8			6.86	0.01	0.05	0	ND	0.01	ND		0.01	553
	7/31/91	0.12	75		4.5			6.97	ND	ND	0.002	ND	0.02	ND		ND	645
	10/29/91	0.036	93.8		14.7			6.64	0.01	0.084	0	ND	0.01	ND		0.01	721
	2/13/92	0.36	105		8.92			7.09	ND	0.05	0.002	ND	0.01	ND		0.01	462
	6/30/92	0.123	124		25			6.95	ND	0.067	ND	ND	ND	ND		ND	591
	1/27/93	ND	100		7.4	0.14		6.65	ND	0.041	ND	ND	ND	ND		ND	449
	8/21/93	0.12	140		11			7.02	ND	0.04	ND	ND	0.012	ND		ND	840
	1/5/94	0.52	190		11	0.2		6.79	ND	0.05	ND	ND	ND	ND		ND	570
	7/21/94	0.21	83		4.5	0.33		6.91	ND	0.05	ND	0.05	ND	ND		ND	620
	1/24/95	0.14	130		5.1	0.4		6.41	ND	0.06	ND	ND	ND	ND		ND	570
	7/24/95	0.28	160		5.3	0.27		6.83	0.008	0.08	ND	ND	ND	ND		ND	1000
	1/22/96	0.45	220		9.9	0.24		7.26	ND	0.07	ND	ND	ND	ND		ND	792
	7/18/96	0.32	180		6.5	0.28		7.12	ND	0.054		ND	ND	ND		ND	712
	1/23/97	0.37	150		7.7	0.29		7.7	ND	0.061	ND	ND	0.063	ND		ND	706
	10/7/97	0.89	410		12	0.29		7.05	0.007	0.11	0.0006	0.011	ND	ND		ND	1133
	3/25/98	0.83	700		7.3	0.24		7.05	ND	0.13	ND	ND	ND	ND		ND	1174
	11/23/98	0.69	370		9.8	0.31		7.01	ND	0.13	ND	ND	ND	ND		ND	1104
	3/24/99	0.55	360		12	0.24		6.9	ND	0.11	ND	ND	ND	ND		ND	1014
	9/27/99	0.68	370		11	0.35		6.9	0.0058	0.11	ND	ND	ND	ND		ND	839
	3/29/00	0.73	310		4.6	0.28		7.2	ND	0.13	ND	ND	ND	ND		ND	939
	10/4/00	0.93	260		6.5	0.32		7.1	0.006	0.11	ND	ND	ND	ND		ND	680
	4/11/01	0.61	380		8.4	0.25		7.2	ND	0.11	ND	ND	ND	ND		ND	923
	10/1/01	0.63	400		7	0.29		7.2	ND	0.12	ND	ND	ND	ND		ND	854
	3/19/02	0.526	150		5.1	0.27		7.32	ND	0.082	ND	ND	ND	ND		ND	732
	9/17/02	0.493	140		6.8	0.26		7.09	0.0056	ND	ND	ND	ND	ND		ND	767
	3/17/03	0.404	160		6.3	0.22		6.7	ND	0.074	ND	ND	ND	ND		ND	776
	9/15/03	0.514	180		9.7	0.29		7.02	ND	0.092	ND	ND	ND	ND		ND	782
	3/8/04	0.485	230		11	0.22		7.14	ND	0.086	ND	ND	ND	ND		ND	868
	9/21/05	0.56	110		9.5	0.29	450	7.73	ND	0.11	ND	ND	ND	ND	ND	ND	576
	3/21/06	0.86	160		12	0.25	520	6.81	ND	0.11	ND	ND	ND	ND	ND	ND	790
	9/26/06	0.71	136		7.7	0.32	500	7.2	ND	0.092	ND	ND	ND	ND	0.017	ND	770
	3/28/07	1	150		6.6	0.23	500	7.29	ND	0.092	ND	ND	ND	ND	ND	ND	672
	9/12/07	0.81	130		6.1	0.54	500	7.21	ND	0.095	ND	ND	ND	ND	ND	ND	1103
	3/12/08	0.54	180		5.9	ND	430	7.36	ND	0.07	ND	ND	ND	ND	ND	ND	2997
	9/24/08	0.8	130		4.9	0.56	420	7.78	ND	0.071	ND	ND	ND	ND	ND	ND	564
	9/30/09	1.3	200		3.9	ND	510	6.9	ND	0.087	ND	ND	ND	ND	ND	ND	1102
	3/24/10	ND	170		4.4	ND	470	7.12	ND	0.081	ND	ND	ND	ND	ND	ND	671
	9/8/10	0.96	150		4.4	ND	490	7.76	ND	0.095	ND	ND	ND	ND	ND	ND	665
	3/22/11	1	180		4.5	ND	430	6.37	ND	0.11	ND	ND	ND	ND	ND	ND	684
	9/27/11	1.3	120		3.3	ND	490	6.93	ND	0.11	ND	ND	ND	ND	ND	ND	730
	3/27/12	2	260		7.4	ND	630	5.92	0.003	0.15	ND	ND	ND	ND	0.074	ND	904
	9/18/12	1.7	240		7	ND	660	6.24	ND	0.12	ND	ND	ND	ND	0.085	ND	762
	3/13/13	1.6	210		5.8	0.31	610	7.11	0.0022	0.12	ND	ND	ND	ND	0.051	ND	562
	9/18/13	1.2	190		5.7	0.2	590	7.11	0.0043	0.11	ND	ND	ND	ND	0.043	0.0026	625
	3/19/14	1.6	320		8.7	0.21	750	6.85	0.0023	0.15	ND	ND	ND	ND	0.11	0.0036	628
	9/24/14	ND	290		ND	ND	ND	7.32	0.0035	0.16	ND	ND	ND	ND	ND	ND	873
	3/18/15	2.9	420		18	ND	950	7.15	0.0021	0.22	ND	ND	ND	ND	0.22	ND	789
	9/30/15	2	400		13	0.23	810	7.24	0.0031	0.19	ND	ND	ND	ND	0.063	ND	952
	4/7/16	2.3	430		12	0.23	910	7.38	0.0023	0.22	ND	ND	ND	ND	0.22	ND	769
	10/18/16	2.8	490		15	ND	1200	7.03	0.003	0.32	ND	ND	ND	ND	0.16	ND	1381
	4/4/17	2.3	520		20	ND	1200	9.28	0.0015	0.37	ND	ND	ND	ND	0.079	ND	1087
	10/6/17	2.7	600		17	ND	1200	7.31	0.0031	0.24	ND	ND	ND	ND	0.12	ND	838

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-06D	6/3/82	0.015	74	60	20	0.17	250	7.5	ND	ND	ND	ND	0.022	ND		ND	471
	9/16/82	0.12	97	70	19	0.23	400	7.3	ND	ND	ND	ND	ND	ND		ND	140
	12/28/82	0.06	88	48	20	0.23	290	7.4	ND	ND	ND	ND	ND	ND		ND	490
	4/5/83	0.12	74	67	20	0.2	330	7.3	ND	ND	ND	ND	ND	ND		0.005	510
	10/17/83	0.047	210	44	21	0.18	330	7.2	ND	0.17	ND	ND	ND	ND		ND	550
	2/7/84	0.12	130	62	19	0.24	300	7.2	ND	ND	ND	ND	ND	ND		ND	520
	4/23/84	ND	91.4	78.2			360	7.8		ND	ND	ND	ND	0.0016		ND	500
	7/31/84	ND	94.3	81.1			327	7.8		0.3	ND	ND	ND	ND		ND	500
	10/18/84	0.17	87	75			321	7.52		ND	ND	ND	ND	ND		ND	450
	1/28/85	0.29	88	51			299	7.35		ND	ND	ND	ND	ND		ND	535
	4/25/85	0.31	85	80.9			348	7.4		ND	ND	ND	ND	ND		ND	490
	7/25/85	ND	76	64.1			322	7.5		ND	ND	ND	ND	ND		ND	520
	10/29/85	0.3	82	73			318	7.4		ND	ND	ND	ND	ND		ND	510
	1/15/86	0.2	81	67.8			320	7.4		ND	ND	ND	ND	ND		ND	520
	4/25/86	ND	82	73.2			304	7.2		ND	ND	ND	ND	ND		ND	505
	7/29/86	ND	84	73.6			310	7		ND	ND	ND	ND	ND		ND	515
	10/28/86	ND	71	68.4			302	7.2		ND	ND	ND	ND	ND		ND	495
	1/27/87		88					7.2									525
	4/17/87		64					7.2									510
	7/16/87		67					7									470
	10/15/87		85					6.8									525
	1/19/88		72					7.4									515
	4/27/88		250					7.3									587
	7/26/88		78					7.2									460
	10/13/88		90					7.5		0.03	0.0025	ND	ND	ND		0.005	503
	1/17/89		140					7.9		0.037	0.0025	ND	ND	ND		0.005	410
	4/20/89		74					7.3		0.03	0.0025	ND	ND	ND		0.005	490
	7/26/89		35					6.45		0.042	0.0025	ND	0.009	ND		0.001	400
	10/19/89		76					7.6		0.03	0.0025	ND	ND	ND		0.001	490
	1/24/90	0.063	94		19			7.15		0.025	0.001	ND	0.0045	ND		0.005	450
	4/27/90	0.149	68.4					7.58		0.025	0.001	ND	0.0045	ND		0.005	490
	7/19/90	0.036	81					7.33		0.067	0.001	ND	0.0045	ND		0.005	529
	10/19/90	0.07	76					7.29		0.057	0.001	ND	0.0045	ND		0.005	494
	1/23/91	0.01	93		20			6.8	ND	0.025	0.001	ND	ND	ND		0.005	428
	4/19/91																
	7/31/91	0.099	122		19			7.42	ND	0.025	0.001	ND	ND	ND		0.005	531
	10/29/91																
	2/13/92	0.15	188		23.6			6.73	ND	0.05	0.002	ND	0.01	ND		0.01	459
	6/30/92	0.066	157		25			7.38	ND	0.059	ND	ND	ND	ND		ND	548
	1/27/93	ND	100		20	0.27		6.72	ND	0.037	ND	ND	ND	ND		ND	450
	8/21/93	ND	270		29			7.2	ND	0.02	ND	ND	ND	ND		ND	680
	1/5/94	ND	120		24	0.17		7.06	ND	0.06	ND	ND	ND	ND		ND	500
	7/21/94																
	1/24/95																
	7/24/95																
	1/22/96																
	7/18/96																
	1/23/97																
	10/7/97																
	3/25/98																
	11/23/98	0.088	80		20	0.23		7.08	ND	0.034	ND	ND	ND	ND		ND	555
	3/24/99	ND	83		20	0.19		6.9	ND	0.033	0.00039	ND	ND	ND		ND	550
	9/27/99	ND	79		20	0.22		6.9	ND	0.031	ND	ND	ND	ND		ND	552
	3/29/00	0.091	83		16	0.22		7.2	ND	0.062	ND	ND	ND	ND		ND	508
	10/4/00	ND	89		17	0.25		7.4	ND	0.027	ND	ND	ND	ND		ND	499
	4/11/01	ND	76		17	0.22		7.3	ND	0.037	ND	ND	ND	ND		ND	505
	10/1/01	ND	69		15	0.22		7.3	ND	0.046	ND	ND	ND	ND		ND	468
	3/19/02	ND	84		14	0.25		7.66	ND	0.023	ND	ND	ND	ND		ND	433
	9/17/02	ND	75		15	0.21		7.2	ND	ND	ND	ND	ND	ND		ND	513
	3/17/03	ND	72		14	0.2		6.8	ND	0.031	ND	ND	ND	ND		ND	505
	9/15/03	ND	81		11	0.24		7.4	ND	ND	ND	ND	ND	ND		ND	472
	3/8/04	ND	79		14	0.23		7.22	ND	0.028	ND	ND	ND	ND		ND	502
	9/21/05	ND	82		16	0.23	320	5.97	ND	0.035	ND	ND	ND	ND	ND	ND	402
	3/22/06	0.026	85		15	0.25	350	8.47	ND	0.036	ND	ND	ND	ND	ND	ND	950
	9/27/06	ND	97.8		16	0.25	349	7.72	ND	0.032	ND	ND	ND	ND	ND	ND	940
	3/28/07	ND	90		20	0.2	340	7.55	ND	0.034	ND	ND	ND	ND	ND	ND	463
	9/11/07	ND	92		20	ND	350	7.7	ND	0.034	ND	ND	ND	ND	ND	ND	364
	3/11/08	ND	95		20	ND	310	7.78	ND	0.03	ND	ND	ND	ND	ND	ND	334
	9/23/08	ND	80		12	ND	270	7.89	ND	0.025	ND	ND	ND	ND	ND	ND	443
	9/29/09	ND	71		9.7	ND	250	7.46	ND	0.025	ND	ND	ND	ND	ND	ND	385
	3/24/10	ND	66		11	ND	270	7.57	ND	0.026	ND	ND	ND	ND	ND	ND	521
	9/9/10	ND	67		11	ND	260	7.83	ND	0.025	ND	ND	ND	ND	ND	ND	390
	3/22/11	ND	66		9.5	ND	180	7.19	ND	0.023	ND	ND	ND	ND	ND	ND	319
	9/28/11	ND	66		8.6	ND	220	7.2	ND	0.025	ND	ND	ND	ND	ND	ND	373
	3/28/12	0.055	65		9.1	ND	240	7.2	ND	0.027	ND	ND	ND	ND	0.0025	ND	328
	9/20/12	0.43	69		9	ND	270	7.58	ND	0.032	ND	ND	ND	ND	0.019	ND	368
	3/12/13	ND	76		11	ND	260	7.71	ND	0.028	ND	ND	ND	ND	0.0031	ND	227
	9/17/13	ND	67		12	0.27	250	6.72	0.0019	0.028	ND	ND	ND	ND	ND	ND	384
	3/18/14	ND	74		12	0.23	270	7.85	0.0013	0.028	ND	ND	ND	ND	ND	ND	284
	9/24/14	ND	81		15	0.38	280	7.49	0.0013	0.029	ND	ND	ND	ND	ND	ND	387
	3/17/15	ND	82		15	0.24	300	7.7	0.0013	0.029	ND	ND	ND	ND	ND	ND	261
	9/29/15	ND	77		13	0.26	330	7.51	ND	0.027	ND	ND	ND	ND	ND	ND	358
	4/5/16	ND	75		12	0.25	250	7.89	0.001	0.029	ND	ND	ND	ND	0.0053	ND	346
	10/19/16	ND	66		12	0.24	300	7.51	ND	0.032	ND	ND	ND	ND	ND	ND	279
	4/5/17	ND	82		15	0.36	310	10.72	ND	0.028	ND	ND	ND	ND	ND	ND	342
	10/6/17	ND	89		15	0.23	390	7.91	0.0047	0.029	ND	ND	ND	ND	0.0058	ND	96

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-06S	6/3/82	ND	100	21	1	0.19	80	5.6	ND	ND	ND	ND	0.02	ND		ND	179
	9/16/82	0.077	49	13	ND	0.21	130	6.8	ND	ND	ND	ND	ND	ND		ND	620
	12/28/82	0.03	67	17	2.5	0.26	120	8.8	ND	ND	ND	ND	0.06	ND		ND	170
	4/5/83	0.07	42	15	1.7	0.23	110	6	ND	ND	ND	ND	ND	ND		ND	140
	10/17/83	0.016	65	14	4	0.24	100	5.7	ND	0.07	ND	ND	ND	ND		ND	160
	2/7/84	0.065	85	17	8.1	0.29	76	5.5	ND	ND	ND	ND	ND	ND		ND	170
	4/23/84	ND	50.3	30			148	6.5		ND	ND	ND	ND	0.0017		ND	170
	7/31/84	ND	58.8	25.2			125	7.9		ND	ND	ND	ND	ND		ND	190
	10/18/84	ND	59	23.3			115	5.73		ND	ND	ND	ND	ND		ND	175
	1/28/85	0.12	67	18.6			134	5.55		ND	ND	ND	ND	ND		ND	230
	4/25/85	ND	61	30.4			167	5.6		ND	ND	ND	ND	ND		ND	210
	7/25/85	ND	65	27.2			165	5.9		ND	ND	ND	ND	ND		ND	230
	10/29/85	0.2	86	35.2			190	5.5		ND	ND	ND	ND	ND		ND	280
	1/15/86	0.2	84	36.1			240	5.6		ND	ND	ND	ND	ND		ND	330
	4/25/86	ND	80	38.9			210	5.4		ND	ND	ND	ND	ND		ND	295
	7/29/86	ND	80	38.2			192	5.2		ND	ND	ND	ND	ND		ND	310
	10/28/86	ND	75	34.7			190	5.7		ND	ND	ND	ND	ND		ND	290
	1/27/87		88					5.6									445
	4/17/87		72					5.8									410
	7/16/87		96					5.2									380
	10/15/87		120					6.1									430
	1/19/88		95					5.4									415
	4/27/88		205					5.5									513
	7/26/88		137					5.4									380
	10/13/88		160					5.5		0.06	0.005	ND	ND	ND		0.005	411
	1/17/89		110					5.8		0.055	0.005	ND	ND	ND		0.005	340
	4/20/89		140					5.9		0.05	0.0025	ND	ND	ND		0.005	410
	7/26/89		140					6.2		0.054	0.0025	ND	ND	ND		0.001	340
	10/19/89		130					7.55		0.05	0.0025	ND	ND	ND		0.001	400
	1/24/90	0.139	131		20			4.82		0.055	0.001	ND	0.012	ND		0.005	390
	4/27/90	0.116	125					6.22		0.025	0.004	ND	0.0045	ND		0.005	550
	7/19/90	0.06	159					4.86		0.094	0.005	ND	0.0045	ND		0.005	590
	10/19/90	0.603	204					4.79		0.094	0.007	ND	0.0045	ND		0.005	515
	1/23/91	0.103	145		25			5.79	ND	0.067	0.004	ND	ND	ND		0.005	424
	4/19/91																
	7/31/91	0.066	137		20.3			5.48	ND	0.025	0.006	ND	ND	ND		0.005	392
	10/29/91																
	2/13/92	0.12	123		20.7			5.52	ND	0.05	0.002	ND	0.01	ND		0.01	250
	6/30/92	0.06	110		15			5.02	ND	0.051	ND	ND	ND	ND		ND	227
	1/27/93	ND	49		22	0.24		5.5	ND	0.032	ND	ND	ND	ND		ND	198
	8/21/93	ND	75		20			6.38	ND	0.05	ND	ND	ND	ND		ND	360
	1/5/94	ND	96		9	0.17		5.95	ND	0.04	ND	ND	ND	ND		ND	240
	7/21/94																
	1/24/95																
	7/24/95																
	1/22/96																
	7/18/96																
	1/23/97																
	10/7/97																
	3/25/98																
	11/23/98	0.11	84		16	0.16		5.55	ND	0.04	0.0026	ND	ND	ND		ND	340
	3/24/99	ND	76		18	0.14		5.3	ND	0.035	0.002	ND	ND	ND		ND	312
	9/27/99	ND	80		14	0.11		5.3	ND	0.031	0.002	ND	ND	ND		ND	275
	3/29/00	0.093	79		13	0.14		5.5	ND	0.072	0.0017	ND	ND	ND		ND	274
	10/4/00	0.051	73		12	0.14		5.3	ND	0.029	0.0014	ND	ND	ND		ND	242
	4/11/01	ND	62		11	0.12		5.5	ND	0.044	0.0014	ND	ND	ND		ND	303
	10/1/01	ND	82		16	0.12		6.5	ND	0.077	0.004	ND	ND	ND		ND	398
	3/19/02	ND	86		37	0.12		5.62	ND	0.064	0.00209	ND	ND	ND		ND	503
	9/17/02	ND	98		19	0.13		6.29	ND	ND	0.00285	ND	ND	ND		ND	362
	3/17/03	ND	97		16	0.12		4.9	ND	0.055	ND	ND	ND	ND		ND	414
	9/15/03	ND	85		9.5	0.12		5.52	ND	0.032	0.0018	ND	ND	ND		ND	305.3
	3/8/04	ND	71		11	0.12		6.43	ND	0.038	0.0017	ND	ND	ND		ND	334
	9/21/05	ND	41		2.5	0.12	160	5.15	ND	0.035	ND	ND	ND	ND	ND	ND	210
	3/22/06	ND	48		4.5	ND	170	5.94	ND	0.04	ND	ND	ND	ND	ND	ND	260
	9/27/06	ND	48.5		11	ND	210	5.8	ND	0.035	ND	ND	ND	ND	ND	ND	240
	3/28/07	ND	42		9.9	ND	210	5.91	ND	0.04	ND	ND	ND	ND	ND	ND	249
	9/11/07	ND	70		11	ND	190	5.62	ND	0.054	ND	ND	ND	ND	ND	ND	533
	3/11/08	0.059	24		2.9	ND	51	6.51	ND	0.022	ND	ND	ND	ND	ND	ND	1179
	9/23/08	ND	22		3.4	ND	75	6.26	ND	0.026	ND	ND	ND	ND	ND	ND	72
	9/29/09	ND	39		1.9	ND	110	5.42	ND	0.036	ND	ND	ND	ND	ND	ND	249
	3/24/10	ND	26		2.1	ND	98	6.14	ND	0.031	ND	ND	ND	ND	ND	ND	141
	9/9/10	ND	37		2.4	ND	120	7.52	ND	0.041	ND	ND	ND	ND	ND	ND	178
	3/22/11	ND	38		5	ND	130	6.32	ND	0.053	ND	ND	ND	ND	ND	ND	173
	9/28/11	ND	51		13	ND	170	5.62	ND	0.077	ND	ND	ND	ND	ND	ND	259
	3/28/12	0.052	84		21	ND	290	5.48	ND	0.1	0.0016	ND	ND	ND	ND	0.0051	369
	9/20/12	0.24	100		16	ND	280	5.16	ND	0.066	ND	ND	ND	ND	0.022	ND	360
	3/12/13	0.053	95		14	ND	210	5.28	ND	0.065	0.002	ND	0.00061	ND	0.0033	ND	220
	9/17/13	ND	65		8.3	ND	190	5.55	ND	0.058	0.0012	ND	ND	ND	ND	0.0025	273
	3/18/14	ND	71		7.5	ND	160	6.94	ND	0.045	0.00131	ND	ND	ND	ND	ND	157
	9/24/14	ND	87		14	ND	170	5.08	ND	0.05	0.0018	ND	ND	ND	ND	ND	249
	3/17/15	ND	51		8	ND	160	7.25	ND	0.039	0.0012	ND	ND	ND	ND	ND	224
	9/29/15	ND	67		11	ND	210	5.6	ND	0.046	0.0021	ND	ND	ND	ND	ND	200
	4/5/16	ND	79		10	ND	180	7.52	ND	0.051	0.0017	ND	ND	ND	ND	ND	287
	10/19/16	ND	70		12	ND	190	7.47	ND	0.056	0.0014	ND	ND	ND	ND	ND	162
	4/5/17	ND	45		13	ND	182	7.01	ND	0.064	0.00078	ND	ND	ND	ND	ND	182
	10/6/17	ND	200		4	ND	260	7.98	ND	0.047	0.0021	ND	ND	ND	ND	ND	629

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-07D	6/3/82	ND	90	83	10	0.16	340	7.4	ND	ND	0.002	ND	0.02	ND		ND	596
	9/16/82	0.16	130	55	17	0.15	410	7.1	ND	ND	0.002	0.004	ND	ND		ND	490
	12/28/82	0.1	110	70	19	0.21	390	7.3	ND	ND	ND	ND	ND	ND		ND	610
	4/5/83	0.15	93	84	18	0.2	370	7.2	ND	ND	ND	ND	ND	ND		ND	570
	10/17/83	0.066	160	58	19	0.21	400	7.4	0.001	0.18	ND	ND	ND	ND		ND	420
	2/7/84	0.11	90	27	19	0.23	350	7.4	ND	ND	ND	ND	ND	ND		ND	550
	4/23/84	ND	94.4	117			377	5.6		ND	ND	ND	0.12	0.002		ND	550
	7/31/84	ND	90.2	85.5			353	7.7		0.4	ND	ND	ND	ND		ND	540
	10/18/84	0.16	96	80.1			346	7.4		ND	ND	ND	ND	ND		ND	490
	1/28/85	0.22	100	53.5			332	7.25		ND	ND	ND	ND	ND		ND	550
	4/25/85	ND	130	88.8			291	6.7		ND	ND	ND	ND	ND		ND	420
	7/25/85	ND	92	72.8			350	7.6		ND	ND	ND	ND	ND		ND	550
	10/29/85	0.3	100	78.5			352	7.4		ND	ND	ND	ND	ND		ND	750
	1/15/86	0.2	99	83.1			350	7.3		ND	ND	ND	ND	ND		ND	560
	4/25/86	ND	110	89.6			362	7.2		ND	ND	ND	ND	ND		ND	565
	7/29/86	ND	88	83.4			340	7		ND	ND	ND	ND	ND		ND	560
	10/28/86	ND	70	81.2			327	7.2		ND	ND	ND	ND	ND		ND	550
	1/27/87		62					7.2									585
	4/17/87		68					7.2									600
	7/16/87		74					7.1									535
	10/15/87		90					6.9									590
	1/19/88		79					7.3									590
	4/27/88		300					7.2									671
	7/26/88		88					7.1									520
	10/13/88		90					7.4		0.03	0.0025	ND	ND	ND		0.005	594
	1/17/89		78					7.8		0.031	0.0025	ND	ND	ND		0.005	480
	4/20/89		71					7		0.028	0.0025	ND	ND	ND		0.005	530
	7/26/89		83					7.1		0.03	0.0025	ND	ND	ND		0.001	500
	10/19/89		70					7.32		0.02	0.0025	ND	ND	ND		0.001	520
	1/24/90	0.053	62		12			7.08		0.025	0.001	ND	0.0045	ND		0.005	480
	4/27/90	0.063	65.7					7.31		0.025	0.001	ND	0.0045	ND		0.005	550
	7/19/90	0.2	80					7.31		0.071	0.001	ND	0.0045	ND		0.005	578
	10/19/90	0.017	67					7.24		0.096	0.001	ND	0.0045	ND		0.005	523
	1/23/91	0.01	76		7.5			7.18	ND	0.025	0.001	ND	ND	ND		0.005	466
	4/19/91																
	7/31/91	0.106	84		13			7.21	ND	0.025	0.001	ND	ND	ND		0.005	590
	10/29/91																
	2/13/92	0.08	135		11.1			6.97	ND	0.05	0.002	ND	0.01	ND		0.01	433
	6/30/92	0.036	170		18			7.52	ND	ND	ND	ND	ND	ND		ND	491
	1/27/93	ND	86		13	0.26		6.75	ND	0.024	ND	ND	ND	ND		ND	385
	8/21/93	ND	96		18			7.23	ND	0.05	ND	ND	ND	ND		ND	590
	1/5/94	0.05J	86		15	0.21		6.86	ND	0.04	ND	ND	ND	ND		ND	410
	7/21/94																
	1/24/95																
	7/24/95																
	1/22/96																
	7/18/96																
	1/23/97																
	10/7/97																
	3/25/98																
	11/23/98	0.1	85		25	0.28		7.31	ND	0.024	ND	ND	ND	ND		ND	539
	3/24/99	ND	87		25	0.25		7	ND	0.021	0.00032	ND	ND	ND		ND	502
	9/27/99	ND	77		26	0.27		7.1	ND	ND	ND	ND	ND	ND		ND	497
	3/29/00	0.08	70		19	0.26		7.3	ND	0.054	ND	ND	ND	ND		ND	492
	10/4/00	0.069	74		20	0.31		7.4	0.005	0.02	ND	ND	ND	ND		ND	452
	4/11/01	ND	50		19	0.24		7.4	ND	0.027	ND	ND	ND	ND		ND	518
	10/1/01	ND	83		20	0.23		7.3	ND	0.027	ND	ND	ND	ND		ND	488
	3/19/02	ND	81		18	0.28		7.57	ND	ND	ND	ND	ND	ND		ND	469
	9/17/02	ND	75		18	0.23		7.52	0.0084	ND	ND	ND	ND	ND		ND	514
	3/17/03	ND	100		32	0.19		6.8	ND	0.029	ND	ND	ND	ND		ND	640
	9/15/03	ND	210		53	0.2		7.22	0.0062	0.031	ND	ND	ND	ND		ND	881
	3/8/04	ND	320		60	0.19		7.22	ND	0.048	ND	ND	ND	ND		ND	1169
	9/21/05	ND	170		43	0.2	580	7.04	ND	0.053	ND	ND	ND	ND	ND	ND	768
	3/22/06	0.038	370		74	0.21	1000	8.69	ND	0.062	ND	ND	ND	ND	ND	ND	1320
	9/27/06	ND	333		50.6	0.21	785	7.2	ND	0.044	ND	ND	ND	ND	0.01	ND	1000
	3/28/07	ND	450		71	0.17	1000	7.41	ND	0.042	ND	ND	ND	ND	ND	ND	1276
	9/12/07	ND	310		58	ND	760	7.4	ND	0.036	ND	ND	ND	ND	ND	ND	769
	3/12/08	ND	330		51	ND	720	7.64	ND	0.04	ND	ND	ND	ND	ND	ND	762
	9/24/08	ND	300		62	ND	770	7.64	ND	0.047	ND	ND	ND	ND	ND	ND	897
	9/29/09	ND	190		44	ND	550	7.25	ND	0.035	ND	ND	ND	ND	ND	ND	798
	3/23/10	ND	180		39	ND	340	6.97	ND	0.03	ND	ND	ND	ND	ND	ND	771
	9/9/10	ND	130		29	ND	380	7.47	ND	0.03	ND	ND	ND	ND	ND	ND	520
	3/23/11	ND	81		14	ND	300	7.38	ND	0.031	ND	ND	ND	ND	ND	ND	462
	9/27/11	ND	86		15	ND	350	6.86	ND	0.036	ND	ND	ND	ND	ND	ND	526
	3/27/12	0.092	72		16	ND	300	6.15	0.0037	0.027	ND	ND	ND	ND	0.0046	ND	459
	9/19/12	0.057	63		10	ND	340	6.84	ND	0.027	ND	ND	ND	ND	ND	ND	400
	3/12/13	ND	71		12	ND	270	7.69	ND	0.027	ND	ND	ND	ND	0.0041	ND	306
	9/17/13	ND	60		10	0.22	300	6.88	-0.011	0.025	ND	ND	ND	ND	0.0069	ND	438
	3/18/14	ND	65		8.8	0.23	270	6.88	0.0042	0.024	ND	ND	ND	ND	0.0044	ND	236
	9/23/14	ND	61		9.6	0.2	310	7.34	0.0043	0.025	ND	ND	ND	ND	0.0053	ND	419
	3/17/15	ND			11	ND	350	7.45	0.0052	0.031	ND	ND	ND	ND	0.005	ND	286
	9/29/15	ND	130		15	ND	500	7.32	0.0061	0.042	ND	ND	ND	ND	0.0059	ND	471
	4/6/16	ND	160		17	ND	510	7.53	0.0035	0.052	ND	ND	ND	ND	0.0065	ND	523
	10/20/16	ND	110		14	ND	400	7.25	0.0066	0.04	ND	ND	ND	ND	ND	ND	335
	4/4/17	ND	180		23	ND	590	9.89	0.002	0.049	ND	ND	ND	ND	ND	ND	572
	10/6/17	ND	100		15	ND	450	8.59	0.01	0.03	ND	ND	ND	ND	ND	ND	107

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-07S	6/3/82	0.015	34	27	3.5	0.15	120	7.1	0.017	ND	ND	ND	ND	ND		ND	271
	9/16/82	0.23	120	46	14	0.14	390	7.5	0.008	ND	ND	ND	ND	ND		ND	490
	12/28/82	0.25	93	56	15	0.2	280	6.7	ND	ND	ND	ND	ND	ND		ND	450
	4/5/83	0.12	80	61	20	0.16	310	6.8	ND	ND	ND	ND	ND	ND		ND	460
	10/17/83	0.048	81	80	20	0.22	320	6.6	0.001	0.17	ND	0.005	0.12	ND		ND	270
	2/7/84	0.091	79	18	15	0.23	230	6.8	ND	ND	ND	ND	ND	ND		ND	470
	4/23/84	ND	82.3	68.4			300	6.5		ND	ND	ND	0.2	0.0014		ND	420
	7/31/84	ND	51.6	47.2			263	7.9		ND	ND	ND	0.02	ND		ND	330
	10/18/84	0.1	84	49			233	6.78		ND	ND	ND	ND	ND		ND	340
	1/28/85	0.2	160	36.3			331	6.6		ND	ND	ND	ND	ND		ND	520
	4/25/85	0.12	89	62.8			393	7.4		ND	ND	ND	ND	ND		0.004	535
	7/25/85	ND	120	50.7			269	6.9		ND	ND	ND	ND	ND		ND	420
	10/29/85	0.3	110	54			274	6.6		ND	ND	ND	ND	ND		ND	420
	1/15/86	0.2	95	47.2			250	6.6		ND	ND	ND	ND	ND		ND	405
	4/25/86	ND	93	49.1			231	6.6		ND	ND	ND	ND	ND		0.002	350
	7/29/86	ND	132	54.4			262	6.4		ND	ND	ND	ND	ND		0.003	430
	10/28/86	ND	190	76.2			391	6.7		ND	ND	ND	ND	ND		0.004	575
	1/27/87		160					6.5									520
	4/17/87		79					6.7									390
	7/16/87		95					6.4									390
	10/15/87		110					6.6									470
	1/19/88		84					6.8									430
	4/27/88		175					6.7									402
	7/26/88		71					6.7									340
	10/13/88		80					6.9		0.04	0.0025	ND	ND	ND		0.005	428
	1/17/89		84					7.4		0.045	0.0025	ND	ND	ND		0.005	390
	4/20/89		86					6.7		0.035	0.0025	ND	ND	ND		0.005	350
	7/26/89		90					6.75		0.054	0.0025	ND	ND	ND		0.001	360
	10/19/89		150					6.85		0.07	0.0025	ND	ND	ND		0.001	470
	1/24/90	0.099	167		6			6.38		0.053	0.001	ND	0.009	ND		0.005	510
	4/27/90	0.083	123					6.79		0.025	0.001	ND	0.0045	ND		0.005	490
	7/19/90	0.033	124					6.69		0.05	0.001	ND	0.0045	ND		0.005	500
	10/19/90	0.043	90					6.54		0.089	0.014	ND	0.0045	ND		0.005	420
	1/23/91	0.043	55		0.5			7.6	ND	0.025	0.001	ND	ND	ND		0.005	309
	4/19/91																
	7/31/91	0.119	76		2			6.6	ND	0.025	0.001	ND	ND	ND		0.005	343
	10/29/91																
	2/13/92	0.13	129		13.5			6.4	ND	0.05	0.002	0.01	0.01	ND		0.01	360
	6/30/92	0.215	162		20			6.24	ND	0.065	ND	ND	ND	ND		ND	423
	1/27/93	ND	140		9.7	0.21		6.26	ND	0.049	ND	ND	ND	ND		ND	371
	8/21/93	ND	79		9.3			6.84	ND	0.05	ND	ND	ND	ND		ND	420
	1/5/94	0.04J	56		6	0.14		6.67	ND	0.04	ND	ND	ND	ND		ND	270
	7/21/94																
	1/24/95																
	7/24/95																
	1/22/96																
	7/18/96																
	1/23/97																
	10/7/97																
	3/25/98																
	11/23/98	0.11	54		9.6	0.24		6.61	ND	0.048	0.00087	ND	ND	ND		ND	337
	3/24/99	ND	50		11	0.21		6.4	ND	0.043	0.00053	ND	ND	ND		ND	344
	9/27/99	ND	65		12	0.27		6.4	ND	0.053	ND	ND	ND	ND		ND	376
	3/29/00	0.087	81		13	0.27		6.8	ND	0.091	ND	ND	ND	ND		ND	426
	10/4/00	0.088	80		9.8	0.35		6.5	ND	0.057	ND	ND	ND	ND		ND	350
	4/11/01	ND	75		14	0.23		6.9	ND	0.044	ND	ND	ND	ND		ND	435
	10/1/01	ND	92		16	0.26		6.2	ND	0.067	ND	ND	ND	ND		ND	454
	3/19/02	ND	88		13	0.25		6.88	ND	0.043	ND	ND	ND	ND		ND	406
	9/17/02	ND	92		6.1	0.27		7.16	ND	ND	ND	ND	ND	ND		ND	385
	3/17/03	ND	89		7.2	0.23		6.2	ND	0.046	ND	ND	ND	ND		ND	404
	9/15/03	0.05	71		11	0.29		6.6	ND	0.038	ND	ND	ND	ND		ND	368.7
	3/8/04	ND	87		9.7	0.22		7.27	ND	0.043	ND	ND	ND	ND		ND	421
	9/21/05	ND	84		14	0.2	290	2.3	ND	0.068	ND	ND	ND	ND	ND	ND	389
	3/22/06	0.039	66		12	0.21	320	7.11	ND	0.051	ND	ND	ND	ND	ND	ND	470
	9/27/06	ND	78.4		11.8	0.25	283	6.74	ND	0.054	ND	ND	ND	ND	ND	ND	110
	3/28/07	ND	49		9.3	0.14	220	6.8	ND	0.034	ND	ND	ND	ND	ND	ND	324
	9/12/07	ND	52		7.7	ND	220	6.63	ND	0.044	ND	ND	ND	ND	ND	ND	735
	3/12/08	ND	65		8.8	ND	230	6.99	ND	0.041	ND	ND	ND	ND	ND	ND	403
	9/24/08	ND	30		11	ND	200	7.19	ND	0.045	ND	ND	ND	ND	ND	ND	237
	9/29/09	ND	34		15	ND	220	6.35	ND	0.048	ND	ND	ND	ND	ND	ND	475
	3/23/10	ND	64		10	ND	240	6.96	ND	0.059	ND	ND	ND	ND	ND	ND	383
	9/9/10	ND	48		14	ND	290	7.63	ND	0.067	ND	ND	ND	ND	ND	ND	428
	3/23/11	ND	77		17	ND	260	6.46	ND	0.05	ND	ND	ND	ND	ND	ND	393
	9/27/11	0.067	52		10	ND	230	7.09	ND	0.052	ND	ND	ND	ND	ND	ND	357
	3/27/12	0.18	48		28	ND	240	7	ND	0.049	ND	ND	ND	ND	0.014	0.0025	388
	9/19/12	0.081	96		12	ND	400	5.83	ND	0.075	ND	ND	ND	ND	ND	ND	487
	3/12/13	ND	40		4.5	ND	190	7	ND	0.039	ND	ND	ND	ND	0.0019	0.0013	161
	9/17/13	ND	38		11	0.33	180	6.61	0.0018	0.046	ND	ND	ND	ND	0.004	ND	357
	3/18/14	ND	44		7.7	0.25	230	6.09	0.001	0.037	ND	ND	ND	ND	ND	ND	203
	9/23/14	ND	28		12	0.3	280	6.8	ND	0.057	ND	ND	ND	ND	ND	ND	389
	3/17/15	ND			8.7	ND	270	6.34	ND	0.042	ND	ND	ND	ND	ND	ND	397
	9/29/15	ND	51		14	0.3	350	6.67	ND	0.063	ND	ND	ND	ND	ND	ND	357
	4/6/16	ND	70		8.1	0.23	350	7.44	ND	0.058	ND	ND	ND	ND	ND	ND	376
	10/20/16	ND	87		10	0.24	370	7.33	0.0011	0.075	ND	ND	ND	ND	ND	0.0027	353
	4/4/17	ND	63		18	0.24	340	8.32	ND	0.057	ND	ND	ND	ND	ND	ND	621
	10/6/17	ND	160		14	0.3	350	7.43	0.0017	0.064	ND	ND	ND	ND	ND	ND	635

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-08D	6/3/82	0.015	48	46	10	0.12	210	7.5	ND	ND	ND	ND	0.017	ND		ND	363
	9/16/82	0.23	74	42	6.6	0.11	300	7.6	ND	ND	ND	ND	ND	ND		ND	380
	12/28/82	0.18	53	38	7.8	0.15	230	7.7	ND	ND	ND	ND	ND	ND		ND	380
	4/5/83	0.33	33	49	8.7	0.1	240	7.7	ND	ND	ND	ND	ND	ND		ND	380
	10/17/83	0.17	50	35	14	0.14	220	7.6	0.002	0.12	ND	ND	ND	ND		0.001	370
	2/7/84	0.35	60	41	6.5	0.24	230	7.7	ND	ND	ND	ND	ND	ND		ND	390
	4/23/84	ND	43.3	58			241	6.6		ND	ND	ND	0.3	0.0012		ND	380
	7/31/84	ND	40	55			233	7.7		0.2	ND	ND	ND	ND		ND	360
	10/18/84	0.26	54	57.7			246	7.7		ND	ND	ND	ND	ND		ND	350
	1/28/85	0.29	58	39.8			156	7.65		ND	ND	ND	ND	ND		ND	425
	4/25/85	0.22	55	59.4			254	7.6		ND	ND	ND	ND	ND		ND	375
	7/25/85	0.2	55	51.6			214	7.9		ND	ND	ND	ND	ND		ND	380
	10/29/85	0.4	64	53.5			234	7.8		ND	ND	ND	ND	ND		ND	400
	1/15/86	0.3	62	50.5			230	7.6		ND	ND	ND	ND	ND		ND	405
	4/25/86	ND	57	55.1			236	7.4		ND	ND	ND	ND	ND		ND	390
	7/29/86	0.13	56	52.8			221	7.4		ND	ND	ND	ND	ND		ND	395
	10/28/86	0.13	45	49.7			234	7.8		ND	ND	ND	ND	ND		ND	380
	1/27/87		49					7.7									415
	4/17/87		43					7.7									400
	7/16/87		30					7.4									365
	10/15/87		60					7.3									430
	1/19/88		42					7.8									410
	4/27/88		190					7.8									457
	7/26/88		62					7.2									380
	10/13/88		65					7.7		0.03	0.0025	ND	ND	ND		0.005	423
	1/17/89		67					8.4		0.028	0.0025	ND	ND	ND		0.005	320
	4/20/89		52					7.4		0.024	0.0025	ND	ND	ND		0.005	415
	7/26/89		58					7.5		0.03	0.0025	ND	ND	ND		0.001	370
	10/19/89		54					7.36		0.02	0.0025	ND	ND	ND		0.001	420
	1/24/90	0.325	69		10			7.44		0.025	0.001	ND	0.0045	ND		0.01	390
	4/27/90	0.093	36					8.02		0.025	0.001	ND	0.0045	ND		0.005	390
	7/19/90	0.245	63					7.71		0.025	0.001	ND	0.0045	ND		0.005	451
	10/19/90	0.109	49					7.28		0.069	0.001	ND	0.0045	ND		0.005	415
	1/23/91	0.062	51		5			7.6	ND	0.057	0.001	ND	ND	ND		0.005	377
	4/19/91																
	7/31/91	0.199	67		8			7.47	ND	0.025	0.001	ND	ND	ND		0.005	453
	10/29/91																
	2/13/92	0.43	38		8.3			7.37	ND	0.05	0.002	ND	0.01	ND		0.01	344
	6/30/92	0.47	68.2		15			7.74	ND	0.061	ND	ND	ND	ND		ND	430
	1/27/93	ND	51		10	0.14		6.78	ND	0.025	ND	ND	ND	ND		ND	307
	8/21/93	0.01	60		15			7.41	ND	0.02	ND	ND	ND	ND		ND	470
	1/5/94	0.1	57		11	0.1		7.11	ND	0.04	ND	ND	ND	ND		ND	290
	7/21/94																
	1/24/95																
	7/24/95																
	1/22/96																
	7/18/96																
	1/23/97																
	10/7/97																
	3/25/98																
	11/23/98	0.15	61		16	0.13		7.43	ND	0.026	ND	ND	ND	ND		ND	457
	3/24/99	0.11	66		15	0.1		7.3	ND	0.026	ND	ND	ND	ND		ND	449
	9/27/99	0.11	54		15	0.12		7.3	ND	0.023	ND	ND	ND	ND		ND	446
	3/29/00	0.19	61		10	0.13		7.5	ND	0.069	ND	ND	ND	ND		ND	441
	10/4/00	0.14	55		10	0.14		7.6	ND	ND	ND	ND	ND	ND		ND	398
	4/11/01	0.083	63		11	0.12		7.5	ND	0.03	ND	ND	ND	ND		ND	455
	10/1/01	0.13	54		11	0.12		7.8	ND	0.032	ND	ND	ND	ND		ND	415
	3/19/02	0.134	58		12	0.13		7.76	ND	0.03	ND	ND	ND	ND		ND	421
	9/17/02	0.144	55		11	0.14		7.77	ND	ND	ND	ND	ND	ND		ND	438
	3/17/03	0.113	68		11	0.11		7	ND	0.029	ND	ND	ND	ND		ND	450
	9/15/03	0.135	63		8.4	0.13		7.57	ND	0.024	ND	ND	ND	ND		ND	410.9
	3/8/04	0.094	62		8.2	0.12		7.42	ND	0.026	ND	ND	ND	ND		ND	413
	9/21/05	0.15	31		8	0.14	260	7.79	ND	0.038	ND	ND	ND	ND	ND	ND	305
	3/22/06	0.16	42		8	0.15	190	7.87	ND	0.043	ND	ND	ND	ND	ND	ND	430
	9/27/06	0.22	35		8.9	0.16	239	7.5	ND	0.038	ND	ND	ND	ND	ND	ND	430
	3/27/07	0.14	50		8	ND	250	7.1	ND	0.035	ND	ND	ND	ND	ND	ND	373
	9/11/07	0.15	46		7.7	ND	250	7.99	ND	0.037	ND	ND	ND	ND	ND	ND	280
	3/11/08	0.16	49		8.4	ND	250	7.72	ND	0.036	ND	ND	ND	ND	ND	ND	370
	9/23/08	0.11	43		7.2	ND	260	7.71	ND	0.034	ND	ND	ND	ND	ND	ND	383
	9/29/09	0.23	35		7.5	ND	250	7.47	ND	0.039	ND	ND	ND	ND	ND	ND	405
	3/23/10	0.18	42		7.4	ND	240	6.98	ND	0.039	ND	ND	ND	ND	ND	ND	471
	10/7/10	0.21	38		7.3	ND	260	7.79	ND	0.36	ND	ND	ND	ND	ND	ND	364
	3/23/11	0.15	41		7	ND	240	7.44	ND	0.038	ND	ND	ND	ND	ND	ND	374
	9/27/11	0.29	31		8.1	ND	260	6.9	ND	0.04	ND	ND	ND	ND	ND	ND	400
	3/27/12	0.44	31		8.7	ND	240	6.3	ND	0.044	ND	ND	ND	ND	0.0019	ND	397
	9/18/12	0.3	39		7.6	ND	250	6.76	ND	0.039	ND	ND	ND	ND	ND	ND	403
	3/12/13	0.21	38		7	ND	230	7.85	ND	0.037	ND	ND	ND	ND	0.0023	ND	211
	9/17/13	0.34	26		9.8	ND	250	7.05	ND	0.04	ND	ND	ND	ND	ND	ND	277
	3/18/14	0.15	41.5		8.2	ND	240	7.97	ND	0.035	ND	ND	ND	ND	ND	ND	276
	9/24/14	0.13	44		8.1	ND	240	7.5	ND	0.037	ND	ND	ND	ND	0.0045	ND	373
	3/17/15	0.21			7.8	ND	270	7.21	ND	0.043	ND	ND	ND	ND	ND	ND	424
	9/29/15	0.26	36		8.1	ND	320	7.55	ND	0.038	ND	ND	ND	ND	ND	ND	325
	4/5/16	0.17	45		7.8	ND	220	8.05	ND	0.037	ND	ND	ND	ND	ND	ND	390
	10/20/16	0.28	38		8	ND	260	7.39	ND	0.038	ND	ND	ND	ND	ND	ND	398
	4/4/17	0.23	44		9.9	ND	320	8.22	ND	0.038	ND	ND	ND	ND	ND	ND	674
	10/6/17	0.35	32		8.9	ND	270	7.34	ND	0.043	ND	ND	ND	ND	ND	ND	468

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-08S	6/3/82	ND	26	34	14	ND	180	7.1	ND	ND	ND	ND	0.032	ND		ND	298
	9/16/82	0.077	24	24	23	ND	250	8	ND	ND	ND	ND	0.025	ND		ND	280
	12/28/82	0.04	26	25	18	ND	170	8	ND	ND	ND	ND	ND	ND		ND	270
	4/5/83	0.1	27	29	19	ND	180	8	ND	ND	0.056	ND	ND	ND		ND	270
	10/17/83	0.048	26	28	22	ND	200	8	ND	0.06	ND	ND	ND	ND		ND	130
	2/7/84	0.07	54	31	22	ND	250	7.9	ND	ND	ND	ND	ND	ND		ND	300
	4/23/84	ND	17	22.1			118	6.3		ND	ND	ND	ND	0.002		ND	150
	7/31/84	ND	30.6	37.9			255	8.1		ND	ND	ND	ND	ND		ND	300
	10/18/84	0.12	24	34.6			160	8.24		ND	ND	ND	ND	ND		ND	230
	1/28/85	0.16	24	25.6			241	8.3		ND	ND	ND	ND	ND		ND	270
	4/25/85	ND	29	31.9			178	8.2		ND	ND	ND	ND	ND		ND	230
	7/25/85	ND	32	30.7			152	8.6		ND	ND	ND	ND	0.0004		ND	255
	10/29/85	0.2	32	29.8			148	8.3		ND	ND	ND	ND	ND		ND	240
	1/15/86	0.2	35	29.3			170	8.2		ND	ND	ND	ND	ND		ND	260
	4/25/86	ND	31	31			158	8		ND	ND	ND	ND	ND		ND	250
	7/29/86	ND	30	30.3			152	7.8		ND	ND	ND	ND	ND		ND	265
	10/28/86	ND	28	28.9			152	8		ND	ND	ND	ND	ND		ND	260
	1/27/87		27					8.2									290
	4/17/87		32					8.2									260
	7/16/87		34					7.6									250
	10/15/87		40					7.4									290
	1/19/88		26					8.2									285
	4/27/88		125					8.4									306
	7/26/88		32					8.1									290
	10/13/88		35					8.5		0.006	0.0025	ND	ND	ND		0.005	327
	1/17/89		43					9		0.006	0.0025	ND	ND	ND		0.005	250
	4/20/89		47					7.9		0.0025	0.0025	ND	ND	ND		0.005	300
	7/26/89		35					7.35		0.008	0.0025	ND	ND	ND		0.001	290
	10/19/89		45					7.19		0.0025	0.0025	ND	ND	ND		0.001	320
	1/24/90	0.181	60		11			8.01		0.025	0.001	ND	0.0045	ND		0.005	300
	4/27/90	0.119	30					8.4		0.025	0.001	ND	0.0045	ND		0.005	320
	7/19/90	0.07	46					8.04		0.025	0.001	ND	0.0045	ND		0.005	325
	10/19/90	0.07	37					8.05		0.025	0.002	0.011	0.0045	ND		0.005	315
	1/23/91	0.01	42		15			8.19	ND	0.025	0.003	ND	ND	ND		0.005	298
	4/19/91																
	7/31/91	0.089	35		8			7.32	ND	0.025	0.001	ND	ND	ND		0.005	302
	10/29/91																
	2/13/92	0.13	35.8		10.6			7.41	ND	0.05	0.002	ND	0.01	ND		0.01	244
	6/30/92	0.089	42.3		20			7.5	ND	ND	ND	ND	ND	ND		ND	277
	1/27/93	ND	34		7.3	0.12		7.2	ND	ND	ND	ND	ND	ND		ND	191
	8/21/93	ND	36		9.9			7.7	ND	0.04	ND	ND	0.019	ND		ND	300
	1/5/94	ND	31		5.8	ND		7.1	ND	ND	ND	ND	ND	ND		ND	120
	7/21/94																
	1/24/95																
	7/24/95																
	1/22/96																
	7/18/96																
	1/23/97																
	10/7/97																
	3/25/98																
	11/23/98	0.1	23		3.9	ND		7.94	ND	ND	ND	ND	ND	ND		ND	237
	3/24/99	ND	34		5.7	ND		7.7	ND	ND	ND	ND	ND	ND		ND	240
	9/27/99	0.064	34		11	ND		7.8	ND	ND	ND	ND	ND	ND		ND	272
	3/29/00	0.079	27		6	ND		8.1	ND	0.038	0.00024	ND	ND	ND		ND	269
	10/4/00	0.078	48		6.3	ND		8	ND	ND	ND	ND	ND	ND		ND	280
	4/11/01	ND	40		4.2	ND		7.9	ND	ND	ND	ND	ND	ND		ND	270
	10/1/01	0.052	47		4	ND		8.3	ND	ND	ND	ND	ND	ND		ND	270
	3/19/02	ND	30		2.6	ND		8.11	ND	ND	ND	ND	ND	ND		ND	233
	9/17/02	ND	28		2.2	ND		8.13	ND	ND	ND	ND	ND	ND		ND	246
	3/17/03	ND	25		2.3	ND		7.6	ND	ND	ND	ND	ND	ND		ND	251
	9/15/03	ND	35		1.9	ND		7.66	ND	ND	ND	ND	ND	ND		ND	241.7
	3/8/04	ND	29		2	ND		7.66	ND	ND	ND	ND	ND	ND		ND	252
	9/21/05	0.024	16		3	ND	170	7.73	ND	0.0039	ND	ND	ND	ND	ND	ND	231
	3/22/06	0.032	22		5	ND	190	9.2	ND	0.0048	ND	ND	ND	ND	ND	ND	249
	9/27/06	ND	34.2		5	ND	202	8.11	ND	0.0039	ND	ND	ND	ND	ND	ND	360
	3/27/07	ND	33		5.5	ND	160	7.22	ND	ND	ND	ND	ND	ND	ND	ND	248
	9/11/07	ND	31		7.5	ND	190	7.98	ND	ND	ND	ND	ND	ND	ND	ND	603
	3/11/08	ND	26		10	ND	190	8.36	ND	ND	ND	ND	ND	ND	ND	ND	189
	9/23/08	ND	190		15	ND	210	7.98	ND	ND	ND	ND	ND	ND	ND	ND	189
	9/29/09	ND	39		10	ND	200	7.24	ND	ND	ND	ND	ND	ND	ND	ND	524
	3/23/10	ND	45		9.4	ND	200	7.81	ND	ND	ND	ND	ND	ND	ND	ND	318
	10/7/10	ND	43		6.6	ND	190	8.29	ND	ND	ND	ND	ND	ND	ND	ND	282
	3/23/11	ND	35		5.9	ND	150	7.63	ND	ND	ND	ND	ND	ND	ND	ND	251
	9/27/11	ND	29		3.6	ND	160	8.14	ND	ND	ND	ND	ND	ND	ND	ND	230
	3/27/12	0.092	32		3.5	ND	150	7.5	ND	0.004	ND	ND	ND	ND	ND	ND	224
	9/18/12	0.094	35		5.2	ND	190	7.57	ND	0.0031	ND	ND	ND	ND	ND	ND	221
	3/12/13	ND	27		4	ND	140	7.88	ND	0.0053	ND	ND	ND	ND	ND	ND	139
	9/17/13	ND	17		5.3	ND	160	7.55	ND	0.0037	ND	ND	ND	ND	ND	ND	192
	3/18/14	ND	26		6.9	ND	150	7.01	ND	0.0045	ND	ND	ND	ND	ND	ND	165
	9/24/14	ND	19		6.8	ND	160	7.88	ND	0.0049	ND	ND	ND	ND	ND	ND	187
	3/17/15	ND			3.7	ND	130	8.03	ND	0.0056	ND	ND	ND	ND	ND	ND	152
	9/29/15	ND	22		3.7	ND	190	8.08	ND	0.0031	ND	ND	ND	ND	ND	ND	193
	4/5/16	ND	22		4.8	ND	130	7.34	ND	0.0033	ND	ND	ND	ND	ND	ND	175
	10/20/16	ND	23		8	ND	220	8	ND	0.0034	ND	ND	ND	ND	ND	ND	247
	4/4/17	ND	20		9.6	ND	230	10.35	ND	0.004	ND	ND	ND	ND	ND	ND	195
	10/6/17	ND	22		8.9	ND	220	7.68	ND	0.0053	ND	ND	ND	ND	ND	ND	840

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-09D	10/17/83	0.44	96	63	17	0.13	440	7.4	ND	0.25	ND	ND	0.05	0.001		0.001	640
	2/7/84	0.57	98	29	16	0.14	480	7.4	ND	ND	ND	ND	ND	ND		ND	720
	4/23/84	ND	42.3	61.1			379	6.5		ND	ND	ND	0.18	0.0017		ND	600
	7/31/84	2	13.9	37.3			356	7.8		0.2	ND	ND	ND	ND		ND	590
	10/18/84	0.48	177	103			492	7.41		ND	ND	ND	ND	ND		ND	670
	1/28/85	0.67	170	63.2			490	7.4		ND	ND	ND	ND	ND		ND	800
	4/25/85	0.47	220	101			530	7.4		ND	ND	ND	ND	ND		ND	750
	7/25/85	0.32	170	82.8			505	7		ND	ND	ND	ND	ND		ND	750
	10/29/85	0.7	180	91.5			506	7.4		ND	ND	ND	ND	ND		ND	790
	1/15/86	0.6	200	107			560	7.4		ND	ND	ND	ND	ND		ND	820
	4/25/86	0.37	220	115			587	7.2		ND	ND	ND	ND	ND		ND	830
	7/29/86	0.45	181	107			557	7		ND	ND	ND	ND	ND		ND	825
	10/28/86	ND	210	111			589	7.4		ND	ND	ND	ND	ND		ND	835
	1/27/87		260					7.2									915
	4/17/87		260					7.2									990
	7/16/87		155					7.2									900
	10/15/87		250					6.6									1000
	1/19/88		310					7.2									1100
	4/27/88		480					7.5									1210
	7/26/88		260					7									940
	10/13/88		319					7.4		0.24	0.0025	ND	ND	ND		0.005	1090
	1/17/89		340					8.2		0.265	0.0025	ND	ND	ND		0.005	880
	4/20/89		340					7		0.241	0.0025	ND	ND	ND		0.005	1030
	7/26/89		250					7.25		0.284	0.0025	ND	ND	ND		0.001	880
	10/19/89		300					7.25		0.25	0.0025	ND	ND	ND		0.001	1050
	1/24/90	0.464	198		29			7.15		0.138	0.001	ND	0.0045	ND		0.005	920
	4/27/90	0.182	222					7.45		0.35	0.001	ND	0.0045	ND		0.005	960
	7/19/90	0.248	198					7.32		0.201	0.001	0.012	0.0045	ND		0.005	946
	10/19/90	0.188	205					7.42		0.264	0.001	ND	0.0045	ND		0.005	876
	1/23/91	0.434	179		7.5			7.5	ND	0.211	0.002	ND	ND	ND		0.005	680
	4/19/91																
	7/31/91	0.5	136		25.3			7.31	ND	0.119	0.001	ND	ND	ND		0.005	726
	10/29/91																
	2/13/92	0.54	174		8.68			7.03	ND	0.144	0.002	ND	0.01	ND		0.01	574
	6/30/92	0.351	163		11			7.46	ND	0.211	ND	ND	ND	ND		ND	642
	1/27/93	ND	140		9.2	0.14		6.93	ND	0.17	ND	ND	ND	ND		ND	578
	8/21/93	0.26	120		14			7.28	ND	0.02	ND	ND	ND	ND		ND	710
	1/5/94	0.16	100		12	0.1		6.8	ND	0.13	ND	ND	ND	ND		ND	560
	7/21/94																
	1/24/95																
	7/24/95																
	1/22/96																
	7/18/96																
	1/23/97																
	10/7/97																
	3/25/98																
	11/23/98	0.17	90		8.4	0.16		7.34	ND	0.11	ND	ND	ND	ND		ND	554
	3/24/99	0.13	94		8.5	0.13		7.3	ND	0.097	ND	ND	ND	ND		ND	565
	9/27/99	0.15	96		6.2	0.15		7.2	ND	0.1	ND	ND	ND	ND		ND	610
	3/29/00	0.26	120		4.8	0.17		7.4	ND	0.16	ND	ND	ND	ND		ND	612
	10/4/00	0.26	140		10	0.16		7.4	ND	0.15	ND	ND	ND	ND		ND	715
	4/11/01	0.16	120		15	0.13		7.4	ND	0.17	ND	ND	ND	ND		ND	831
	10/1/01	0.21	170		12	0.14		7.6	ND	0.15	ND	ND	ND	ND		ND	737
	3/19/02	0.216	120		8.6	0.17		7.61	ND	0.129	ND	ND	ND	ND		ND	646
	9/17/02	0.201	96		6.3	0.15		7.62	ND	ND	ND	ND	ND	ND		ND	590
	3/17/03	0.201	110		6.7	0.15		6.9	ND	0.098	ND	ND	ND	ND		ND	609
	9/15/03	0.197	110		5.2	0.16		7.39	ND	0.11	ND	ND	ND	ND		ND	581
	3/8/04	0.156	92		5.3	0.16		7.38	ND	0.085	ND	ND	ND	ND		ND	562
	9/21/05	0.26	47		8.5	0.18	340	6.79	ND	0.087	ND	ND	ND	ND	ND	ND	406
	3/22/06	0.34	69		8.5	0.19	320	7.71	ND	0.084	ND	ND	ND	ND	ND	ND	560
	9/27/06	0.33	72.1		7.5	0.19	337	7.72	ND	0.07	ND	ND	ND	ND	ND	ND	750
	3/28/07	0.25	82		7.8	0.11	350	7.5	ND	0.079	ND	ND	ND	ND	ND	ND	509
	9/11/07	0.35	70		8.6	ND	340	8.1	ND	0.074	ND	ND	ND	ND	ND	ND	378
	3/12/08	0.34	74		7.8	ND	320	7.87	ND	0.067	ND	ND	ND	ND	ND	ND	472
	9/23/08	0.22	70		7	ND	340	7.56	ND	0.076	ND	ND	ND	ND	ND	ND	470
	9/29/09	0.57	52		10	ND	340	7.5	ND	0.06	ND	ND	ND	ND	ND	ND	542
	3/23/10	0.47	57		8.9	ND	330	7.64	ND	0.056	ND	ND	ND	ND	ND	ND	521
	9/9/10	0.87	49		14	ND	340	8.26	ND	0.053	ND	ND	ND	ND	ND	ND	517
	3/23/11	1	52		10	ND	310	7.82	ND	0.051	ND	ND	ND	ND	ND	ND	506
	9/27/11	0.8	62		9.5	ND	360	7.03	ND	0.056	ND	ND	ND	ND	ND	ND	532
	3/27/12	1.1	62		11	ND	320	7.12	ND	0.055	ND	ND	ND	ND	0.0023	ND	489
	9/18/12	0.63	87		11	ND	400	7.69	ND	0.062	ND	ND	ND	ND	ND	ND	505
	3/12/13	0.76	89		10	ND	330	7.95	ND	0.056	ND	ND	ND	ND	0.0022	ND	365
	9/17/13	0.65	89		15	0.21	370	6.25	ND	0.072	ND	ND	ND	ND	ND	ND	403
	3/18/14	0.69	83		16	0.26	340	6.86	ND	0.066	ND	ND	ND	ND	ND	0.0039	2.96
	9/23/14	0.348	86		14	ND	380	7.52	ND	0.0668	ND	ND	ND	ND	ND	ND	513
	3/17/15	0.43	78		11	ND	390	7.86	ND	0.066	ND	ND	ND	ND	ND	ND	347
	9/29/15	0.66	52		12	0.22	390	7.45	ND	0.055	ND	ND	ND	ND	ND	ND	431
	4/7/16	0.95	52		11	0.2	310	7.97	ND	0.063	ND	ND	ND	ND	ND	0.0029	438
	10/20/16	1.8	24		15	0.29	330	7.41	ND	0.046	ND	ND	ND	ND	ND	0.016	328
	4/6/17	1.2	35		59	0.22	350	8.13	ND	0.05	ND	ND	ND	ND	ND	ND	687
	10/6/17	1.3	2.2		18	ND	400	7.89	ND	0.051	ND	ND	ND	ND	ND	ND	138

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-09S	10/17/83	0.15	76	80	11	0.12	420	7.2	0.004	0.11	ND	ND	ND	ND		0.001	720
	2/7/84	0.2	96	34	18	ND	470	7.8	ND	ND	ND	ND	ND	ND		ND	760
	4/23/84	ND	55.8	78			322	6.2		ND	ND	ND	0.12	0.0016		ND	490
	7/31/84	ND	42	58.2			289	7.4		0.2	ND	ND	ND	ND		ND	400
	10/18/84	0.3	129	103			450	7.27		ND	ND	ND	ND	ND		ND	620
	1/28/85	0.36	150	68.8			467	7.25		ND	ND	ND	ND	ND		ND	730
	4/25/85	0.28	120	84.1			375	7.4		ND	ND	ND	ND	ND		ND	560
	7/25/85	0.23	120	73.2			402	7		ND	ND	ND	ND	ND		ND	645
	10/29/85	0.4	120	82.5			426	7.2		ND	ND	ND	ND	ND		ND	680
	1/15/86	0.4	140	88			440	7.2		ND	ND	ND	ND	ND		ND	660
	4/25/86	0.12	140	98.5			468	7.2		ND	ND	ND	ND	ND		ND	685
	7/29/86	0.14	132	87.6			423	6.9		ND	ND	ND	ND	ND		ND	660
	10/28/86	0.15	120	82.8			402	7.2		ND	ND	ND	ND	ND		ND	625
	1/27/87		150					7.2									730
	4/17/87		63					7.2									750
	7/16/87		105					7.1									710
	10/15/87		160					6.8									810
	1/19/88		158					7									835
	4/27/88		410					7.5									871
	7/26/88		170					7.2									740
	10/13/88		190					7.4		0.14	0.0025	ND	ND	ND		0.005	828
	1/17/89		190					8.2		0.163	0.0025	ND	ND	ND		0.005	680
	4/20/89		195					6.9		0.169	0.0025	ND	ND	ND		0.005	750
	7/26/89		190					7.5		0.178	0.0025	ND	ND	ND		0.001	710
	10/19/89		180					7.35		0.18	0.0025	ND	ND	ND		0.001	790
	1/24/90	0.228	139		22			7.04		0.124	0.001	ND	0.043	ND		0.005	710
	4/27/90	0.129	178					7.36		0.025	0.001	ND	0.0045	ND		0.005	820
	7/19/90	0.136	136					7.21		0.123	0.001	ND	0.0045	ND		0.005	820
	10/19/90	0.278	98					6.63		0.018	0.001	ND	0.0045	ND		0.005	646
	1/23/91	0.062	103		10			7.27	ND	0.16	0.001	ND	ND	ND		0.005	595
	4/19/91																
	7/31/91	0.189	122		15			7.26	ND	0.132	0.001	ND	ND	ND		0.005	702
	10/29/91																
	2/13/92	0.18	163		14.9			6.77	ND	0.098	0.002	ND	0.01	ND		0.01	589
	6/30/92	0.139	155		30			7.13	ND	0.133	ND	ND	ND	ND		ND	637
	1/27/93	ND	93		11	0.14		6.75	ND	0.12	ND	ND	ND	ND		ND	472
	8/21/93	0.07	89		18			7.23	ND	ND	ND	ND	ND	ND		ND	640
	1/5/94	0.06J	79		26	0.11		6.9	ND	0.11	ND	ND	ND	ND		ND	570
	7/21/94																
	1/24/95																
	7/24/95																
	1/22/96																
	7/18/96																
	1/23/97																
	10/7/97																
	3/25/98																
	11/23/98	0.18	82		19	0.14		7.24	ND	0.12	ND	ND	ND	ND		ND	565
	3/24/99	0.062	89		11	0.12		7.3	ND	0.11	ND	ND	ND	ND		ND	548
	9/27/99	0.06	87		76	0.11		7	ND	0.17	ND	ND	ND	ND		ND	825
	3/29/00	0.12	96		6.4	0.15		7.3	ND	0.15	ND	ND	0.0053	ND		ND	578
	10/4/00	0.13	99		12	0.16		7.3	ND	0.14	ND	ND	ND	ND		ND	610
	4/11/01	ND	38		8.1	0.12		7.4	ND	0.14	ND	ND	ND	ND		ND	639
	10/1/01	0.082	160		8.5	0.12		7.5	ND	0.13	ND	ND	ND	ND		ND	608
	3/19/02	0.075	95		7.4	0.14		7.47	ND	0.119	ND	ND	ND	ND		ND	578
	9/17/02	0.072	86		6	0.13		7.58	ND	0.102	ND	ND	ND	ND		ND	568
	3/17/03	0.054	92		4.6	0.12		6.8	ND	0.102	ND	ND	ND	ND		ND	563
	9/15/03	0.075	110		13	0.15		7.3	ND	0.118	ND	ND	ND	ND		ND	588
	3/8/04	0.051	93		5.7	0.12		7.39	ND	0.091	ND	ND	ND	ND		ND	556
	9/21/05	0.039	72		11	0.12	390	7.16	ND	0.13	ND	ND	ND	ND	ND	ND	508
	3/22/06	0.05	76		8.5	0.11	370	8.9	ND	0.1	ND	ND	ND	ND	ND	ND	480
	9/27/06	ND	104		10.4	0.13	385	7.3	ND	0.11	ND	ND	ND	ND	ND	ND	630
	3/28/07	ND	86		7.1	ND	370	7.3	ND	0.094	ND	ND	ND	ND	ND	ND	501
	9/11/07	ND	93		9.2	ND	380	7.04	ND	0.11	ND	ND	ND	ND	ND	ND	919
	3/12/08	ND	88		6.7	ND	330	7.76	ND	0.086	ND	ND	ND	ND	ND	ND	355
	9/23/08	ND	90		8.8	ND	420	7.64	ND	0.11	ND	ND	ND	ND	ND	ND	422
	9/29/09	ND	88		7.3	ND	370	6.24	ND	0.093	ND	ND	ND	ND	ND	ND	742
	3/23/10	ND	89		8.3	ND	280	6.85	ND	0.09	ND	ND	ND	ND	ND	ND	564
	9/9/10	ND	93		9.9	ND	360	7.68	ND	0.095	ND	ND	ND	ND	ND	ND	502
	3/23/11	ND	81		8.2	ND	320	6.76	ND	0.086	ND	ND	ND	ND	ND	ND	469
	9/27/11	ND	78		7.3	ND	350	7.04	ND	0.095	ND	ND	ND	ND	ND	ND	520
	3/27/12	0.077	79		8.5	ND	340	6.23	ND	0.088	ND	ND	ND	ND	0.0018	ND	518
	9/18/12	0.083	88		9.5	ND	380	6.45	ND	0.095	ND	ND	ND	ND	ND	ND	543
	3/12/13	0.051	99		8.1	ND	350	7.52	ND	0.086	ND	ND	ND	ND	0.0022	ND	230
	9/17/13	0.12	79		10	ND	300	6	ND	0.086	ND	ND	ND	ND	ND	ND	530
	3/18/14	0.11	89		10	ND	310	6.31	ND	0.074	ND	ND	ND	ND	ND	ND	3.35
	9/23/14	0.079	86		12	ND	380	7.25	ND	0.082	ND	ND	ND	ND	ND	ND	496
	3/17/15	0.076	86		9.6	ND	360	6.36	ND	0.077	ND	ND	ND	ND	ND	ND	552
	9/29/15	0.054	83		12	ND	420	7.29	ND	0.087	ND	ND	ND	ND	ND	ND	457
	4/7/16	0.073	71		12	ND	300	7.43	ND	0.087	ND	ND	ND	ND	ND	ND	273
	10/20/16	ND	75		17	ND	390	7.5	ND	0.087	ND	ND	ND	ND	ND	ND	339
	4/7/17	ND	73		16	ND	360	8.86	ND	ND	ND	ND	ND	ND	ND	ND	314
	10/6/17	0.055	ND		19	ND	ND	7.26	ND	0.087	ND	ND	ND	ND	ND	ND	705

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-10D	10/17/83	0.068	26	32	3	0.21	290	8.8	0.002	0.12	ND	ND	ND	ND		ND	270
	2/7/84	0.096	20	11	1.9	0.14	140	8	ND	ND	ND	ND	ND	ND		ND	280
	4/23/84	ND	26.8	45.4			185	7.6		ND	ND	ND	ND	0.0017		ND	270
	7/31/84	ND	ND	42.8			133	8.3		ND	ND	ND	ND	ND		ND	230
	10/18/84	0.11	5	34.9			129	7.99		ND	ND	ND	ND	ND		ND	205
	1/28/85	0.15	ND	26			127	7.85		ND	ND	ND	ND	ND		ND	230
	4/25/85	0.13	ND	33.8			154	8		ND	ND	ND	ND	ND		ND	200
	7/25/85	ND	14	33.8			136	8.3		ND	ND	ND	ND	ND		ND	250
	10/29/85	0.2	60	39.7			146	8		ND	ND	ND	ND	ND		ND	260
	1/15/86	0.2	22	36.8			170	8		ND	ND	ND	ND	ND		ND	280
	4/25/86	ND	22	38			164	7.6		ND	ND	ND	ND	ND		ND	265
	7/29/86	ND	20	35.8			154	7.5		ND	ND	ND	ND	ND		ND	270
	10/28/86	ND	16	35.4			171	7.8		ND	ND	ND	ND	ND		ND	285
	1/27/87		33					8									355
	4/17/87		36					7.7									390
	7/16/87		35					7.5									395
	10/15/87		68					6.3									505
	1/19/88		56					7.8									515
	4/27/88		220					7.8									543
	7/26/88		40					7.5									400
	10/13/88		70					7.7		0.03	0.0025	ND	ND	ND		0.005	511
	1/17/89		58					8.1		0.027	0.0025	ND	ND	ND		0.005	380
	4/20/89		70					7.5		0.024	0.0025	ND	ND	ND		0.005	450
	7/26/89		93					7.6		0.031	0.0025	ND	ND	ND		0.001	480
	10/19/89		130					7.6		0.04	0.0025	ND	ND	ND		0.001	650
	1/24/90	0.114	113		8			7.44		0.025	0.001	ND	0.012	ND		0.005	620
	4/27/90	0.127	148					7.67		0.098	0.001	ND	0.0045	ND		0.005	690
	7/19/90	0.156	129					7.52		0.082	0.001	ND	0.0045	ND		0.005	781
	10/19/90	0.169	149					7.47		0.105	0.004	0.011	0.0045	ND		0.005	766
	1/23/91	0.302	157		6.25			7.34	0.01	0.114	0.002	ND	0.01	ND		0.01	646
	4/19/91	0.291	225		13			7.13	ND	0.053	0.002	0.01	ND	ND		ND	726
	7/31/91	1.46	199		4.5			7.03	0.01	0.05	0	ND	0.01	ND		0.01	864
	10/29/91	0.519	185.1		7.34			7.03	ND	0.107	0.002	ND	ND	ND		ND	902
	2/13/92	0.36	207		7.23			7.2	ND	0.05	0.002	ND	0.01	ND		0.01	614
	6/30/92	0.228	118		7			7.42	ND	0.082	ND	ND	ND	ND		ND	563
	1/27/93	ND	25		1.7	0.12		7.52	ND	0.023	ND	ND	ND	ND		ND	290
	8/21/93	0.08	31		2.3			7.34	ND	0.12	ND	ND	ND	ND		ND	360
	1/5/94	0.07	23		2.8	0.15		6.71	ND	0.02	ND	ND	ND	ND		ND	210
	7/21/94	0.1	36		1.1	0.17		6.71	ND	0.02	ND	ND	ND	ND		ND	350
	1/24/95	0.11	42		ND	0.2		7.18	ND	0.03	ND	ND	ND	ND		ND	300
	7/24/95	0.06	47		2.6	0.18		7.27	ND	0.02	ND	ND	ND	ND		ND	480
	1/22/96	ND	72		3.4	0.18		7.64	ND	0.03	0.004	ND	ND	ND		ND	503
	7/18/96	0.14	120		9.9	0.16		7.78	ND	0.034		ND	ND	ND		ND	565
	1/23/97	0.17	81		7.6	0.16		7.52	ND	0.044	ND	ND	0.068	ND		ND	560
	10/7/97	0.12	97		4.4	0.18		7.38	ND	0.021	ND	ND	ND	ND		ND	541
	3/25/98	ND	95		4.1	0.2		7.6	ND	0.032	ND	ND	ND	ND		ND	494
	11/23/98	0.1	54		3.9	0.26		7.41	ND	0.026	ND	ND	ND	ND		ND	442
	3/24/99	0.07	30		3.1	0.27		7.2	ND	0.02	ND	ND	ND	ND		ND	362
	9/27/99	0.074	16		1.8	0.33		7.3	ND	ND	ND	ND	ND	ND		ND	308
	3/29/00	0.11	19		1.8	0.33		7.8	ND	0.037	ND	ND	ND	ND		ND	299
	10/4/00	0.14	23		2.2	0.3		7.5	ND	ND	ND	ND	ND	ND		ND	280
	4/11/01	0.065	51		24	0.22		7.6	ND	0.028	ND	ND	ND	ND		ND	452
	10/1/01	0.084	18		3.4	0.24		7.8	ND	ND	0.0025	ND	ND	ND		ND	272
	3/19/02	0.09	20		1.4	0.25		7.72	ND	ND	ND	ND	ND	ND		ND	264
	9/17/02	0.076	15		1.7	0.21		7.69	ND	ND	ND	ND	ND	ND		ND	290
	3/17/03	0.061	14		2.3	0.19		7.1	ND	ND	ND	ND	ND	ND		ND	297
	9/15/03	0.115	14		3.1	0.22		7.6	ND	ND	ND	ND	ND	ND		ND	271.4
	3/8/04	0.055	15		2	0.19		7.68	ND	ND	ND	ND	ND	ND		ND	276
	9/20/05	0.027	11		ND	0.17	150	7.59	ND	0.015	ND	ND	ND	ND	ND	ND	220
	3/21/06	0.047	13		1	0.16	170	7.98	ND	0.016	ND	ND	ND	ND	ND	ND	310
	9/26/06	0.067	18.8		1.7	0.17	218	7.68	ND	0.015	ND	ND	ND	ND	ND	ND	570
	3/27/07	ND	13		1.3	0.13	160	7.75	ND	0.015	ND	ND	ND	ND	ND	ND	248
	9/11/07	0.06	13		3.4	ND	160	7.59	ND	0.016	ND	0.045	ND	ND	ND	ND	810
	3/12/08	0.055	16		3.6	ND	160	7.91	ND	0.015	ND	ND	ND	ND	ND	ND	346
	9/23/08	ND	16		3.5	ND	170	7.99	ND	0.016	ND	ND	ND	ND	ND	ND	190
	9/30/09	0.058	18		2.4	ND	180	7.67	ND	0.015	ND	ND	ND	ND	ND	ND	281
	3/24/10	ND	28		2.2	ND	200	7.43	ND	0.015	ND	ND	ND	ND	ND	ND	396
	10/7/10	ND	48		2.2	ND	240	8.6	ND	0.019	ND	ND	ND	ND	ND	ND	318
	3/23/11	ND	31		2.4	ND	210	7.6	ND	0.017	ND	ND	ND	ND	ND	ND	289
	9/28/11	ND	25		2.5	ND	200	7.86	ND	0.018	ND	ND	ND	ND	ND	ND	336
	3/28/12	0.067	25		2.8	ND	190	7.06	ND	0.019	ND	ND	ND	ND	ND	ND	292
	9/20/12	7.8	26		2.7	ND	220	6.33	ND	0.04	ND	ND	ND	ND	1.2	ND	333
	3/13/13	0.055	25		2.6	0.26	210	7.4	ND	0.019	ND	ND	ND	ND	0.00087	ND	251
	9/18/13	0.05	33		3	ND	270	6.78	ND	0.022	ND	ND	ND	ND	ND	ND	245
	3/19/14	0.051	33		2.3	ND	210	7.02	ND	0.016	ND	ND	ND	ND	ND	ND	210
	9/23/14	ND	31		2.8	ND	200	7.65	ND	0.017	ND	ND	ND	ND	0.0062	ND	271
	3/18/15	ND	32		3.3	ND	240	7.67	ND	0.017	ND	ND	ND	ND	ND	ND	249
	9/30/15	0.053	33		4.6	ND	230	7.72	ND	0.017	ND	ND	ND	ND	ND	ND	259
	4/7/16	0.053	45		4.3	ND	200	7.43	ND	0.018	ND	ND	ND	ND	ND	ND	173
	10/18/16	0.055	40		5.1	ND	230	7.58	ND	0.02	ND	ND	ND	ND	ND	ND	343
	4/8/17	ND	48		4.7	ND	292	10.03	ND	0.018	ND	ND	ND	ND	ND	ND	260
	10/6/17	ND	44		7.7	ND	292	7.69	ND	0.02	ND	ND	ND	ND	ND	ND	617

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-10S	10/17/83	0.14	51	45	9	ND	290	7.5	0.001	0.24	ND	ND	ND	ND		0.005	440
	2/7/84	0.18	69	25	15	ND	330	7.8	ND	ND	ND	ND	ND	ND		ND	550
	4/23/84	ND	91.5	110			404	6.8		0.24	ND	ND	0.31	0.0016		ND	570
	7/31/84	ND	71.3	76.2			326	8		ND	ND	ND	ND	ND		ND	450
	10/18/84	0.18	70	67.8			276	7.61		ND	ND	ND	ND	ND		ND	415
	1/28/85	0.25	81	44.2			283	7.5		ND	ND	ND	ND	ND		ND	480
	4/25/85	0.17	7.3	69.9			313	7.6		ND	ND	ND	ND	ND		ND	450
	7/25/85	ND	63	60.5			285	7.8		ND	ND	ND	ND	ND		ND	470
	10/29/85	0.2	78	69			316	7.4		ND	ND	ND	ND	ND		ND	520
	1/15/86	0.2	69	64.8			290	7.4		ND	ND	ND	ND	ND		ND	455
	4/25/86	ND	64	66.7			283	7.2		ND	ND	ND	ND	ND		ND	435
	7/29/86	0.16	73	64.6			287	7.1		ND	ND	ND	ND	ND		0.003	490
	10/28/86	ND	58	64.8			311	7.2		ND	ND	ND	ND	ND		ND	480
	1/27/87		64					7.4									440
	4/17/87		49					7.4									440
	7/16/87		38					7.1									410
	10/15/87		53					7									440
	1/19/88		49					7.5									485
	4/27/88		180					7.5									461
	7/26/88		35					7.5									340
	10/13/88		44					7.7		0.02	0.0025	ND	ND	ND		0.005	440
	1/17/89		61					7.9		0.021	0.0025	ND	ND	ND		0.005	360
	4/20/89		70					7.4		0.019	0.0025	ND	ND	ND		0.005	390
	7/26/89		53					7.35		0.019	0.0025	ND	ND	ND		0.001	380
	10/19/89		52					7.79		0.02	0.0025	ND	ND	ND		0.001	410
	1/24/90	0.083	72		2			7.31		0.025	0.001	ND	0.0045	ND		0.011	450
	4/27/90	0.119	47.3					7.6		0.025	0.001	ND	0.0045	ND		0.005	460
	7/19/90	0.056	65					7.52		0.091	0.001	ND	0.0045	ND		0.005	471
	10/19/90	0.111	50					7.3		0.057	0.003	ND	0.0045	ND		0.005	474
	1/23/91	0.01	48		7.5			7.18	0.01	0.05	0	ND	0.01	ND		0.01	461
	4/19/91	0.057	36		7.8			7.03	ND	0.05	0.002	ND	ND	ND		ND	470
	7/31/91	0.99	74		1			7.19	0.01	0.05	0	ND	0.032	ND		0.01	460
	10/29/91	0.059	76.5		9.29			7.37	ND	0.1	0.002	0.01	ND	ND		ND	660
	2/13/92	0.15	94.5		9.64			7.11	ND	0.05	0.002	ND	0.01	ND		0.01	425
	6/30/92	0.275	93.8		8			7.42	ND	0.058	ND	ND	ND	ND		ND	472
	1/27/93	ND	58		5.2	0.11		7.44	ND	0.022	ND	ND	ND	ND		ND	302
	8/21/93	0.45	62		9			7.41	ND	0.01	ND	ND	ND	ND		ND	520
	1/5/94	0.14	49		24	0.08J		6.9	ND	0.03	ND	ND	ND	ND		ND	490
	7/21/94	0.22	46		16	0.09J		6.32	ND	0.03	ND	0.04	ND	ND		ND	480
	1/24/95	0.23	47		11	0.2		7.19	ND	0.02	ND	ND	ND	ND		ND	380
	7/24/95	0.09	65		19	0.12		7.3	ND	ND	ND	ND	ND	ND		ND	540
	1/22/96	0.1	73		23	0.12		7.61	ND	0.02	0.002	ND	ND	ND		ND	533
	7/18/96	0.14	67		11	0.12		7.13	ND	0.023		ND	ND	ND		ND	433
	1/23/97	0.13	52		49	0.1		7.62	ND	0.03	ND	ND	0.082	ND		ND	540
	10/7/97	0.33	61		27	0.15		7.33	ND	ND	ND	ND	ND	ND		ND	548
	3/25/98	0.12	120		47	0.1		7.65	ND	0.22	ND	ND	ND	ND		ND	584
	11/23/98	0.26	57		14	0.13		7.37	ND	0.021	ND	ND	ND	ND		ND	482
	3/24/99	0.087	71		25	0.1		7	ND	ND	ND	ND	ND	ND		ND	534
	9/27/99	0.11	54		39	0.17		7.1	ND	ND	ND	ND	ND	ND		ND	502
	3/29/00	0.13	54		25	0.15		7.6	ND	0.041	ND	ND	ND	ND		ND	510
	10/4/00	0.2	47		6	0.22		7.3	ND	ND	ND	ND	ND	ND		ND	405
	4/11/01	0.066	54		31	0.13		7.4	ND	0.024	ND	ND	ND	ND		ND	563
	10/1/01	0.12	62		24	0.16		7.5	ND	0.022	ND	ND	ND	ND		ND	464
	3/19/02	0.058	43		23	0.19		7.78	ND	ND	ND	ND	ND	ND		ND	383
	9/17/02	0.093	57		49	0.15		7.52	ND	ND	ND	ND	ND	ND		ND	552
	3/17/03	0.054	52		35	0.13		6.8	ND	ND	ND	ND	ND	ND		ND	506
	9/15/03	0.147	53		21	0.18		7.34	ND	ND	ND	ND	ND	ND		ND	423.5
	3/8/04	0.085	58		32	0.14		7.57	ND	ND	ND	ND	ND	ND		ND	481
	9/20/05	0.051	42		18	0.12	260	7.4	ND	0.021	ND	ND	ND	ND	ND	ND	392
	3/21/06	0.05	38		12	0.12	260	8.8	ND	0.016	ND	ND	ND	ND	ND	ND	417
	9/26/06	0.079	81.4		21	0.12	361	7.3	ND	0.023	ND	ND	ND	ND	0.017	ND	560
	3/27/07	0.082	61		8.5	ND	290	7.72	ND	0.016	ND	ND	ND	ND	ND	ND	417
	9/11/07	0.068	51		7.8	ND	270	7.95	ND	0.019	ND	ND	ND	ND	ND	ND	316
	3/12/08	0.075	61		9.9	ND	260	7.86	ND	0.016	ND	ND	ND	ND	ND	ND	278
	9/23/08	0.068	66		8.4	ND	310	8	ND	0.022	ND	ND	ND	ND	ND	ND	508
	9/30/09	0.072	59		9.3	ND	290	7.12	ND	0.016	ND	ND	ND	ND	ND	ND	582
	3/24/10	ND	70		11	ND	310	7.92	ND	0.018	ND	ND	ND	ND	ND	ND	460
	10/7/10	ND	41		13	ND	210	8.32	ND	0.015	ND	ND	ND	ND	ND	ND	361
	3/23/11	ND	58		5.4	ND	300	7.16	ND	0.017	ND	ND	ND	ND	ND	ND	428
	9/28/11	0.054	49		9.8	ND	240	7.63	ND	0.016	ND	ND	ND	ND	ND	ND	435
	3/28/12	0.072	65		12	ND	280	7.32	ND	0.014	ND	ND	ND	ND	ND	ND	427
	9/20/12	0.67	50		12	ND	240	8.91	ND	0.057	ND	ND	ND	ND	0.034	ND	334
	3/13/13	0.13	62		30	0.19	300	7	ND	0.02	ND	ND	ND	ND	0.006	0.0012	527
	9/18/13	0.06	79		8.6	ND	430	7.21	ND	0.022	ND	ND	ND	ND	0.023	ND	365
	3/19/14	0.066	65		11	ND	270	7.13	ND	0.015	ND	ND	ND	ND	0.0097	ND	3.23
	9/23/14	ND	54		6.4	ND	260	8.56	ND	0.014	ND	ND	ND	ND	0.0052	ND	352
	3/18/15	ND	48		5.9	ND	240	7.76	ND	0.011	ND	ND	ND	ND	ND	ND	402
	9/30/15	ND	59		3.7	ND	240	7.58	ND	0.012	ND	ND	ND	ND	ND	ND	297
	4/7/16	ND	47		11	ND	220	8.4	ND	0.012	ND	ND	ND	ND	ND	ND	368
	10/18/16	ND	56		7.8	ND	260	7.43	ND	0.013	ND	ND	ND	ND	ND	ND	395
	4/9/17	0.061	53		22	ND	360	8.53	ND	0.016	ND	ND	ND	ND	ND	ND	393
	10/6/17	0.063	76		26	ND	410	7.2	ND	0.018	ND	ND	ND	ND	ND	ND	252

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-11D	1/5/94	0.07	110		21	0.16		6.61	ND	0.04	ND	ND	ND	ND		ND	670
	7/21/94	0.08	133		19	0.21		6.95	ND	0.03	ND	0.09	ND	ND		ND	710
	1/24/95	0.73	2000		160	0.2		6.53	ND	0.04	ND	ND	ND	ND		ND	3810
	7/24/95	0.13	510		61	0.19		7.18	ND	0.03	ND	ND	ND	ND		ND	2100
	1/22/96	1.4	4600		310	0.15		7.17	ND	0.06	ND	ND	ND	ND		ND	8350
	7/18/96	0.72	2100		160	0.18		7.5	ND	0.035		ND	ND	ND		ND	4210
	1/23/97	0.75	1900		190	0.21		7.13	ND	0.032	ND	ND	0.02	ND		ND	4170
	10/7/97	0.18	570		50	0.19		7.16	ND	ND	ND	0.013	ND	ND		ND	1577
	3/25/98	0.11	440		35	0.22		7.14	ND	0.021	0.00027	ND	ND	ND		ND	1110
	11/23/98	1	2800		280	0.22		7.21	ND	0.12	ND	ND	ND	ND		ND	7890
	3/24/99	1.9	5900		510	0.2		7.1	ND	0.026	ND	ND	ND	ND		ND	13100
	9/27/99	3.5	13000		890	0.2		7.1	ND	0.05	ND	ND	ND	ND		ND	5760
	3/29/00	9.9	14000		1100	0.28		7.3	ND	0.082	ND	ND	ND	ND		ND	20100
	10/4/00	6.9	16000		860	0.23		7.2	ND	0.048	ND	ND	ND	ND		ND	27900
	4/11/01	5	6700		700	0.25		7.4	ND	0.033	0.0006	ND	0.016	ND		ND	18860
	10/1/01	7.8	12000		1300	0.21		7.3	ND	0.04	ND	ND	ND	ND		ND	28700
	3/19/02	6.23	5700		710	0.28		7.55	ND	ND	0.00101	ND	ND	ND		ND	17080
	9/17/02	7.22	18000		930	0.21		7.26	ND	ND	0.00156	ND	0.0066	ND		ND	25900
	3/17/03	9.93	19000		1200	0.23		7.4	ND	ND	ND	ND	0.008	ND		ND	29000
	9/15/03	8.28	21000		1200	0.27		7.56	ND	ND	ND	ND	ND	ND		ND	22330
	3/8/04	7.68	19000		1300	0.22		7.47	ND	ND	0.002	ND	0.022	ND		ND	27070
	9/20/05	8.9	23000		1400	0.22	30000	6.99	ND	0.083	ND	ND	ND	ND	0.84	ND	25645
	3/21/06	10	24000		1600	0.2	34000	7.77	ND	0.061	ND	ND	ND	ND	0.52	ND	3400
	9/26/06	9.6	21900		1530	0.21	34400	7.3	ND	0.039	ND	ND	ND	ND	0.41	ND	3300
	3/27/07	9.3	16000		2200	0.18	27000	7.25	ND	0.032	ND	ND	ND	ND	0.45	ND	25170
	9/12/07	9.6	19000		1300	ND	34000	7.36	ND	0.036	ND	ND	ND	ND	0.45	ND	22570
	3/11/08	8.4	22000		1400	ND	31000	7.57	ND	0.029	ND	ND	ND	ND	0.46	ND	19530
	9/23/08	6.7	16000		1100	2.5	27000	7.47	ND	0.032	ND	ND	ND	ND	0.27	ND	19087
	9/29/09	6.2	17000		1200	ND	27000	6.96	ND	0.045	ND	ND	ND	ND	0.17	ND	47069
	3/23/10	6.9	18000		1200	ND	30000	7.38	ND	0.028	ND	ND	ND	ND	0.19	ND	27805
	9/9/10	0.34	3600		280	ND	4500	8.32	ND	0.08	ND	ND	ND	ND	ND	ND	533
	3/23/11	3.7	8900		730	ND	23000	6.7	ND	0.029	ND	ND	ND	ND	0.06	ND	15804
	9/28/11	2.1	6800		510	ND	11000	6.99	ND	0.084	ND	ND	ND	ND	ND	ND	12056
	3/28/12	7.4	18000		1500	ND	29000	6.69	0.0054	0.029	ND	ND	ND	ND	0.16	0.025	29114
	9/19/12	8.3	28000		1900	ND	37000	7.74	ND	0.028	ND	ND	ND	ND	0.14	ND	31062
	3/13/13	15	19000		1200	ND	28000	7.29	0.0045	0.028	ND	ND	ND	ND	0.11	0.027	18564
	9/17/13	7	24000		1800	ND	31000	7.25	ND	0.032	ND	ND	ND	ND	0.078	0.0083	24999
	3/18/14	2.6	6700		500	ND	11000	6.01	-0.012	0.11	ND	0.014	ND	ND	0.12	0.013	8160
	9/23/14	3	8500		630	ND	14000	6.98	0.0015	0.023	ND	ND	ND	ND	0.029	ND	14037
	3/17/15	5.9	19000		1200	ND	30000	6.57	ND	0.031	ND	ND	ND	ND	0.051	ND	23493
	9/29/15	7.9	35000		1500	ND	37000	7.18	0.0024	0.037	ND	ND	0.00055	ND	0.036	0.0084	25467
	4/6/16	2.4	6900		510	ND	13000	7.38	0.0024	0.026	ND	ND	ND	ND	0.016	0.0029	9796
	10/19/16	6.9	20000		1300	ND	35000	7.29	0.0036	0.036	ND	ND	ND	ND	0.021	0.06	30020
	4/5/17	0.26	4500		170	ND	7900	7.82	0.0021	0.025	ND	ND	ND	ND	0.0091	ND	975
	10/6/17	0.1	100		23	ND	490	7.03	ND	0.032	ND	ND	ND	ND	0.0085	ND	261
MW-11S	1/5/94	0.17	62		22	0.12		6.9	ND	0.07	ND	ND	ND	ND		ND	630
	7/21/94	0.21	92		14	0.18		7	ND	0.05	ND	0.02	ND	ND		ND	680
	1/24/95	0.18	72		6.4	0.2		6.65	0.01	0.03	ND	ND	ND	ND		ND	510
	7/24/95	0.15	47		28	0.15		7.19	ND	0.04	ND	ND	ND	ND		ND	720
	1/22/96	0.09	47		9.3	0.14		7.53	ND	0.03	ND	ND	ND	ND		ND	583
	7/18/96	0.17	70		11	0.17		7.62	ND	0.044		ND	ND	ND		ND	582
	1/23/97	0.14	42		29	0.63		7.4	ND	0.044	ND	ND	0.031	ND		ND	710
	10/7/97	0.14	98		20	0.17		7.15	ND	0.03	0.0008	ND	ND	ND		ND	667
	3/25/98	0.1	59		8.5	0.14		7.26	ND	0.033	0.00055	ND	ND	ND		ND	525
	11/23/98	0.17	67		16	0.17		7.24	ND	0.051	ND	ND	ND	ND		ND	611
	3/24/99	0.098	100		10	0.16		7.1	ND	0.035	ND	ND	ND	ND		ND	533
	9/27/99	0.13	160		23	0.23		7.1	ND	0.036	ND	ND	ND	ND		ND	539
	3/29/00	0.18	150		28	0.15		7.2	ND	0.12	ND	ND	ND	ND		ND	971
	10/4/00	ND	73		17	0.22		7.1	ND	0.046	ND	ND	ND	ND		ND	611
	4/11/01	0.096	64		23	0.16		7.4	ND	0.053	0.0003	ND	ND	ND		ND	724
	10/1/01	0.12	210		20	0.19		7.2	ND	0.08	ND	ND	ND	ND		ND	719
	3/19/02	0.095	130		14	0.2		7.41	ND	0.035	ND	ND	ND	ND		ND	600
	9/17/02	0.141	140		21	0.21		7.33	ND	ND	ND	ND	ND	ND		ND	773
	3/17/03	0.101	130		18	0.15		6.8	ND	0.04	ND	ND	ND	ND		ND	744
	9/15/03	0.143	140		17	0.22		7.17	ND	0.05	ND	ND	ND	ND		ND	695
	3/8/04	0.107	250		17	0.16		7.31	ND	0.079	ND	ND	ND	ND		ND	1013
	9/20/05	0.099	86		18	0.18	470	7.14	ND	0.046	ND	ND	ND	ND	ND	ND	547
	3/21/06	0.1	45		18	0.15	390	8.66	ND	0.044	ND	ND	ND	ND	ND	ND	668
	9/26/06	0.1	76.1		18.6	0.15	422	7.37	ND	0.063	ND	ND	ND	ND	ND	ND	990
	3/27/07	0.063	41		5.9	ND	330	7.43	ND	0.034	ND	ND	ND	ND	ND	ND	479
	9/12/07	0.065	55		11	ND	390	7.18	ND	0.049	ND	ND	ND	ND	ND	ND	827
	3/11/08	0.059	37		8	ND	240	7.53	ND	0.02	ND	ND	ND	ND	ND	ND	331
	9/23/08	0.057	52		6.8	ND	320	7.68	ND	0.036	ND	ND	ND	ND	ND	ND	348
	9/29/09	0.061	82		8.4	ND	360	7.22	ND	0.047	ND	ND	ND	ND	ND	ND	586
	3/23/10	ND	49		8	ND	345	7.1	ND	0.041	ND	ND	ND	ND	ND	ND	594
	9/9/10	ND	62		8.1	ND	340	8.37	ND	0.043	ND	ND	ND	ND	ND	ND	517
	3/23/11	ND	100		19	ND	470	7.54	ND	0.075	ND	ND	ND	ND	ND	ND	722
	9/28/11	0.077	53		35	ND	460	6.97	ND	0.06	ND	ND	ND	ND	ND	ND	731
	3/28/12	ND	100		29	ND	450	6.77	ND	0.058	ND	ND	ND	ND	0.0022	ND	716
	9/19/12	0.085	90		21	ND	500	6.34	ND	0.037	ND	ND	ND	ND	ND	ND	643
	3/13/13	0.072	52		24	0.15	460	6.19	ND	0.05	ND	ND	ND	ND	0.00073	0.001	321
	9/17/13	0.064	150		22	ND	450	7.11	ND	0.048	ND	ND	ND	ND	ND	ND	597
	3/18/14	0.056	23		3	0.3	190	6.8	ND	0.021	ND	ND	ND	ND	0.0054	ND	136
	9/23/14	ND	82		11	0.21	420	7.17	ND	0.031	ND	ND	ND	ND	0.0089	ND	573
	3/17/15	0.07	66		12	ND	450	7.44	ND	0.031	ND	ND	ND	ND	0.0058	ND	348
	9/29/15	0.057	67		18	ND	480	7.2	ND	0.031	ND	ND	ND	ND	ND	ND	508
	4/6/16	0.053	52		14	ND	390	8.03	ND	0.036	ND	ND	ND	ND	0.0061	ND	455
	10/19/16	0.071	72		14	ND	440	7.17	ND	0.042	ND	ND	ND	ND	0.0066	ND	608
	4/5/17	0.06	110		9.9	0.21	470	8.38	ND	0.045	ND	ND	ND	ND	ND	ND	899
	10/6/17	0.066	110		17	ND	460	7.74	ND	0.043	ND	ND	ND	ND	0.0083	ND	676

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-12D	1/5/94	ND	77		25	0.18		7.05	ND	0.04	ND	ND	ND	ND		ND	710
	7/21/94	ND	110		20	0.22		6.94	ND	0.03	ND	0.01J	ND	ND		ND	690
	1/24/95	0.07	940		69	0.2		6.28	ND	0.03	ND	ND	ND	ND		ND	1840
	7/24/95	ND	84		22	0.21		7.12	ND	0.03	ND	ND	ND	ND		ND	770
	1/22/96	0.21	1200		79	0.2		7.14	ND	0.05	ND	ND	ND	ND		ND	2680
	7/18/96	0.12	170		25	0.23		7.34	ND	0.034		ND	ND	ND		ND	802
	1/23/97	0.14	54		18	0.13		7.52	ND	0.037	ND	ND	0.072	ND		ND	428
	10/7/97	0.066	96		22	0.23		7.12	ND	ND	0.0003	ND	ND	ND		ND	616
	3/25/98	ND	88		27	0.23		7.28	ND	0.028	ND	ND	ND	ND		ND	647
	11/23/98	0.26	1900		130	0.22		7.01	ND	0.049	ND	ND	ND	ND		ND	3460
	3/24/99	0.62	2900		220	0.2		7	ND	0.026	ND	ND	ND	ND		ND	6120
	9/27/99	0.84	3700		280	0.25		7	ND	0.057	ND	ND	ND	ND		ND	5730
	3/29/00	6.9	7900		500	0.2		7	ND	0.075	0.00027	ND	ND	ND		ND	1583
	10/4/00	5.1	8000		450	0.2		7	ND	0.049	ND	ND	ND	ND		ND	14400
	4/11/01	3.6	3900		440	0.18		7.2	ND	0.034	0.0007	ND	0.013	ND		0.0075	12170
	10/1/01	5.8	8300		590	0.18		7.1	ND	0.035	0.0024	ND	ND	ND		ND	17530
	3/19/02	5.67	8400		590	0.22		7.27	ND	ND	0.00105	ND	ND	ND		ND	13490
	9/17/02	5.16	8700		460	0.2		7.02	ND	ND	0.00142	ND	ND	ND		ND	15040
	3/17/03	7.18	14000		850	0.21		7.2	ND	ND	ND	ND	0.0052	ND		ND	21500
	9/15/03	5.66	10000		530	0.22		7.21	ND	ND	ND	ND	ND	ND		ND	14200
	3/8/04	6.05	13000		650	0.2		7.11	ND	ND	ND	ND	0.01	ND		ND	18840
	9/20/05	4	8500		600	0.23	14000	6.9	ND	0.064	ND	ND	ND	ND	0.04	ND	12565
	3/21/06	5.4	13000		870	0.24	21000	8.67	ND	0.036	ND	ND	ND	ND	0.064	ND	22900
	9/26/06	4.5	25000		786	0.25	19300	7.66	ND	0.029	ND	ND	ND	ND	0.038	ND	21000
	3/27/07	1.6	2900		170	0.29	5300	7.52	ND	0.014	ND	ND	ND	ND	ND	ND	5804
	9/11/07	1.3	3600		240	ND	6400	7.26	ND	0.092	ND	ND	ND	ND	ND	ND	7720
	3/11/08	1.2	3600		250	0.56	5700	7.25	ND	0.021	ND	ND	ND	ND	ND	ND	2765
	9/23/08	0.23	340		28	ND	880	7.36	ND	0.039	ND	ND	ND	ND	ND	ND	999
	9/29/09	0.25	2300		180	ND	3600	7.07	ND	0.077	ND	ND	ND	ND	ND	ND	4160
	3/23/10	1.1	9600		620	ND	19000	7.11	ND	0.027	ND	0.017	ND	ND	ND	ND	11000
	9/8/10	ND	130		17	ND	460	8.2	ND	0.045	ND	ND	ND	ND	ND	ND	554
	3/23/11	1.1	7200		450	ND	16000	6.93	ND	0.037	ND	ND	ND	ND	ND	ND	11545
	9/28/11	1.9	11000		750	ND	19000	7.02	ND	0.063	ND	ND	ND	ND	ND	ND	19195
	3/28/12	2	14000		980	ND	17000	7.19	0.0048	0.026	ND	ND	ND	ND	0.039	0.023	20932
	9/19/12	2.8	17000		950	ND	26000	6.41	ND	0.032	ND	ND	ND	ND	0.063	ND	26013
	3/13/13	6	17000		1100	0.6	25000	7.23	0.0021	0.031	ND	ND	ND	ND	0.07	0.02	18719
	9/17/13	1.1	6700		460	ND	10000	7.13	0.0012	0.075	ND	ND	ND	ND	0.019	0.0031	11318
	3/18/14	3.7	19000		1100	ND	27000	6.84	ND	0.032	ND	ND	ND	ND	0.07	ND	18143
	9/23/14	2.7	15000		930	ND	24000	7.32	ND	0.02	ND	ND	ND	ND	0.042	0.016	21849
	3/17/15	2.1	13000		720	ND	19000	6.87	ND	0.036	ND	ND	ND	ND	ND	0.02	16857
	9/29/15	3.5	28000		1100	ND	29000	7.12	0.0017	0.024	ND	ND	ND	ND	0.066	0.0056	21618
	4/5/16	2.2	11000		700	ND	20000	7.31	0.0017	0.028	ND	ND	ND	ND	0.039	0.003	946
	10/19/16	5	290		38	ND	740	7.21	0.0024	0.029	ND	ND	ND	ND	0.076	0.033	25560
	4/5/17	0.15	980		80	ND	20000	8.29	ND	0.031	ND	ND	ND	ND	ND	ND	1928
	10/6/17	0.064	210		29	ND	2300	6.89	ND	0.037	ND	ND	ND	ND	ND	ND	285
MW-12S	1/5/94	0.07	31		9	0.11		7.21	ND	0.05	ND	ND	ND	ND		ND	420
	7/21/94	0.07	45		1.9	0.18		7	ND	0.03	ND	ND	ND	ND		ND	350
	1/24/95	0.09	62		6.8	0.2		6.55	ND	0.02	ND	ND	ND	ND		ND	310
	7/24/95	0.05	36		5.6	0.15		7.25	0.008	0.03	ND	ND	ND	ND		ND	440
	1/22/96	0.12	79		11	0.13		7.27	ND	0.04	ND	ND	ND	ND		ND	475
	7/18/96	0.12	72		22	0.13		7.39	ND	0.032		ND	ND	ND		ND	409
	1/23/97	0.12	95		34	0.29		7.41	ND	0.029	ND	ND	0.032	ND		ND	700
	10/7/97	0.074	55		20.9	0.3		7.19	0.012	ND	ND	ND	ND	ND		ND	445
	3/25/98	ND	64		4.6	0.11		7.32	0.0052	0.036	ND	ND	ND	ND		ND	439
	11/23/98	0.12	41		9.7	0.16		7.1	ND	0.032	0.00027	ND	ND	ND		ND	411
	3/24/99	0.069	66		7.7	0.14		7.2	ND	0.027	ND	ND	ND	ND		ND	357
	9/27/99	0.069	50		7	0.16		7.1	ND	0.026	ND	ND	ND	ND		ND	210
	3/29/00	0.12	86		11	0.16		7.2	ND	0.085	ND	ND	ND	ND		ND	440
	10/4/00	0.15	56		10	0.18		7	ND	0.037	ND	ND	ND	ND		ND	424
	4/11/01	ND	59		17	0.14		7.3	ND	0.045	ND	ND	ND	ND		ND	415
	10/1/01	0.11	65		21	0.13		7.3	ND	0.041	ND	ND	ND	ND		ND	393
	3/19/02	0.103	79		14	0.16		7.21	ND	0.032	ND	ND	ND	ND		ND	405
	9/17/03	0.082	74		17	0.17		7.24	ND	ND	ND	ND	ND	ND		ND	492
	3/17/03	0.06	85		16	0.14		6.8	ND	0.035	ND	ND	ND	ND		ND	477
	9/15/03	0.104	62		11	0.2		7.19	ND	0.278	ND	ND	ND	ND		ND	438
	3/8/04	0.055	73		9.2	0.15		7.2	ND	0.057	ND	ND	ND	ND		ND	458
	9/20/05	0.054	76		16	0.18	350	6.8	ND	0.059	ND	ND	ND	ND	ND	ND	480
	3/21/06	0.06	52		11	0.12	360	7.17	ND	0.059	ND	ND	ND	ND	ND	ND	480
	9/26/06	0.078	53.7		9	0.15	344	7	ND	0.044	ND	ND	ND	ND	ND	ND	500
	3/27/07	0.086	42		10	ND	310	7.08	ND	0.048	ND	ND	ND	ND	ND	ND	457
	9/11/07	0.073	72		8.5	ND	330	7.36	ND	0.045	ND	ND	ND	ND	ND	ND	383
	3/11/08	0.084	40		5	ND	200	7.6	ND	0.035	ND	ND	ND	ND	ND	ND	202
	9/23/08	0.11	23		3.5	ND	220	7.32	ND	0.044	ND	ND	ND	ND	ND	ND	228
	9/29/09	0.084	36		5	ND	260	6.81	ND	0.032	ND	ND	ND	ND	ND	ND	553
	3/23/10	0.065	44		5.2	ND	240	7.41	ND	0.059	ND	ND	ND	ND	ND	ND	455
	9/8/10	0.067	47		14	ND	320	6.78	ND	0.057	ND	ND	ND	ND	ND	ND	471
	3/23/11	0.072	61		20	ND	410	6.45	ND	0.17	ND	ND	ND	ND	ND	ND	619
	9/28/11	0.12	90		27	ND	380	7	ND	0.066	ND	ND	ND	ND	ND	ND	573
	3/28/12	0.11	89		11	ND	310	6.57	ND	0.097	ND	ND	ND	ND	0.0031	0.0059	456
	9/19/12	0.16	100		11	ND	510	8.18	ND	0.077	ND	ND	ND	ND	ND	ND	519
	3/13/13	0.11	57		12	0.21	270	6.95	0.00056	0.074	ND	ND	ND	ND	0.0012	0.0026	220
	9/17/13	0.17	81		12	0.21	390	7.11	0.0014	0.075	ND	ND	ND	ND	0.0072	ND	438
	3/18/14	0.11	44		1.9	ND	290	7.82	ND	0.05	ND	ND	ND	ND	ND	ND	185
	9/23/14	0.15	24		2.2	0.31	270	6.88	ND	0.073	ND	ND	ND	ND	0.0081	ND	308
	3/17/15	0.15	19		3.5	ND	290	7	ND	0.068	ND	ND	ND	ND	ND	ND	249
	9/29/15	0.18	39		20	0.31	384	7.11	ND	0.068	ND	ND	ND	ND	0.018	ND	424
	4/5/16	0.085	33		6.4	0.21	240	7.1	ND	0.057	ND	ND	ND	ND	ND	ND	341
	10/19/16	0.16	26		6.1	0.27	240	7.48	ND	0.073	ND	ND	ND	ND	0.0075	ND	242
	4/5/17	0.13	27		16	ND	340	7.98	ND	0.078	ND	ND	ND	ND	ND	ND	648
	10/6/17	0.14	84		21	0.35	440	7.5	ND	0.071	ND	ND	ND	ND	0.019	ND	655

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-13D	11/23/98	0.42	1700		160	0.17		7.12	ND	0.056	ND	ND	ND	ND		ND	3870
	3/24/99	1.9	8100		650	0.14		7.1	ND	0.037	ND	ND	ND	ND		0.042	16660
	9/27/99	0.71	2300		220	0.14		7.1	ND	0.061	ND	ND	ND	ND		ND	3890
	3/29/00	7.5	19000		890	0.2		7.2	ND	0.076	0.00036	ND	ND	ND		ND	32400
	10/4/00	3.2	5700		440	ND		7.1	ND	0.061	ND	ND	ND	ND		ND	11400
	4/11/01	7.5	3400		710	0.16		7.3	ND	0.04	0.00028	ND	0.016	ND		ND	19680
	10/1/01	8	1400		720	0.14		7.1	ND	0.044	ND	ND	ND	ND		ND	20000
	3/19/02	7.89	4900		570	0.15		7.33	ND	ND	0.00101	ND	ND	ND		ND	12950
	9/17/02	7.81	6000		450	0.16		7.14	ND	ND	ND	ND	ND	ND		ND	12390
	3/17/03	15.4	18000		1100	0.16		7.3	ND	ND	ND	ND	ND	ND		ND	26500
	9/15/03	22.5	20000		1100	0.19		7.3	ND	ND	ND	ND	ND	ND		ND	26080
	3/8/04	19.3	20000		1300	0.16		7.3	ND	ND	0.0014	ND	0.021	ND		ND	28150
	9/20/05	24	15000		1200	0.19	27000	7.13	ND	0.046	ND	ND	ND	ND	8.8	ND	22735
	3/22/06	7.4	3900		330	0.21	7300	7.88	ND	0.042	ND	ND	ND	ND	2.4	ND	9000
	9/26/06	25.9	38300		1170	0.17	28400	7.2	ND	0.035	ND	ND	ND	ND	10.1	ND	27000
	3/27/07	5.7	3600		230	0.25	6300	7.34	ND	0.018	ND	ND	ND	ND	1.8	ND	7110
	9/11/07	27	20000		1100	ND	30000	7.28	ND	0.036	ND	ND	ND	ND	9.2	ND	28880
	3/11/08	24	18000		1100	ND	27000	7.65	ND	0.03	ND	ND	ND	ND	8.3	ND	18540
	9/24/08	1.2	440		38	ND	990	8.22	ND	0.055	ND	ND	ND	ND	0.12	ND	994
	9/29/09	1.5	1100		52	ND	1700	7.46	ND	0.086	ND	ND	ND	ND	0.27	ND	2250
	3/23/10	23	16000		940	ND	26000	7.69	ND	0.033	ND	ND	ND	ND	7.6	ND	24836
	10/7/10	1.8	1300		510	ND	2100	8.19	ND	0.06	ND	ND	ND	ND	0.3	ND	2720
	3/23/11	3	3500		240	ND	5200	6.8	ND	0.084	ND	ND	ND	ND	0.53	ND	5588
	9/28/11	8.5	8000		560	ND	13000	7.14	ND	0.056	ND	ND	ND	ND	2	ND	14170
	3/28/12	ND	1100		82	ND	1800	7.16	ND	0.052	ND	ND	ND	ND	0.18	0.0021	2668
	9/19/12	20	20000		1200	ND	35000	7.86	ND	0.035	ND	ND	ND	ND	4.7	ND	27674
	3/12/13	0.45	1500		120	ND	2400	7.6	ND	0.12	ND	ND	ND	ND	0.13	ND	1902
	9/18/13	15	20000		1300	ND	33000	6.86	ND	0.03	ND	ND	ND	ND	3.4	ND	29975
	3/18/14	0.66	1600		150	ND	2800	7.49	ND	0.071	ND	ND	ND	ND	0.26	ND	2105
	9/24/14	17	19000		1200	ND	30000	7.42	ND	0.029	ND	ND	ND	ND	3.4	ND	23001
	3/18/15	1.2	1100		110	ND	2700	7.27	ND	0.054	ND	ND	ND	ND	0.32	ND	2837
	9/30/15	0.957	1000		90	ND	1880	7.43	ND	0.046	ND	ND	ND	ND	0.22	ND	1820
	4/5/16	1.4	2400		190	ND	4000	7.3	ND	0.056	ND	ND	ND	ND	0.44	ND	1713
	10/19/16	19	21000		1300	ND	35000	7.44	0.0024	0.031	ND	ND	ND	ND	2.5	0.032	10486
	4/5/17	0.45	490		56	ND	1100	9.4	ND	0.047	ND	ND	ND	ND	0.075	ND	976
	10/6/17	18	20000		1400	ND	34000	7.57	0.0024	0.031	ND	ND	ND	ND	2.2	0.01	850
MW-13S	11/23/98	0.18	110		24	0.26		7.11	0.014	0.064	ND	ND	ND	ND		ND	585
	3/24/99	0.1	120		19	0.23		7.1	0.014	0.039	ND	ND	ND	ND		ND	518
	9/27/99	0.12	120		24	0.27		7	0.012	0.062	ND	ND	ND	ND		ND	520
	3/29/00	0.21	95		21	0.25		7.2	0.0095	0.084	ND	ND	ND	ND		ND	536
	10/4/00	0.15	120		26	0.32		7	0.008	0.067	ND	ND	ND	ND		ND	574
	4/11/01	0.074	120		31	0.25		7.2	0.012	0.05	ND	ND	ND	ND		ND	538
	10/1/01	0.16	130		26	0.22		7.1	0.011	0.051	ND	ND	ND	ND		ND	522
	3/19/02	0.114	140		31	0.25		7.19	ND	0.043	ND	ND	ND	ND		ND	524
	9/17/02	0.121	120		31	0.26		7.23	0.0201	ND	ND	ND	ND	ND		ND	598
	3/17/03	0.092	150		29	0.21		6.6	ND	0.052	ND	ND	ND	ND		ND	600
	9/15/03	0.142	130		32	0.26		7	0.01	0.066	ND	ND	ND	ND		ND	632
	3/8/04	0.095	120		23	0.2		7.22	0.008	0.059	ND	ND	ND	ND		ND	612
	9/20/05	0.1	61		16	0.24	310	7.3	ND	0.069	ND	ND	ND	ND	ND	ND	433
	3/22/06	0.11	74		12	0.19	300	8.27	ND	0.054	ND	ND	ND	ND	ND	ND	413
	9/26/06	0.12	47.8		10.9	0.25	307	7.1	ND	0.098	ND	ND	ND	ND	ND	ND	110
	3/27/07	0.11	58		12	0.15	300	6.93	ND	0.073	ND	ND	ND	ND	ND	ND	445
	9/11/07	0.12	73		14	ND	300	7.06	ND	0.067	ND	ND	ND	ND	ND	ND	370
	3/11/08	0.12	51		11	ND	300	7.4	ND	0.046	ND	ND	ND	ND	ND	ND	576
	9/24/08	0.11	68		14	ND	300	7.43	ND	0.08	ND	ND	ND	ND	ND	ND	447
	9/29/09	0.099	58		12	ND	280	7.14	ND	0.062	ND	ND	ND	ND	ND	ND	454
	3/23/10	0.067	48		10	ND	290	7.7	ND	0.062	ND	ND	ND	ND	ND	ND	486
	10/7/10	0.1	58		11	ND	310	8.17	ND	0.14	ND	ND	ND	ND	ND	ND	462
	3/23/11	0.07	67		15	ND	290	6.14	ND	0.1	ND	ND	ND	ND	ND	ND	429
	9/28/11	0.091	75		14	ND	310	7.64	ND	0.06	ND	ND	ND	ND	ND	ND	464
	3/28/12	0.063	71		16	ND	280	7.99	0.004	0.043	ND	ND	ND	ND	0.0054	0.0028	433
	9/19/12	0.1	70		17	ND	340	6.04	ND	0.086	ND	ND	ND	ND	0.011	ND	494
	3/12/13	0.064	72		16	ND	300	7.29	ND	0.12	ND	ND	ND	ND	0.0058	ND	333
	9/18/13	0.077	110		14	0.27	470	6.22	0.0022	0.2	ND	ND	ND	ND	0.0078	ND	679
	3/18/14	0.058	85		11	ND	350	6.99	0.0016	0.079	ND	ND	ND	ND	0.0047	ND	230
	9/24/14	0.066	84		10	ND	380	7.05	0.0018	0.11	ND	ND	ND	ND	0.0064	ND	456
	3/18/15	0.058	94		10	ND	320	6.32	0.002	0.073	ND	ND	ND	ND	0.0062	ND	526
	9/30/15	0.074	84		8.5	0.24	330	7.21	0.0018	0.063	ND	ND	ND	ND	0.0075	ND	411
	4/5/16	0.074	36		9.4	0.2	270	7.36	0.0012	0.086	ND	ND	ND	ND	ND	ND	235
	10/19/16	0.11	27		6.5	ND	300	7.66	0.0032	0.06	ND	ND	ND	ND	0.0088	ND	342
	4/5/17	0.059	30		11	0.2	280	9.39	ND	0.087	ND	ND	ND	ND	ND	ND	278
	10/6/17	0.064	46		11	ND	290	7.48	0.0022	0.061	ND	ND	ND	ND	0.0082	ND	266

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
MW-14D	11/23/98	0.1	70		24	0.24		7.28	ND	0.028	ND	ND	ND	ND		ND	606
	3/24/99	0.05	88		24	0.22		7.1	ND	0.027	ND	ND	ND	ND		ND	584
	9/27/99	ND	86		25	0.23		7	ND	0.025	ND	ND	ND	ND		ND	624
	3/29/00	0.11	110		20	0.23		7.2	ND	0.058	ND	ND	ND	ND		ND	600
	10/4/00	ND	99		21	0.25		7.1	ND	0.027	ND	ND	ND	ND		ND	600
	4/11/01	ND	96		23	0.22		7.3	ND	0.03	ND	ND	ND	ND		ND	620
	10/1/01	0.055	85		22	0.21		7.1	ND	0.034	ND	ND	ND	ND		ND	579
	3/19/02	ND	100		24	0.26		7.5	ND	ND	ND	ND	ND	ND		ND	551
	9/17/02	ND	110		23	0.23		7.13	ND	ND	ND	ND	ND	ND		ND	612
	3/17/03	ND	110		22	0.21		6.8	ND	0.028	ND	ND	ND	ND		ND	615
	9/15/03	ND	110		21	0.26		7.3	ND	0.023	ND	ND	ND	ND		ND	583
	3/8/04	ND	110		21	0.24		7.12	ND	0.025	ND	ND	ND	ND		ND	610
	9/20/05	ND	83		20	0.22	390	6.57	ND	0.031	ND	ND	ND	ND	ND	ND	485
	3/22/06	0.035	91		20	0.15	370	7.16	ND	0.031	ND	ND	ND	ND	ND	ND	580
	9/27/06	ND	93.5		19.7	0.19	380	7.44	ND	0.028	ND	ND	ND	ND	ND	ND	90
	3/27/07	ND	100		19	0.15	380	7.32	ND	0.028	ND	ND	ND	ND	ND	ND	521
	9/11/07	ND	100		18	ND	360	7.16	ND	0.03	ND	ND	ND	ND	ND	ND	760
	3/11/08	ND	98		19	ND	370	7.6	ND	0.027	ND	ND	ND	ND	ND	ND	410
	9/24/08	ND	98		18	ND	390	7.81	ND	0.032	ND	ND	ND	ND	ND	ND	491
	9/30/09	ND	96		20	ND	380	7.25	ND	0.028	ND	ND	ND	ND	ND	ND	568
	3/23/10	ND	95		19	ND	370	7.46	ND	0.027	ND	ND	ND	ND	ND	ND	556
	9/9/10	ND	91		21	ND	360	7.73	ND	0.028	ND	ND	ND	ND	ND	ND	548
	3/23/11	ND	84		18	ND	300	6.87	ND	0.025	ND	ND	ND	ND	ND	ND	496
	9/28/11	0.061	82		17	ND	360	7.42	ND	0.032	ND	ND	ND	ND	ND	ND	529
	3/28/12	0.051	83		16	ND	340	7.12	ND	0.029	ND	ND	ND	ND	0.0045	ND	530
	9/20/12	0.067	82		15	ND	150	6.3	ND	0.03	ND	ND	ND	ND	ND	ND	525
	3/12/13	ND	88		15	ND	320	7.66	ND	0.028	ND	ND	ND	ND	0.0053	ND	357
	9/17/13	ND	82		17	0.24	290	6.93	ND	0.027	ND	ND	ND	ND	0.012	ND	515
	3/19/14	0.05	78		19	0.22	330	7.14	ND	0.023	ND	ND	ND	ND	0.0067	ND	340
	9/24/14	ND	83		36	ND	310	7.29	ND	0.029	ND	ND	ND	ND	0.0074	ND	359
	3/18/15	ND	72		16	ND	340	7.19	ND	0.028	ND	ND	ND	ND	0.0074	ND	546
	9/29/15	0.051	73		15	ND	430	7.06	ND	0.027	ND	ND	ND	ND	0.0075	ND	426
	4/6/16	ND	73		16	ND	400	8.02	ND	0.025	ND	ND	ND	ND	0.0063	ND	452
	10/20/16	ND	76		16	ND	380	7.52	ND	0.029	ND	ND	ND	ND	0.0068	ND	334
	4/5/17	ND	79		15	ND	370	9.06	ND	0.021	ND	ND	ND	ND	0.0058	ND	388
	10/6/17	ND	82		16	ND	450	7.6	ND	0.024	ND	ND	ND	ND	0.0062	ND	91
MW-14S	11/23/98	0.1	80		20	0.19		7.06	0.0062	0.052	ND	ND	ND	ND		ND	416
	3/24/99	0.052	92		22	0.15		6.9	ND	0.052	ND	ND	ND	ND		ND	419
	9/27/99	0.051	100		15	0.19		6.7	ND	0.058	0.00044	ND	ND	ND		ND	487
	3/29/00	0.16	93		13	0.16		7	ND	0.086	0.00023	ND	ND	ND		ND	423
	10/4/00	ND	100		13	0.21		6.8	ND	0.063	0.0005	ND	ND	ND		ND	450
	4/11/01	ND	90		14	0.14		7	ND	0.062	0.00027	ND	ND	ND		ND	452
	10/1/01	ND	100		29	0.16		6.8	ND	0.075	ND	ND	ND	ND		ND	528
	3/19/02	ND	160		27	0.16		6.8	ND	ND	ND	ND	ND	ND		ND	486
	9/17/02	ND	130		16	0.18		6.82	ND	ND	ND	ND	ND	ND		ND	459
	3/17/03	ND	91		27	0.16		6.3	ND	0.039	ND	ND	ND	ND		ND	446
	9/15/03	ND	96		17	0.17		6.79	ND	0.061	ND	ND	ND	ND		ND	471
	3/8/04	ND	86		36	0.13		6.85	ND	0.062	ND	ND	ND	ND		ND	539
	9/20/05	ND	81		5	0.17	250	6.92	ND	0.07	ND	ND	ND	ND	ND	ND	349
	3/22/06	0.034	110		10	0.12	240	7.7	ND	0.07	ND	ND	ND	ND	ND	ND	331
	9/27/06	ND	55.5		17.2	0.16	268	6.6	ND	0.071	ND	ND	ND	ND	ND	ND	410
	3/27/07	ND	50		11	ND	220	6.6	ND	0.058	ND	ND	ND	ND	ND	ND	305
	9/11/07	ND	75		8.4	ND	240	6.9	ND	0.083	ND	ND	ND	ND	ND	ND	301
	3/11/08	ND	86		10	ND	270	6.76	ND	0.081	ND	ND	ND	ND	ND	ND	446
	9/24/08	ND	51		11	ND	210	6.99	ND	0.062	ND	ND	ND	ND	ND	ND	251
	9/30/09	ND	67		7.4	ND	200	6.15	ND	0.06	ND	ND	ND	ND	ND	ND	520
	3/23/10	ND	37		9.2	ND	230	7.53	ND	0.11	ND	ND	ND	ND	ND	ND	395
	9/9/10	ND	70		13	ND	250	7.63	ND	0.12	ND	ND	ND	ND	ND	ND	377
	3/23/11	ND	75		18	ND	270	6.12	ND	0.084	ND	ND	ND	ND	ND	ND	357
	9/28/11	ND	110		10	ND	265	6.92	ND	0.097	ND	ND	ND	ND	ND	ND	428
	3/28/12	ND	120		8	ND	250	7.29	ND	0.088	ND	ND	ND	ND	0.0033	0.0016	373
	9/20/12	0.049	66		6.9	ND	230	7.21	ND	0.093	ND	ND	ND	ND	ND	ND	352
	3/12/13	ND	55		6.2	ND	510	6.56	ND	0.089	ND	ND	ND	ND	0.0023	ND	210
	9/17/13	ND	67		3.6	ND	270	6.74	ND	0.13	ND	ND	ND	ND	ND	ND	374
	3/19/14	ND	76		5.2	ND	240	6.86	ND	0.071	ND	ND	ND	ND	ND	ND	175
	9/24/14	ND	69		6.6	ND	200	6.99	ND	0.067	ND	ND	ND	ND	ND	ND	281
	3/18/15	ND	68		7.2	ND	240	7.61	ND	0.085	ND	ND	ND	ND	ND	ND	206
	9/29/15	ND	49		5	0.2	230	6.53	ND	0.069	ND	ND	ND	ND	ND	ND	252
	4/6/16	ND	44		6.4	ND	250	7.49	ND	0.07	ND	ND	ND	ND	ND	ND	219
	10/20/16	ND	42		9.8	ND	250	7.52	ND	0.11	ND	ND	ND	ND	ND	ND	273
	4/5/17	ND	31		13	ND	220	8.8	ND	0.071	ND	ND	ND	ND	ND	ND	194
	10/6/17	ND	76		27	ND	340	7.34	ND	0.18	ND	ND	ND	ND	ND	ND	625

Table 1: Historical Analytical Results
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

		Appendix III Parameters							Appendix IV Parameters								Field Parameters
		Boron	Sulfate	Calcium	Chloride	Fluoride	Total Dissolved Solids	pH	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Molybdenum	Selenium	Conductivity
Well	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm
SW-04	11/23/98	0.44	410		51	0.31		7.85	ND	0.082	0.0034	ND	0.063	ND		ND	1204
	3/24/99	1.3	900		75	0.22		7.7	ND	0.033	ND	ND	ND	ND		ND	2460
	9/27/99	Dry	Dry		Dry	Dry		Dry	Dry	Dry	Dry	Dry	Dry	Dry		Dry	Dry
	3/29/00	1.8	830		53	0.25		7.8	ND	0.097	ND	ND	ND	ND		ND	1783
	10/4/00	0.95	130		18	0.22		7.6	ND	0.035	ND	ND	ND	ND		ND	610
	4/11/01	1.3	680		66	0.27		7.9	ND	0.052	ND	ND	ND	ND		ND	2170
	10/1/01	0.44	130		23	0.22		7.8	ND	0.092	ND	ND	ND	ND		ND	689
	3/19/02	0.411	160		17	0.2		7.45	ND	0.02	ND	ND	ND	ND		ND	629
	9/17/02	0.823	98		12	0.21		7.58	ND	ND	ND	ND	ND	ND		ND	433
	3/17/03	0.29	170		15	0.13		7.4	ND	0.029	ND	ND	ND	ND		ND	550
	9/15/03	0.311	110		15	0.23		8.05	ND	0.041	ND	ND	ND	ND		ND	503
	3/8/04	0.935	530		44	0.23		6.68	ND	0.053	ND	ND	ND	ND		ND	1781
	9/20/05	0.34	120		13	0.21	370	7.4	ND	0.074	ND	ND	ND	ND	ND	ND	673
	3/21/06	1.9	1100		86	0.27	1900	9.83	ND	0.072	ND	ND	ND	ND	0.23	ND	284
	9/26/06	0.77	374		39.2	0.23	832	8.1	ND	0.052	ND	ND	ND	ND	0.04	ND	120
	3/27/07	1.2	1400		100	0.19	2400	7.4	ND	0.055	ND	ND	ND	ND	0.069	ND	2951
	9/11/07	0.46	200		25	ND	530	8	ND	0.021	ND	ND	ND	ND	ND	ND	1005
	3/11/08	1.9	1400		95	ND	3500	8.3	ND	0.046	ND	ND	ND	ND	0.22	ND	162
	9/23/08	1.6	1200		89	ND	2300	7.64	ND	0.068	ND	ND	ND	ND	0.16	ND	2489
	9/30/09	0.81	90		11	ND	330	7.52	ND	0.04	ND	ND	ND	ND	ND	ND	499
	3/24/10	1.4	700		68	ND	1700	7.58	ND	0.043	ND	ND	ND	ND	0.18	ND	2146
	9/10/10	0.66	98		14	ND	290	8.81	ND	0.039	ND	ND	ND	ND	ND	ND	800
	3/23/11	1.2	820		58	ND	1500	6.9	ND	0.044	ND	ND	ND	ND	0.11	ND	1866
	9/27/11	0.5	92		22	ND	370	7.85	ND	0.031	ND	ND	ND	ND	ND	ND	547
	3/27/12	1	500		43	ND	990	6.74	ND	0.014	ND	ND	ND	ND	0.08	ND	1391
	9/18/12	0.082	98		17	ND	520	6.5	ND	0.091	ND	ND	ND	ND	ND	ND	711
	3/13/13	0.94	670		51	ND	1200	7.03	0.00066	0.051	ND	ND	ND	ND	0.15	0.0015	1014
	9/17/13	0.84	290		39	0.25	670	7.8	0.0064	0.076	ND	ND	ND	ND	0.12	ND	997
	3/18/14	1.1	720		59	ND	1400	6.74	ND	0.06	ND	ND	ND	ND	0.22	ND	1194
	9/23/14	0.79	460		38	0.37	950	7.28	ND	0.072	ND	ND	ND	ND	0.1	ND	1314
	3/17/15	0.76	360		26	ND	800	7.47	0.0013	0.045	ND	ND	ND	ND	0.071	ND	1142
	9/29/15	0.16	62		14	ND	420	7.42	0.0011	0.064	ND	ND	ND	ND	0.022	ND	432
	4/6/16	1.6	760		52	ND	1500	7.43	0.0013	0.062	ND	ND	ND	ND	0.13	ND	1374
	10/19/16	2	860		60	ND	1700	7.47	0.0018	0.071	ND	ND	ND	ND	0.21	ND	1261
	4/5/17	1.6	1300		97	ND	2300	6.72	0.0011	0.054	ND	ND	ND	ND	0.18	ND	32.92
	10/6/17	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SW-10	11/23/98	0.083	38		15	0.18		7.28	ND	0.054	ND	ND	ND	ND		ND	487
	3/24/99	ND	73		16	0.16		8	ND	0.045	ND	ND	ND	ND		ND	440
	9/27/99	Dry	Dry		Dry	Dry		Dry	Dry	Dry	Dry	Dry	Dry	Dry		Dry	Dry
	3/29/00	0.15	90		15	0.15		7.9	ND	0.1	ND	ND	ND	ND		ND	512
	10/4/00	0.063	64		14	ND		7.4	ND	0.058	ND	ND	ND	ND		ND	424
	4/11/01	ND	95		21	0.17		7.7	ND	0.057	ND	ND	ND	ND		ND	514
	10/1/01	0.09	93		17	0.16		7.6	ND	0.068	ND	ND	ND	ND		ND	504
	3/19/02	0.084	990		21	0.18		7.94	ND	0.046	ND	ND	ND	ND		ND	495
	9/17/02	ND	80		11	0.18		7.48	ND	ND	ND	ND	ND	ND		ND	498
	3/17/03	ND	59		11	0.12		7	ND	0.031	ND	ND	ND	ND		ND	334
	9/15/03	0.086	82		19	0.2		7.29	ND	0.067	ND	ND	ND	ND		ND	508
	3/8/04	ND	99		16	0.17		6.26	ND	0.056	ND	ND	ND	ND		ND	534
	9/20/05	ND	82		12	0.19	290	7.77	ND	0.072	ND	ND	ND	ND	ND	ND	500
	3/21/06	0.033	43		14	0.16	330	9.59	ND	0.056	ND	ND	ND	ND	ND	ND	515
	9/26/06	ND	83.2		12.5	0.16	493	7.8	ND	0.073	ND	ND	ND	ND	ND	ND	530
	3/27/07	ND	78		12	0.11	300	7.81	ND	0.064	ND	ND	ND	ND	ND	ND	436
	9/11/07	ND	70		12	ND	290	7.86	ND	0.071	ND	ND	ND	ND	ND	ND	909
	3/12/08	ND	72		13	ND	270	7.92	ND	0.059	ND	ND	ND	ND	ND	ND	337
	9/23/08	ND	63		11	ND	310	8.06	ND	0.064	ND	ND	ND	ND	ND	ND	559
	9/30/09	ND	59		9.5	ND	270	7.81	ND	0.059	ND	ND	ND	ND	ND	ND	414
	3/23/10	ND	60		9.9	ND	280	7.43	ND	0.055	ND	ND	ND	ND	ND	ND	481
	9/9/10	ND	61		12	ND	290	7.75	ND	0.061	ND	ND	ND	ND	ND	ND	445
	3/23/11	ND	26		1.7	ND	310	6.93	ND	0.062	ND	ND	ND	ND	ND	ND	403
	9/27/11	ND	57		12	ND	240	7.5	ND	0.062	ND	ND	ND	ND	ND	ND	381
	3/28/12	ND	65		13	ND	210	7.99	ND	0.062	ND	ND	ND	ND	0.0058	ND	394
	9/18/12	0.04	61		12	ND	200	6.27	ND	0.066	ND	ND	ND	ND	ND	ND	437
	3/13/13	0.033	67		14	0.22	320	7.13	ND	0.057	ND	ND	ND	ND	0.0042	0.00066	276
	9/17/13	ND	64		12	ND	320	7.39	ND	0.071	ND	ND	ND	ND	0.0066	ND	349
	3/19/14	ND	49		14	ND	280	7.4	ND	0.05	ND	ND	ND	ND	0.0043	ND	243
	9/24/14	ND	69		14	0.28	320	7.23	ND	0.0621	ND	ND	ND	ND	0.00698	ND	409
	3/18/15	ND	64		12	ND	280	7.96	ND	0.058	ND	ND	ND	ND	0.0063	ND	461
	9/29/15	ND	60		15	ND	380	7.59	0.0011	0.078	ND	ND	ND	ND	0.0099	ND	429
	4/6/16	ND	58		13	ND	260	8.4	ND	0.062	ND	ND	ND	ND	ND	ND	328
	10/18/16	ND	62		13	ND	310	7.18	0.0015	0.078	ND	ND	ND	ND	0.0084	ND	452
	4/9/17	ND	55		13	ND	300	9.69	ND	0.0518	ND	ND	ND	ND	ND	ND	270
	10/6/17	ND	78		13	ND	420	7.47	ND	0.0971	ND	ND	ND	ND	0.0068	ND	659

Prepared by:
Checked by:
Reviewed by:

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW20												
		2016-07-12	2016-07-12	2016-09-08	2016-11-08	2016-12-07	2017-01-10	2017-02-28	2017-03-28	2017-04-27	2017-04-27	2017-06-26	2017-08-22	2017-10-04
		FD	N	N	N	N	N	N	N	FD	N	N	N	N
Appendix III Parameters														
Boron	mg/L	1.7	1.7	0.28	0.92	0.97	0.52	0.27	0.63	0.84	0.88	1.4	1.5 O	2.1
Calcium	mg/L	130	120	71	97	100	91	76	96	100	110	110	130 O	94
Chloride	mg/L	7.8	7.6	12	12	11	12	12	14	14	15	14	17 O	19
Fluoride	mg/L	0.18 J	0.18 J	0.27 J	0.36 J	0.36 J	0.31 J	0.24 J	0.24 J	0.17 J	0.19 J	0.23 J	0.18 JO	0.2 J
Sulfate	mg/L	300 J+	300 J+	44	190	180	94	69	140	170	170	220	310 O	270
Total Dissolved Solids	mg/L	760	740	290	570	600	420	370	480	550	560	630	750 O	780
pH	SU		7.04	7.31	6.96	7.18	7.05	7.14	6.79		7.1	7.1	6.68	6.47
Appendix IV Parameters														
Antimony	mg/L	< 0.0020 U	0.00058 J	< 0.0020 U	< 0.0020 U	< 0.002 U	< 0.002 U	0.0022	0.00036 J	< 0.002 U	< 0.002 U	< 0.002 U	0.0012 JO	< 0.002 U
Arsenic	mg/L	0.017	0.018	0.016	0.01	0.011	0.01	0.0064	0.0076	0.0059	0.0062	0.0089	0.41 O	0.011
Barium	mg/L	0.084	0.081	0.030 J-	0.041	0.036	0.03	0.022	0.032	0.036	0.037	0.04	0.25 O	0.068
Beryllium	mg/L	0.00020 JO	0.0012 O	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00036 J	< 0.001 U	0.00061 JO	< 0.001 U
Cadmium	mg/L	< 0.0010 U	0.00015 J	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00043 JO	< 0.001 U
Chromium	mg/L	< 0.0020 U	0.0015 J	< 0.0020 U	< 0.0020 U	0.00085 J	0.00053 J	0.0013 J	0.00043 J	< 0.002 U	< 0.002 U	0.0013 J	0.036 O	< 0.002 U
Cobalt	mg/L	0.00056 J	0.00077 J	0.00034 J	0.00087 J	0.0018	0.0012	0.00097 J	0.00091 J	0.0012	0.0014	0.0019	0.0019 O	0.0007 J
Fluoride	mg/L	0.18 J	0.18 J	0.27 J	0.36 J	0.36 J	0.31 J	0.24 J	0.24 J	0.17 J	0.19 J	0.23 J	0.18 JO	0.2 J
Lead	mg/L	0.00026 J	0.00041 J	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00027 J	< 0.001 U	0.0005 J	< 0.001 U	0.00099 JO	< 0.001 U
Lithium	mg/L	0.0040 J	0.0041 J	< 0.0080 U	< 0.0080 U	0.0011 J	0.0012 J	0.0014 J	< 0.008 U	0.0036 J	0.0037 J	< 0.04 U	0.0047 J+O	0.0043 J
Mercury	mg/L	0.00017 J	< 0.00020 U	< 0.00020 U	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJO	< 0.0002 U
Molybdenum	mg/L	0.12	0.12	0.13	0.1	< 0.25 U	0.074	0.1	0.073 J+	0.06	0.067	0.075	0.19 O	0.19
Radium 226 + 228	pci/l	1.01	0.995	0.753	0.797 J+	0.575	0.376	< 0.416 U	< 0.358 U	< 0.3 U	< 0.259 U	0.8	2.75 O	
Radium-226	pci/l	0.487	0.485	0.327	< 0.361 U	0.373 J+	< 0.24 U	0.194	< 0.107 U	0.115	0.151	0.549	1.19 O	
Radium-228	pci/l	0.524	0.51	0.427	0.473 J+	0.202	< 0.376 U	< 0.416 U	< 0.358 U	< 0.3 U	< 0.259 U	< 0.372 U	1.55 O	
Selenium	mg/L	0.00029 J	0.0012 J	< 0.0050 U	0.0038 J	0.01	0.0069	0.0047 J	0.005	0.002 J	0.0024 J	0.0019 J	0.1 O	0.0011 J
Thallium	mg/L	< 0.0010 U	0.00016 J	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00021 JO	< 0.001 U
Field Parameters														
Dissolved Oxygen	mg/L		0.31	0.25	0.32	0.23	0.19	0.17	0.24		0.22	0.17	0.04	0.45
Oxidation-Reduction Potential	millivolts		-99.7	-98.4	-57.3	50.6	-43.4	-76.2	-100.9		-97.9	-65	-56.1	-42.6
pH	SU		7.04	7.31	6.96	7.18	7.05	7.14	6.79		7.1	7.1	6.68	6.47
Specific Conductance	uS/cm		914	496	892	884	647	574	702		768	988	1084	1119
Temperature	deg c		16.48	20.97	19.24	12.1	14.22	12.52	11.89		11.94	14.93	17.52	17.69
Turbidity	NTU		4.9	3.14	4.91	4.69	4.78	4.64	3.14		4.83	4.88	4.87	4.12

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW21												
		2016-07-12	2016-09-07	2016-11-08	2016-12-07	2016-12-07	2017-01-10	2017-03-01	2017-03-28	2017-04-27	2017-06-26	2017-08-22	2017-10-04	2017-10-04
		N	N	N	FD	N	N	N	N	N	N	N	FD	N
Appendix III Parameters														
Boron	mg/L	1.2	1	0.86	1	1	1	0.95	1	0.86	1	0.88	1.1	1.1
Calcium	mg/L	53	48	49	50	45	51	54	56	61	49	66	48	48
Chloride	mg/L	2.9	2.7	2.4	2.3	2.3	2.4	2.6	2.8	4	2.5	3.6	2.1	2.1
Fluoride	mg/L	0.15 J	0.20 J	0.19 J	0.19 J	0.19 J	0.17 J	0.17 J	0.19 J	0.15 J	0.19 J	0.15 J	0.22 J	0.22 J
Sulfate	mg/L	93 J+	65	62	54	59	51	56	48	56	51	54	45	46
Total Dissolved Solids	mg/L	310	250	270	270	280	230	270	270	330	240	330	270	260
pH	SU	7.21	7.73	7.07		7.4	7.05	7.2	6.71	6.8	7.13	6.41		6.51
Appendix IV Parameters														
Antimony	mg/L	0.00024 J	< 0.0020 U	< 0.0020 U	< 0.01 U	< 0.002 U	< 0.002 U	< 0.002 U	0.0014 J	< 0.002 U	< 0.002 U	< 0.002 U		
Arsenic	mg/L	0.0057	0.0074	0.0072	0.0065 J	0.0074	0.0072	0.0078	0.0085	0.0071	0.0075	0.011		
Barium	mg/L	0.048	0.044 J-	0.044	0.038	0.041	0.04	0.048	0.051	0.057	0.041	0.068		
Beryllium	mg/L	0.00071 J	< 0.0010 U	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U		
Cadmium	mg/L	0.000071 J	< 0.0010 U	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U		
Chromium	mg/L	0.00070 J	0.00068 J	< 0.0020 U	0.012	0.00076 J	0.00079 J	< 0.002 U	0.001 J	0.00098 J	< 0.002 U	< 0.002 U		
Cobalt	mg/L	0.0011	0.0012	0.0017	< 0.005 U	< 0.001 U	0.00085 J	0.0024	0.003	0.0048	0.0029	0.005		
Fluoride	mg/L	0.15 J	0.20 J	0.19 J	0.19 J	0.19 J	0.17 J	0.17 J	0.19 J	0.15 J	0.19 J	0.15 J	0.22 J	0.22 J
Lead	mg/L	0.00032 J	< 0.0010 U	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00043 J	< 0.001 U	< 0.001 U	0.00045 J		
Lithium	mg/L	0.0010 J	0.0013 J	< 0.0080 U	0.00083 J	0.0009 J	0.00072 J	0.0005 J	< 0.008 U	< 0.008 U	< 0.04 U	< 0.008 U		
Mercury	mg/L	< 0.00020 U	< 0.00020 U	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ		
Molybdenum	mg/L	0.0053 U	0.0063 J	0.0065 J	< 0.05 U	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	0.0052 J	0.006 J	0.0054 J		
Radium 226 + 228	pci/l	< 0.412 U	< 0.4 U	0.513 J+	0.55	0.739	< 0.522 U	0.428	< 0.677 U	0.505	0.462	< 0.324 U		
Radium-226	pci/l	0.184	0.187	0.299	0.321 J+	0.2 J+	< 0.285 U	0.2	0.231	0.283	< 0.09 U	0.188		
Radium-228	pci/l	< 0.412 U	< 0.4 U	< 0.448 U	0.228	0.539	< 0.522 U	< 0.419 U	< 0.677 U	< 0.248 U	0.373	< 0.324 U		
Selenium	mg/L	0.00059 J	0.00070 J	< 0.0050 U	< 0.025 U	< 0.005 U	0.00084 J	< 0.005 U	0.0012 J	< 0.005 U	< 0.005 U	0.00092 J		
Thallium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U		
Field Parameters														
Dissolved Oxygen	mg/L	0.2	0.25	0.31		0.29	0.21	0.35	0.19	0.83	0.81	0.48		0.08
Oxidation-Reduction Potential	millivolts	-73	729	-65.6		-79.3	-67.2	-77.6	-52.9	-28.2	-45.1	2.4		-19
pH	SU	7.21	7.73	7.07		7.4	7.05	7.2	6.71	6.8	7.13	6.41		6.51
Specific Conductance	uS/cm	356	408	436		406	388	463	435	479	452	516		413
Temperature	deg c	13.14	17.04	15.25		13.12	11.22	8.98	8.9	9.28	13.23	15.76		16.08
Turbidity	NTU	1.53	1.18	1.2		1.56	2.39	3.03	4.76	3.2	0.86	1.07		0.77

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW21B												
		2016-07-12	2016-09-07	2016-11-08	2016-11-08	2016-12-07	2017-01-10	2017-01-10	2017-03-01	2017-03-28	2017-04-27	2017-06-26	2017-08-23	2017-10-04
		N	N	FD	N	N	FD	N	N	N	N	N	N	N
Appendix III Parameters														
Boron	mg/L	3.2	3.6	5.2	5.3	5.4	5.1	5.1	4.1	3.5	2.9	3.4	3.8	4
Calcium	mg/L	120	120	130	130	130	150	150	140	140	130	150	140	150
Chloride	mg/L	28	36	34	35	33	33	33	29	35	30	37	41	40
Fluoride	mg/L	0.21 J	0.22 J	< 10 U	< 10 U	< 10 U	0.18 J	0.18 J	0.2 J	0.17 J	0.19 J	0.14 J	< 5 U	0.17 J
Sulfate	mg/L	610 J+	590	630	650	590	560	580	530	550	480	590	660	650 J-
Total Dissolved Solids	mg/L	1000	1100	1100	1200	1100	1100	1000	1000	1100	970	1100	1200	1300
pH	SU	7.29	7.32		7.07	7.2		6.99	7.5	6.89	7.3	7.24	6.51	6.54
Appendix IV Parameters														
Antimony	mg/L	0.00022 J	< 0.0020 U	< 0.0020 U	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.0026 J	0.0021 J	0.0018 J	0.0018 J	0.0019 J	0.0018 J	0.0017 J	< 0.005 U	0.0017 J	0.0019 J	0.0023 J	0.0019 J	
Barium	mg/L	0.079	0.083 J-	0.085	0.086	0.084	0.082	0.083	0.067	0.073	0.067	0.073	0.069	
Beryllium	mg/L	0.00051 J	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	0.00013 J	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	< 0.0020 U	0.00037 J	< 0.0020 U	< 0.0020 U	< 0.002 U	0.00034 J	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.00036 J	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	0.00013 J	< 0.001 U	< 0.001 U	0.00022 J	< 0.001 U	0.00022 J	< 0.001 U	
Fluoride	mg/L	0.21 J	0.22 J	< 10 U	< 10 U	< 10 U	0.18 J	0.18 J	0.2 J	0.17 J	0.19 J	0.14 J	< 5 U	0.17 J
Lead	mg/L	0.00082 J	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00029 J	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	0.0027 J	0.0029 J	0.0018 J	0.0019 J	0.0048 J	0.004 J	0.004 J	0.0028 J	< 0.008 U	0.0022 J	< 0.04 U	0.0033 J+	
Mercury	mg/L	< 0.00020 U	< 0.00020 U	< 0.00020 U	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	0.7	0.84	1.2	1.3	1.1	1.1	1.1	0.75	0.59	0.53	0.62	0.6	
Radium 226 + 228	pci/l	0.947	1.34	2.07 J+	1.84 J+	1.52	2.6 J	1.72 J	0.884	0.824	0.797	0.842	1.3	
Radium-226	pci/l	0.931	0.875	0.901	1.17	0.926 J+	0.929	0.786	0.654	0.434	0.575	0.499	0.791	
Radium-228	pci/l	< 0.524 U	0.469	1.17 J+	0.674 J+	0.593	1.67 J	0.93 J+	< 0.354 U	0.391	< 0.299 U	0.344	0.514	
Selenium	mg/L	0.00067 J	0.00066 J	< 0.0050 U	< 0.0050 U	< 0.005 U	0.00062 J	0.00049 J	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	
Thallium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters														
Dissolved Oxygen	mg/L	1.89	0.43		0.27	0.23		0.43	0.24	0.29	0.26	0.23	0.45	0.17
Oxidation-Reduction Potential	millivolts	-80.4	-77.9		-82.7	-87.4		-88.2	-109.2	-95.4	-98.3	-86.5	77.3	-5.8
pH	SU	7.29	7.32		7.07	7.2		6.99	7.5	6.89	7.3	7.24	6.51	6.54
Specific Conductance	uS/cm	1099	1449		1496	1521		1479	1418	1280	1164	1588	1536	1634
Temperature	deg c	11.89	14.25		13.01	12.25		12.11	11.07	11.08	10.81	11.95	12.76	13.49
Turbidity	NTU	4.21	3.05		1.07	1.16		1.24	3.96	2.9	4.53	3.97	3.21	1.59

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW22										
		2016-07-12	2016-09-07	2016-11-08	2016-12-07	2017-01-10	2017-03-01	2017-03-28	2017-04-28	2017-06-27	2017-08-23	2017-10-04
		N	N	N	N	N	N	N	N	N	N	N
Appendix III Parameters												
Boron	mg/L	0.95	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.6	1.6	1.7
Calcium	mg/L	98	99	97	120	140	110	130	120	120	130	110
Chloride	mg/L	2.7	2.9	3.9 J	4.1 J	4.2 J	3.6	4.1 J	4.2	4.2	4.6 J	4.8
Fluoride	mg/L	0.20 J	0.21 J	0.20 J	0.2 J	0.2 J	0.16 J	< 5 U	0.16 J	0.2 J	0.14 J	0.2 J
Sulfate	mg/L	100 J+	130	140	180	200	160	220	180	170	190	160
Total Dissolved Solids	mg/L	390	430	490	580	600	530	590	580	550	610	570
pH	SU	7.19	7.56	6.9	7.02	6.68	7.15	6.5	6.69	7.01	6.62	6.53
Appendix IV Parameters												
Antimony	mg/L	< 0.0020 U	< 0.0020 U	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.0045 J	0.0041 J	0.0062	0.0032 J	0.0028 J	< 0.005 U	0.0018 J	0.0018 J	0.0019 J	0.0035 J	
Barium	mg/L	0.072	0.059 J-	0.079	0.081	0.078	0.063	0.08	0.076	0.065	0.099	
Beryllium	mg/L	0.00030 J	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	< 0.0020 U	< 0.0020 U	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.00059 J	0.0014	0.0011	0.0019	0.0025	0.0025	0.0025	0.0024	0.0018	0.0024	
Fluoride	mg/L	0.20 J	0.21 J	0.20 J	0.2 J	0.2 J	0.16 J	< 5 U	0.16 J	0.2 J	0.14 J	0.2 J
Lead	mg/L	0.00026 J	< 0.0010 U	0.00017 J	< 0.001 U	< 0.001 U	< 0.001 U	0.00027 J	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	0.0013 J	0.0013 J	< 0.0080 U	0.00081 J	0.0012 J	0.00073 J	< 0.008 U	< 0.008 U	< 0.04 U	0.0019 J+	
Mercury	mg/L	0.00010 J	< 0.00020 U	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	0.0048 U	0.0055 J	0.014	< 0.01 U	0.015	0.012	0.011 J+	0.0059 J	0.0089 J	0.007 J	
Radium 226 + 228	pci/l	< 0.533 U	< 0.43 U	0.686 J+	0.503	< 0.447 U	0.5	0.515	< 0.281 U	0.443	0.443	
Radium-226	pci/l	0.247	0.267	< 0.38 U	0.375 J+	< 0.279 U	0.255	0.153	0.157	0.171	0.305	
Radium-228	pci/l	< 0.533 U	< 0.43 U	< 0.443 U	0.128	< 0.447 U	< 0.413 U	< 0.365 U	< 0.281 U	< 0.327 U	< 0.352 U	
Selenium	mg/L	0.00034 J	0.00060 J	< 0.0050 U	< 0.005 U	0.00066 J	< 0.005 U	0.00064 J	< 0.005 U	< 0.005 U	< 0.005 U	
Thallium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters												
Dissolved Oxygen	mg/L	0.39	0.2	0.25	0.49	0.31	0.29	0.72	0.41	0.12	0.2	0.21
Oxidation-Reduction Potential	millivolts	-79.7	741.8	-31.2	-50	7.5	-79.5	15.4	-16.9	-17.1	44.9	-5.5
pH	SU	7.19	7.56	6.9	7.02	6.68	7.15	6.5	6.69	7.01	6.62	6.53
Specific Conductance	uS/cm	502	700	738	867	858	831	785	860	797	865	836
Temperature	deg c	14.12	17.49	15.63	13.12	10.72	8.47	8.39	9.5	13.24	16.32	16.97
Turbidity	NTU	4.66	2.31	2.12	2.89	3.09	4.21	3.14	4.4	4.87	3.34	3.69

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW22B											
		2016-07-13	2016-09-07	2016-11-08	2016-12-07	2017-01-10	2017-03-01	2017-03-01	2017-03-28	2017-04-28	2017-06-27	2017-08-23	2017-10-04
		N	N	N	N	N	FD	N	N	N	N	N	N
Appendix III Parameters													
Boron	mg/L	17	16	17	18	17	17	18	17	17	17	18	18
Calcium	mg/L	390	350	400	390	410	400	400	350	360	330	380	350
Chloride	mg/L	470	690	840	790	760	690	670	740	770	760	790	750
Fluoride	mg/L	0.35 J	< 100 U	< 200 U	< 200 U	< 50 U	< 50 U	< 50 U	< 50 U	< 100 U	< 100 U	< 50 U	< 50 U
Sulfate	mg/L	7100 J+	7400	9000	8400	7700	7500	6800	7000	6900	7300	7500	8500 J-
Total Dissolved Solids	mg/L	9600	12000	14000	14000	13000	13000	12000	12000	12000	11000	13000	13000
pH	SU	7.53	7.42	7.31	7.21	7.18		7.66	7.02	7.15	7.37	7.21	6.91
Appendix IV Parameters													
Antimony	mg/L	< 0.0020 U	< 0.0020 U	< 0.010 U	< 0.01 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.01 U	< 0.002 U	
Arsenic	mg/L	0.0026 J	0.0021 J	0.0027 J	0.0029 J	0.0025 J	< 0.005 U	< 0.005 U	0.002 J	0.002 J	< 0.025 U	0.0019 J	
Barium	mg/L	0.075	0.070 J-	0.077	0.08	0.081	0.075	0.078	0.072	0.067	0.064	0.068	
Beryllium	mg/L	0.00011 J	< 0.0010 U	< 0.0050 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.005 U	< 0.001 U	
Cadmium	mg/L	0.00035 J	< 0.0010 U	< 0.0050 U	< 0.005 U	< 0.001 U	0.00044 J	0.00045 J	< 0.001 U	0.00046 J	< 0.005 U	0.00049 J	
Chromium	mg/L	0.0012 J	0.0012 J	< 0.010 U	0.0015 J	0.0012 J	< 0.002 U	< 0.002 U	0.0012 J	0.001 J	< 0.01 U	0.0011 J	
Cobalt	mg/L	0.00050 U	0.00018 J	< 0.0050 U	< 0.005 U	0.00026 J	< 0.001 U	< 0.001 U	0.00014 J	< 0.001 U	< 0.005 U	0.0002 J	
Fluoride	mg/L	0.35 J	< 100 U	< 200 U	< 200 U	< 50 U	< 50 U	< 50 U	< 50 U	< 100 U	< 100 U	< 50 U	< 50 U
Lead	mg/L	0.0016	< 0.0010 U	< 0.0050 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00059 J	< 0.001 U	0.0028 J	< 0.001 U	
Lithium	mg/L	0.26	0.25	0.28	0.29	0.3	0.28	0.27	0.29	0.3	0.31	0.32 J+	
Mercury	mg/L	< 0.00020 U	< 0.00020 U	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	< 0.0002 UJ	
Molybdenum	mg/L	3.9	3.1	2.5	2.8	3.2	0.3 J	3.1 J	2.9	3	2.1	2.7	
Radium 226 + 228	pci/l	5.87	6.59	10.5 J+	8.18	9.05	9.06	7.69	6.25	5.53	7.21	7.74	
Radium-226	pci/l	1.93	2.07	4.06	3.17 J+	2.02	1.77	1.83	1.53	1.73	1.57	1.79	
Radium-228	pci/l	3.94	4.53	6.42 J+	5.01	7.02 J+	7.29	5.86	4.71	3.8	5.64	5.94	
Selenium	mg/L	0.0017 J	0.0021 J	< 0.025 U	< 0.025 U	0.0028 J	< 0.005 U	< 0.005 U	0.0026 J	0.002 J	< 0.025 U	0.0016 J	
Thallium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0050 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.005 U	0.00021 J	
Field Parameters													
Dissolved Oxygen	mg/L	1.07	0.34	0.21	0.15	0.13		0.15	0.1	0.11	0.11	0.03	0.16
Oxidation-Reduction Potential	millivolts	-97.2	-88.1	-101.4	-84.7	-103.4		-157.7	-108.2	-126.1	-98	20.1	-6.5
pH	SU	7.53	7.42	7.31	7.21	7.18		7.66	7.02	7.15	7.37	7.21	6.91
Specific Conductance	uS/cm	8594	13730	1512	1577	1510		1536	10170	13680	1478	1397	1496
Temperature	deg c	12.23	13.41	13.09	12.28	12.14		11.35	11.18	11.2	12.38	12.87	13.48
Turbidity	NTU	4.29	3.67	3.76	1.57	2.67		3.44	2.99	4.54	2.97	2.39	1.13

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

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"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW23										
		2016-07-13	2016-09-07	2016-11-08	2016-12-08	2017-01-10	2017-03-01	2017-03-29	2017-04-28	2017-06-27	2017-08-23	2017-10-03
		N	N	N	N	N	N	N	N	N	N	N
Appendix III Parameters												
Boron	mg/L	21	19	24	24	25	26	26	25	23	24	26
Calcium	mg/L	460	430	420	380	490	490	470	500	470	440	450
Chloride	mg/L	11	20	18 J	22	18 J	17	20	15 J	56	17	17
Fluoride	mg/L	0.43 J	0.70 J	0.60 J	< 10 U	0.8 J	0.89 J	0.76 J	0.78 J	< 50 U	0.8 J	1.1 J
Sulfate	mg/L	1700 J+	1700	1600	1200	1600	1500	1700	1700	1600	1700	1600
Total Dissolved Solids	mg/L	2300	2500	2300	2500	2400	2600	2600	2800	2600	2600	2600
pH	SU	8.54	8.5	8.38	8.53	8.22	8.97	8.31	8.72	8.46	8.37	8.12
Appendix IV Parameters												
Antimony	mg/L	0.00089 J	0.00072 J	0.00066 J	< 0.002 U	0.0021	0.006 J+	0.0033	0.0065	0.0022	0.0013 J	
Arsenic	mg/L	0.012	0.019	0.025	0.024 J	0.047	0.12	0.1	0.11	0.11	0.044	
Barium	mg/L	0.043	0.033 J-	0.03	0.035	0.032	0.029	0.031	0.029	0.027	0.029	
Beryllium	mg/L	0.00039 J	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	< 0.0020 U	< 0.0020 U	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.00013 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Fluoride	mg/L	0.43 J	0.70 J	0.60 J	< 10 U	0.8 J	0.89 J	0.76 J	0.78 J	< 50 U	0.8 J	1.1 J
Lead	mg/L	0.00022 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00046 J	
Lithium	mg/L	0.043	0.026	0.027	0.026	0.027	0.027	0.029	0.032	0.026 J	0.026 J+	
Mercury	mg/L	< 0.00020 U	< 0.00020 U	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	0.02	0.0088 J	0.015	< 0.01 U	0.05	0.037	0.067	0.013	0.007 J	0.005 J	
Radium 226 + 228	pci/l	1.33	1.26	1.06 J+	1.48	1.69	0.544	0.411	0.603	0.637	0.9	
Radium-226	pci/l	0.604	0.431	0.391	0.4 J+	0.402	0.328	0.171	0.304	0.293	0.275	
Radium-228	pci/l	0.724	0.834	0.672 J+	1.08	1.28 J+	< 0.376 U	< 0.403 U	0.299	< 0.351 U	0.625	
Selenium	mg/L	0.0016 J	0.0018 J	0.0023 J	0.0032 J	0.0017 J	< 0.005 U	0.0018 J	0.0023 J	0.0015 J	0.0011 J	
Thallium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters												
Dissolved Oxygen	mg/L	0.14	0.2	0.12	0.1	0.11	0.2	0.11	0.15	0.09	0.02	0.04
Oxidation-Reduction Potential	millivolts	-306	-303	-308.5	-344.8	-330.6	-349.2	-341.9	-346.7	-313.6	-272.8	-260
pH	SU	8.54	8.5	8.38	8.53	8.22	8.97	8.31	8.72	8.46	8.37	8.12
Specific Conductance	uS/cm	2075	2624	2800	2829	2657	2956	2580	2677	2811	2711	2736
Temperature	deg c	12.93	15.15	14.78	13.11	13.1	11.53	11.21	11.05	12.45	14.31	14.81
Turbidity	NTU	2.11	0.77	0.28	0.56	0.71	0.25	0.74	0.82	1.77	1.12	0.7

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW23B										
		2016-07-13	2016-09-07	2016-11-08	2016-12-08	2017-01-11	2017-03-01	2017-03-29	2017-04-28	2017-06-27	2017-08-23	2017-10-03
		N	N	N	N	N	N	N	N	N	N	N
Appendix III Parameters												
Boron	mg/L	15	11	13	14	13	13	13	13	14	14	14
Calcium	mg/L	270	250	240	270	250	270	240	250	230	240	240
Chloride	mg/L	570	630	680	630	630	570	690	580	610	640	590
Fluoride	mg/L	0.53 J	< 100 U	< 200 U	< 200 U	1.3 J	< 50 U	< 50 U	< 100 U	< 100 U	< 50 U	1.4 J
Sulfate	mg/L	7900 J+	6800	7400	6200	6500	5800	6300	6200	6100	6200	6000
Total Dissolved Solids	mg/L	10000	11000	11000	11000	10000	11000	11000	11000	9600	11000	11000
pH	SU	8.65	8.32	8.21	8.12	7.69	8.55	7.95	8.48	8.27	8.32	7.89
Appendix IV Parameters												
Antimony	mg/L	< 0.0020 U	< 0.0020 U	< 0.010 U	< 0.01 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.01 U	< 0.002 U	
Arsenic	mg/L	0.0031 J	0.0020 J	< 0.025 U	0.002 J	0.0018 J	< 0.005 U	0.0022 J	0.0022 J	< 0.025 U	0.0019 J	
Barium	mg/L	0.047	0.046 J-	0.048	0.051	0.047	0.045	0.045	0.046	0.041	0.038	
Beryllium	mg/L	0.00042 J	< 0.0010 U	< 0.0050 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.005 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0050 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.005 U	< 0.001 U	
Chromium	mg/L	0.0022	0.0027	0.0025 J	< 0.01 U	0.0022	0.0026	0.0025	0.0023	< 0.01 U	0.0024	
Cobalt	mg/L	0.00053 U	0.00034 J	< 0.0050 U	< 0.005 U	0.00016 J	< 0.001 U	0.00028 J	< 0.001 U	< 0.005 U	< 0.001 U	
Fluoride	mg/L	0.53 J	< 100 U	< 200 U	< 200 U	1.3 J	< 50 U	< 50 U	< 100 U	< 100 U	< 50 U	1.4 J
Lead	mg/L	0.0011	< 0.0010 U	< 0.0050 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.005 U	0.00063 J	
Lithium	mg/L	0.092	0.086	0.068	0.072	0.062	0.078	0.065	0.074	0.35	0.06 J+	
Mercury	mg/L	0.000090 U	< 0.00020 U	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	0.037	0.036	0.043 J	0.077	0.044	0.05	0.055	0.046	0.043 J	0.05	
Radium 226 + 228	pci/l	3.9	4.22	5.05 J+	4.49	5.18	4.13	4.05	3.19	3.46	4.38	
Radium-226	pci/l	1.12	1.1	1.37	1.01 J+	1.09	0.871	1	0.936	0.83	0.806	
Radium-228	pci/l	2.78	3.12	3.68 J+	3.48	4.08 J+	3.26	3.05	2.26	2.63	3.58	
Selenium	mg/L	0.0031 J	0.0014 J	< 0.025 U	< 0.025 U	0.0021 J	< 0.005 U	0.002 J	0.0015 J	< 0.025 U	0.0013 J	
Thallium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0050 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.005 U	< 0.001 U	
Field Parameters												
Dissolved Oxygen	mg/L	0.25	0.14	0.19	0.12	0.54	0.35	0.33	0.25	0.14	0.16	0.07
Oxidation-Reduction Potential	millivolts	-262.8	-180	-203.8	-249.3	-145.2	-240.3	-223.6	-231.8	-178.6	-186.7	-213.7
pH	SU	8.65	8.32	8.21	8.12	7.69	8.55	7.95	8.48	8.27	8.32	7.89
Specific Conductance	uS/cm	9658	12860	1362	1359	1306	1360	10400	10830	1253	1226	1229
Temperature	deg c	12.89	14.21	13.08	12.61	12.55	12.49	12.54	12.24	12.79	13.47	13.75
Turbidity	NTU	4.37	2.49	2.72	0.97	0.79	0.79	0.61	1.75	1.51	1.2	0.66

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW24											
		2016-11-11	2016-12-07	2017-01-09	2017-02-28	2017-03-27	2017-04-25	2017-04-25	2017-06-27	2017-06-27	2017-08-24	2017-10-03	2017-10-03
		N	N	N	N	N	FD	N	FD	N	N	FD	N
Appendix III Parameters													
Boron	mg/L	0.081 J	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	0.11 J	0.15 J
Calcium	mg/L	66	61	80	51	72	76	76	51	67	69	82	82
Chloride	mg/L	16	14	32	3.6	11	19	20	24	24	16	30	30
Fluoride	mg/L	< 5.0 U	0.11 J	0.11 J	0.13 J	0.1 J	0.1 J	0.094 J	0.15 J	0.15 J	0.11 J	0.18 J	0.18 J
Sulfate	mg/L	58	43	51	44	46	63	60	58	58	67	75	73
Total Dissolved Solids	mg/L	270	320	340	210	340	310	310	330	330	330	390	430
pH	SU	7.47	7.29	7.17	7.31	7.01		7.49		7.31	6.5		6.11
Appendix IV Parameters													
Antimony	mg/L	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U		
Arsenic	mg/L	0.0023 J	0.0023 J	0.0019 J	0.00035 J	0.0017 J	0.0017 J	0.0017 J	0.0014 J	0.0019 J	0.0019 J		
Barium	mg/L	0.048	0.049	0.055	0.02	0.039	0.041	0.043	0.028	0.037	0.036		
Beryllium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U		
Cadmium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U		
Chromium	mg/L	0.00026 J	0.00027 J	< 0.002 U	0.00052 J	0.00034 J	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U		
Cobalt	mg/L	0.00028 J	< 0.001 U	0.00041 J	< 0.001 U	0.00032 J	0.00032 J	0.00039 J	< 0.001 U	0.00019 J	< 0.001 U		
Fluoride	mg/L	< 5.0 U	0.11 J	0.11 J	0.13 J	0.1 J	0.1 J	0.094 J	0.15 J	0.15 J	0.11 J	0.18 J	0.18 J
Lead	mg/L	0.00029 J	< 0.001 U	< 0.001 U	< 0.001 U	0.00039 J	0.0006 J	0.0008 J	< 0.001 U	< 0.001 U	< 0.001 U		
Lithium	mg/L	< 0.0080 U	0.0029 J	0.0029 J	0.0015 J	< 0.008 U	0.004 J	0.004 J	< 0.04 U	< 0.04 U	0.0028 J+		
Mercury	mg/L	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ		
Molybdenum	mg/L	0.0018 J	< 0.01 U	< 0.01 U	0.0031 J	0.0018 J	0.0024 J	0.002 J	0.003 J	0.0013 J	< 0.01 U		
Radium 226 + 228	pci/l	0.882	0.727	0.997	0.629	< 0.38 U	0.308	< 0.361 U	0.538	0.478	< 0.354 U		
Radium-226	pci/l	< 0.383 U	0.371 J+	0.433	0.195	0.137	0.193	0.149	0.243	0.172	0.176		
Radium-228	pci/l	0.526	0.357	0.564 J+	< 0.495 U	< 0.38 U	< 0.263 U	< 0.361 U	< 0.358 U	< 0.319 U	< 0.354 U		
Selenium	mg/L	< 0.0050 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U		
Thallium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U		
Field Parameters													
Dissolved Oxygen	mg/L	0.55	0.44	0.35	0.22	0.13		0.26		0.14	0.26		0.12
Oxidation-Reduction Potential	millivolts	-102.1	-9.9	-63	-68.3	-74.3		-101.1		-97.1	64.4		61.3
pH	SU	7.47	7.29	7.17	7.31	7.01		7.49		7.31	6.5		6.11
Specific Conductance	uS/cm	415	516	574	536	475		504		516	514		553
Temperature	deg c	14.53	12.14	9.52	8.72	8.95		12.63		13.34	15.75		16.16
Turbidity	NTU	2.56	4.35	4.67	4.38	4.77		4.4		4.61	2.82		2.92

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW24B										
		2016-11-11	2016-12-07	2017-01-09	2017-02-28	2017-02-28	2017-03-27	2017-04-25	2017-06-27	2017-08-24	2017-08-24	2017-10-03
		N	N	N	FD	N	N	N	N	FD	N	N
Appendix III Parameters												
Boron	mg/L	0.083 J	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	0.11 J
Calcium	mg/L	55	51	58	50 J	73 J	52	51	51	56	57	54
Chloride	mg/L	6.5	6.2	5.2	3.7 J	18 J	4.3	3.3	3.8	9.9	11	8.4
Fluoride	mg/L	0.14 J	0.13 J	0.14 J	0.13 J	0.11 J	0.14 J	0.12 J	0.15 J	0.14 J	0.12 J	0.16 J
Sulfate	mg/L	55	46	47	51	56	51	52	51	57	61	45
Total Dissolved Solids	mg/L	210	250	230 J+	230 J	320 J	250	210	230	280	290	260
pH	SU	7.12	7.42	7.24		7.55	7.39	7.83	7.61		6.97	6.5
Appendix IV Parameters												
Antimony	mg/L	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.00050 J	0.00041 J	< 0.005 U	< 0.005 U	0.0016 J	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	
Barium	mg/L	0.026	0.024	0.022	0.02 J	0.045 J	0.02	0.019	0.019	0.02	0.022	
Beryllium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	0.0011 J	0.00027 J	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.00031 J	< 0.001 U	0.00019 J	< 0.001 U	0.00023 J	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00023 J	
Fluoride	mg/L	0.14 J	0.13 J	0.14 J	0.13 J	0.11 J	0.14 J	0.12 J	0.15 J	0.14 J	0.12 J	0.16 J
Lead	mg/L	0.00069 J	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00028 J	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	< 0.0080 U	0.0016 J	0.0019 J	0.0015 J	0.0026 J	< 0.008 U	0.0022 J	< 0.04 U	0.0018 J+	0.0019 J+	
Mercury	mg/L	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	< 0.0002 UJ	
Molybdenum	mg/L	0.0029 J	< 0.01 U	< 0.01 U	0.0088 J	0.0021 J	0.0017 J	0.0016 J	0.0019 J	0.0045 J	0.0016 J	
Radium 226 + 228	pci/l	0.699	0.96	0.63	< 0.454 U	0.372	< 0.357 U	0.323	< 0.296 U	0.521	< 0.35 U	
Radium-226	pci/l	0.456	0.418 J+	< 0.242 U	< 0.152 U	0.166	< 0.0976 U	0.091	0.103	0.16	0.109	
Radium-228	pci/l	< 0.4 U	0.541	< 0.472 U	< 0.454 U	< 0.371 U	< 0.357 U	< 0.278 U	< 0.296 U	< 0.435 U	< 0.35 U	
Selenium	mg/L	< 0.0050 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	
Thallium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters												
Dissolved Oxygen	mg/L	2.23	0.56	0.79		0.49	2.1	0.28	1.31		0.64	0.52
Oxidation-Reduction Potential	millivolts	-92.4	-123.4	-87.1		-119.4	-113.2	-129.3	-110.7		-42.2	-20.4
pH	SU	7.12	7.42	7.24		7.55	7.39	7.83	7.61		6.97	6.5
Specific Conductance	uS/cm	304	404	372		320	336	347	371		359	394
Temperature	deg c	12.8	12.46	11.55		11.11	10.71	14.23	11.86		12.94	13.51
Turbidity	NTU	4.76	4.41	3.66		4.8	4.97	4.97	3.82		3.24	4.3

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW25								
		2016-11-10	2016-12-08	2017-01-11	2017-03-01	2017-03-29	2017-04-26	2017-06-28	2017-08-24	2017-10-03
		N	N	N	N	N	N	N	N	N
Appendix III Parameters										
Boron	mg/L	0.3	0.24	0.21	0.16 J	0.21	0.22	0.2	0.25	0.19 J
Calcium	mg/L	76	65	81	61	90	79	77	82	81
Chloride	mg/L	3.1 J	2.2	2.9	1.8	1.5	1.5 J	1.9	1.5 J	1.8 J
Fluoride	mg/L	2.3 J	1.9 J	1.8 J-	1.9	1.9	1.6 J	1.7	1.9 J	1.6 J
Sulfate	mg/L	94	67	70	89	85	64	67	110	82
Total Dissolved Solids	mg/L	400	360	330	350	330	350	360	400	350
pH	SU	6.72	7.26	6.82	7.6	7.16	6.82	6.89	6.61	6.83
Appendix IV Parameters										
Antimony	mg/L	0.00073 J	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	0.00077 J	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.0020 J	0.0025 J	0.0019 J	< 0.005 U	< 0.005 U	0.002 J	0.0018 J	0.002 J	
Barium	mg/L	0.036	0.033	0.031	0.024	0.073	0.03	0.03	0.034	
Beryllium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	0.00029 J	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.0039 O	0.002	0.0019	0.0012	0.00015 J	0.0014	0.0011	0.00085 J	
Fluoride	mg/L	2.3 J	1.9 J	1.8 J-	1.9	1.9	1.6 J	1.7	1.9 J	1.6 J
Lead	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	0.00046 J	0.0042 J	0.0031 J	0.0044 J	< 0.008 U	0.0026 J	< 0.04 U	0.0027 J+	
Mercury	mg/L	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	0.0097 J	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	0.0054 J	0.0057 J	0.0049 J	
Radium 226 + 228	pci/l	< 0.393 U	0.794	0.813 J+	0.602	< 0.37 U	< 0.251 U	0.308	< 0.386 U	
Radium-226	pci/l	< 0.385 U	0.246 J+	0.264	< 0.124 U	0.169	< 0.105 U	0.0754	0.0896	
Radium-228	pci/l	< 0.393 U	0.547	0.549 J+	0.535	< 0.37 U	< 0.251 U	< 0.306 U	< 0.386 U	
Selenium	mg/L	0.0010 J	0.0014 J	0.0022 J	< 0.005 U	< 0.005 U	0.0038 J	0.0026 J	0.0026 J	
Thallium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters										
Dissolved Oxygen	mg/L	0.53	0.96	1.28	7.85	5.78	1.92	0.23	1.17	0.08
Oxidation-Reduction Potential	millivolts	-12.2	172.1	24.7	27	-20.6	214.1	33.4	56.9	-4.7
pH	SU	6.72	7.26	6.82	7.6	7.16	6.82	6.89	6.61	6.83
Specific Conductance	uS/cm	527	544	561	568	485	519	541	575	542
Temperature	deg c	16.23	8.04	10.24	7.82	8.68	10.74	13.26	16.39	15.73
Turbidity	NTU	0.76	4.44	2.87	1.17	1.4	1.31	1.8	0.94	0.71

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW25B									
		2016-11-10	2016-11-10	2016-12-08	2017-01-11	2017-03-02	2017-03-29	2017-04-26	2017-06-28	2017-08-24	2017-10-03
		FD	N	N	N	N	N	N	N	N	N
Appendix III Parameters											
Boron	mg/L	0.29	0.29	0.36	0.27	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	< 0.2 U	0.17 J
Calcium	mg/L	110	99	100	100	94	62	86	83	75	77
Chloride	mg/L	4.9 J	5	4.9 J	5.6	6.5	7.8	7.4	7.1	6.9	6.8
Fluoride	mg/L	0.16 J	0.16 J	0.14 J	0.15 J	0.19 J	0.19 J	0.14 J	0.22 J	0.15 J	0.23 J
Sulfate	mg/L	76	74	62	62	62	59	56	61	71	62
Total Dissolved Solids	mg/L	410	440	450	390	390	360	380	400	370	350
pH	SU		6.66	7.06	6.72	7.33	6.79	7.16	7.01	6.65	6.46
Appendix IV Parameters											
Antimony	mg/L	< 0.0020 U	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.0014 J	0.0011 J	0.00053 J	0.00041 J	< 0.005 U	0.0019 J	< 0.005 U	< 0.005 U	< 0.005 U	
Barium	mg/L	0.076	0.075	0.088	0.084	0.071	0.023	0.069	0.064	0.058	
Beryllium	mg/L	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	0.00053 J	< 0.0020 U	< 0.002 U	0.00038 J	0.00031 J	0.00036 J	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.00044 J	0.00031 J	< 0.001 U	< 0.001 U	< 0.001 U	0.0011	0.00022 J	< 0.001 U	< 0.001 U	
Fluoride	mg/L	0.16 J	0.16 J	0.14 J	0.15 J	0.19 J	0.19 J	0.14 J	0.22 J	0.15 J	0.23 J
Lead	mg/L	0.00063 J	0.00045 J	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	< 0.0080 U	0.00068 J	0.0027 J	0.0022 J	0.0019 J	< 0.008 U	0.0029 J	< 0.04 U	0.0018 J+	
Mercury	mg/L	< 0.00020 U	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	0.0010 J	0.0014 J	< 0.01 U	< 0.01 U	0.00096 J	< 0.01 U	< 0.01 U	< 0.01 U	< 0.01 U	
Radium 226 + 228	pci/l	1.23	0.66	0.744	0.826 J+	0.826	< 0.382 U	0.299	0.464	1.12	
Radium-226	pci/l	< 0.532 U	0.554	0.232 J+	0.445	0.297	< 0.0983 U	0.293	0.206	0.28	
Radium-228	pci/l	1.01	< 0.417 U	0.512	< 0.388 U	< 0.535 U	< 0.382 U	< 0.248 U	< 0.451 U	0.838	
Selenium	mg/L	< 0.0050 U	< 0.0050 U	< 0.005 U	< 0.005 U	< 0.005 U	0.0024 J	< 0.005 U	< 0.005 U	< 0.005 U	
Thallium	mg/L	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters											
Dissolved Oxygen	mg/L		0.74	0.98	1.99	3.9	2.28	0.33	0.36	0.06	1.07
Oxidation-Reduction Potential	millivolts		-77.5	-95.6	-52.7	-60.2	-92.8	-107.1	-109.2	-10.5	-17.1
pH	SU		6.66	7.06	6.72	7.33	6.79	7.16	7.01	6.65	6.46
Specific Conductance	uS/cm		560	677	650	654	559	547	577	517	533
Temperature	deg c		13.61	7.79	12.3	11.09	11.04	12	11.61	12.65	12.81
Turbidity	NTU		3.45	2.21	1.13	3.4	3.89	3.04	1.77	0.85	0.78

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

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"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW26									
		2016-11-10	2016-12-08	2017-01-11	2017-03-02	2017-03-28	2017-04-26	2017-06-27	2017-06-27	2017-08-23	2017-10-04
		N	N	N	N	N	N	FD	N	N	N
Appendix III Parameters											
Boron	mg/L	0.22	0.25	0.25	0.3	0.32	0.29	0.25	0.26	0.22	0.26
Calcium	mg/L	100	93	110	100	100	99	86	71	94	92
Chloride	mg/L	5.6	6.2	6.6	5	6.5	3.3	3.8	3.8	2.9	2.6
Fluoride	mg/L	2.5	2.5 J	2.3	2.3	2.3	2	2.3	2.3	3	3.1
Sulfate	mg/L	68	68	71	78	94	76	110	110	130	110
Total Dissolved Solids	mg/L	290	430	420	470	500	470	470	460	480	470
pH	SU	8.84	7.57	7.16	7.56	6.93	7.14		7.74	7.09	6.85
Appendix IV Parameters											
Antimony	mg/L	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.0017 J	0.0017 J	0.0012 J	0.001 J	0.00099 J	0.0011 J	0.0012 J	0.00095 J	0.0013 J	
Barium	mg/L	0.045	0.038	0.039	0.031	0.034	0.037	0.037	0.03	0.031	
Beryllium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	< 0.0020 U	< 0.002 U	0.00044 J	0.0005 J	0.0005 J	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.00060 J	0.001	0.0012	0.0011	0.0013	0.00092 J	0.00053 J	0.00046 J	0.00098 J	
Fluoride	mg/L	2.5	2.5 J	2.3	2.3	2.3	2	2.3	2.3	3	3.1
Lead	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00022 J	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	0.017	0.0095	0.0091	0.0047 J	< 0.008 U	0.0086	0.014 J	0.015 J	0.0017 J+	
Mercury	mg/L	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	0.0078 J	< 0.01 U	< 0.01 U	0.0048 J	< 0.01 U	0.0053 J	0.0059 J	0.0044 J	0.0055 J	
Radium 226 + 228	pci/l	0.874	1.03	1.53 J+	< 0.488 U	0.681	0.364	0.792	0.897	1.4	
Radium-226	pci/l	0.351	0.412 J+	0.481	0.269	0.195	0.191	0.517	0.443	0.227	
Radium-228	pci/l	0.524	0.614	1.05 J+	< 0.488 U	0.486	< 0.248 U	< 0.377 U	0.454	1.17	
Selenium	mg/L	0.00049 J	0.0005 J	< 0.005 U	< 0.005 U	0.00058 J	< 0.005 U	0.00096 J	< 0.005 U	< 0.005 U	
Thallium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters											
Dissolved Oxygen	mg/L	0.25	0.73	0.69	0.54	0.22	0.64		0.3	0.23	0.16
Oxidation-Reduction Potential	millivolts	-114.5	-67.8	-74.3	-26.1	-37.6	23.7		-92.4	-19.8	17.5
pH	SU	8.84	7.57	7.16	7.56	6.93	7.14		7.74	7.09	6.85
Specific Conductance	uS/cm	443	630	693	772	677	649		660	667	670
Temperature	deg c	16.48	7.68	10.41	8.65	8.83	11.15		15.05	17.62	17.26
Turbidity	NTU	43.7	3.19	2.1	0.8	1.49	1.35		2.33	1.44	0.7

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW26B								
		2016-11-10	2016-12-08	2017-01-11	2017-03-02	2017-03-28	2017-04-26	2017-06-27	2017-08-23	2017-10-04
		N	N	N	N	N	N	N	N	N
Appendix III Parameters										
Boron	mg/L	0.19 J	0.19 J	< 0.2 U	0.21	0.27	0.23	0.45	0.36	0.4
Calcium	mg/L	81	68	85	90	100	90	150	120	130
Chloride	mg/L	8.6	7.5	8.8	12	19	12	42	28	31
Fluoride	mg/L	0.23 J	0.18 J	0.2 J	0.22 J	0.21 J	0.18 J	0.3 J	0.17 J	0.36 J
Sulfate	mg/L	63	58	65	150	230	120	510	390	400
Total Dissolved Solids	mg/L	380	370	340	480	650	460	1100	870	990
pH	SU	7.28	7.53	7.04	7.71	7.06	7.57	7.47	7.17	6.63
Appendix IV Parameters										
Antimony	mg/L	< 0.0020 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.00097 J	0.00081 J	0.00048 J	0.00054 J	0.00042 J	< 0.005 U	< 0.005 U	< 0.005 U	
Barium	mg/L	0.061	0.058	0.063	0.064	0.067	0.064	0.067	0.06	
Beryllium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	0.00051 J	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.00033 J	0.00025 J	0.00021 J	< 0.001 U	0.00016 J	< 0.001 U	< 0.001 U	< 0.001 U	
Fluoride	mg/L	0.23 J	0.18 J	0.2 J	0.22 J	0.21 J	0.18 J	0.3 J	0.17 J	0.36 J
Lead	mg/L	0.00080 J	< 0.001 U	< 0.001 U	< 0.001 U	0.00019 J	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	< 0.0080 U	0.0022 J	0.0026 J	0.0043 J	< 0.008 U	0.0039 J	< 0.04 U	0.0038 J+	
Mercury	mg/L	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	0.0012 J	< 0.01 U	< 0.01 U	0.002 J	< 0.01 U	0.0014 J	0.002 J	< 0.01 U	
Radium 226 + 228	pci/l	0.536	0.99	0.598 J+	< 0.532 U	0.459	< 0.264 U	0.866	1.25	
Radium-226	pci/l	0.451	0.511 J+	< 0.211 U	0.267	0.32	0.232	0.467	0.331	
Radium-228	pci/l	< 0.382 U	0.479	0.446 J+	< 0.532 U	< 0.332 U	< 0.264 U	0.399	0.924	
Selenium	mg/L	< 0.0050 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	
Thallium	mg/L	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters										
Dissolved Oxygen	mg/L	0.36	0.59	1.97	1.7	1.08	1.34	0.27	0.14	0.25
Oxidation-Reduction Potential	millivolts	-85.9	-121.4	-50.6	-57.9	-74.5	-83.1	-96.9	20.6	31.3
pH	SU	7.28	7.53	7.04	7.71	7.06	7.57	7.47	7.17	6.63
Specific Conductance	uS/cm	480	534	573	750	838	614	1479	1128	1317
Temperature	deg c	13.28	7.87	11.97	11.3	11.17	12	12.42	12.87	13.02
Turbidity	NTU	4.06	1.3	1.5	4.38	3.31	3.65	1.62	0.91	0.67

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW27									
		2016-11-09	2016-12-07	2016-12-07	2017-01-10	2017-02-28	2017-03-28	2017-04-26	2017-06-27	2017-08-23	2017-10-03
		N	FD	N	N	N	N	N	N	N	N
Appendix III Parameters											
Boron	mg/L	6.5	4.9	4.8	5	5.1	5.6	4.9	2	4.9	4.9
Calcium	mg/L	190	220	190	230	240	260	220	73	220	200
Chloride	mg/L	24	23	23	28	45	53	48	15	30	31
Fluoride	mg/L	0.42 J	0.36 J	0.33 J	0.45 J	5.4	0.46 J	0.3 J	0.57 J	0.36 J	0.57 J
Sulfate	mg/L	740	640	640	790	840	940	880	90	780	750
Total Dissolved Solids	mg/L	1400	1300	1300	1400	1600	1600	1600	450	1400	1300
pH	SU	7.2		7.25	7.22	7.24	6.89	7.54	7.05	7.11	6.91
Appendix IV Parameters											
Antimony	mg/L	< 0.0020 U	< 0.01 U	< 0.002 U	0.00032 J	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.018	0.017 J	0.016 J	0.017	0.014	0.018	0.015	0.034	0.021	
Barium	mg/L	0.15	0.17	0.17	0.17	0.17	0.19	0.15	0.12	0.28	
Beryllium	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00023 J	< 0.001 U	< 0.001 U	
Chromium	mg/L	< 0.0020 U	0.012	0.00062 J	0.00067 J	0.00035 J	0.001 J	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.00013 J	< 0.005 U	< 0.001 U	0.00036 J	0.00019 J	0.00034 J	< 0.001 U	0.001	0.00026 J	
Fluoride	mg/L	0.42 J	0.36 J	0.33 J	0.45 J	5.4	0.46 J	0.3 J	0.57 J	0.36 J	0.57 J
Lead	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	0.0014	< 0.001 U	0.0021	0.00051 J	0.0014	< 0.001 U	
Lithium	mg/L	0.0019 J	0.0044 J	0.0073 J	0.0052 J	0.0052 J	< 0.008 U	0.0074 J	< 0.04 U	0.003 J+	
Mercury	mg/L	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	1	1	0.94	0.87	1.4	1.3	1.8	0.32	1.2	
Radium 226 + 228	pci/l	2.54	2.6	2.18	2.1	2.64	1.91	1.8	1.11	2.12	
Radium-226	pci/l	1.53	1.54 J+	1.07 J+	1.18	1.58	1.16	1.2	0.36	1.26	
Radium-228	pci/l	1	1.06	1.11	0.923 J+	1.05	0.753	0.594	0.755	0.86	
Selenium	mg/L	< 0.0050 U	< 0.025 U	< 0.005 U	0.00077 J	0.00051 J	0.0008 J	< 0.005 U	< 0.005 U	< 0.005 U	
Thallium	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters											
Dissolved Oxygen	mg/L	0.63		0.16	0.18	0.14	0.09	0.14	0.1	0.4	0.09
Oxidation-Reduction Potential	millivolts	-78.5		-105	-69.3	-85.8	-91.1	-88.6	-98.3	-49	-75.6
pH	SU	7.2		7.25	7.22	7.24	6.89	7.54	7.05	7.11	6.91
Specific Conductance	uS/cm	1390		1665	1755	1947	1733	1736	701	1721	1691
Temperature	deg c	16.19		9.91	11.76	10.58	9.93	11.2	16.31	16.57	16.7
Turbidity	NTU	3.34		4.72	4.14	3.56	4.33	3.42	3.87	2.03	1.21

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

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"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW27B								
		2016-11-09	2016-12-07	2017-01-09	2017-02-28	2017-03-28	2017-04-26	2017-06-27	2017-08-23	2017-10-03
		N	N	N	N	N	N	N	N	N
Appendix III Parameters										
Boron	mg/L	11	11	11	11	11	9.8	12	12	12
Calcium	mg/L	410	450	450	430	390	490	270	370	350
Chloride	mg/L	460	450	450	420	450	480	440	460	420
Fluoride	mg/L	< 200 U	< 50 U	< 50 U	< 50 U	< 50 U	< 100 U	< 100 U	< 50 U	< 50 U
Sulfate	mg/L	7900	6800	7000	6800	7100	7400	6400	6700	6300
Total Dissolved Solids	mg/L	12000	12000	11000	12000	11000	13000	10000	12000	11000
pH	SU	7.25	7.3	7.19	7.27	6.93	7.4	7.23	7.26	7.01
Appendix IV Parameters										
Antimony	mg/L	0.0030 J	< 0.01 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.01 U	< 0.002 U	
Arsenic	mg/L	0.0032 J	0.0024 J	0.002 J	0.0018 J	0.0014 J	0.0016 J	< 0.025 U	0.0011 J	
Barium	mg/L	0.05	0.045	0.046	0.044	0.044	0.04	0.03	0.038	
Beryllium	mg/L	< 0.0050 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.005 U	< 0.001 U	
Cadmium	mg/L	< 0.0050 U	< 0.005 U	< 0.001 U	0.0005 J	< 0.001 U	0.00038 J	< 0.005 U	0.00038 J	
Chromium	mg/L	< 0.010 U	< 0.01 U	< 0.002 U	0.00086 J	0.00086 J	< 0.002 U	< 0.01 U	< 0.002 U	
Cobalt	mg/L	0.00090 J	< 0.005 U	0.00014 J	< 0.001 U	0.00013 J	< 0.001 U	< 0.005 U	< 0.001 U	
Fluoride	mg/L	< 200 U	< 50 U	< 50 U	< 50 U	< 50 U	< 100 U	< 100 U	< 50 U	< 50 U
Lead	mg/L	0.0015 J	< 0.005 U	< 0.001 U	< 0.001 U	0.00027 J	< 0.001 U	< 0.005 U	< 0.001 U	
Lithium	mg/L	0.019 J	0.029 J	0.027	0.025	0.028	0.04	< 0.2 U	0.029 J+	
Mercury	mg/L	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	2.9	3	3.4 J+	3.5	3.3	2.9	2.3	3.4	
Radium 226 + 228	pci/l	4.06	4.54	3.28	3.09	3.35	2.45	2.87	3.68	
Radium-226	pci/l	1.9	2.12 J+	1.3	1.19	1.31	1.13	0.993	1.14	
Radium-228	pci/l	2.16	2.41	1.98 J+	1.89	2.03	1.32	1.88	2.54	
Selenium	mg/L	0.0031 J	< 0.025 U	0.002 J	0.002 J	0.0019 J	0.002 J	< 0.025 U	0.0013 J	
Thallium	mg/L	< 0.0050 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.005 U	< 0.001 U	
Field Parameters										
Dissolved Oxygen	mg/L	0.58	0.31	0.37	0.28	0.22	0.53	0.24	0.04	0.26
Oxidation-Reduction Potential	millivolts	-97.4	-108.6	-56.7	-94	-95	-81.5	-81.3	-46.7	-65
pH	SU	7.25	7.3	7.19	7.27	6.93	7.4	7.23	7.26	7.01
Specific Conductance	uS/cm	10690	13880	1311	1306	9969	9849	1286	1232	1225
Temperature	deg c	13.74	9.24	12.58	12.41	11.95	12.33	13.3	13.73	13.98
Turbidity	NTU	4.18	3.3	0.98	0.59	0.8	1.69	1.57	1.28	0.94

Note:
mg/L = milligram per liter
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deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
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"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW28									
		2016-11-10	2016-12-07	2017-01-09	2017-01-09	2017-02-28	2017-03-27	2017-04-27	2017-06-27	2017-08-23	2017-10-03
		N	N	FD	N	N	N	N	N	N	N
Appendix III Parameters											
Boron	mg/L	3.7	3.6	2.9	3	2.7	2.8	3.3	3.4	3.6	3.3
Calcium	mg/L	210	210	200	210	200	220	210	240	230	220
Chloride	mg/L	14	16	17 J	180 J	17	21	25	28	32	32
Fluoride	mg/L	0.36 J	0.32 J	0.36 J	3.3 J	0.4 J	0.33 J	0.24 J	< 20 U	0.25 J	0.37 J
Sulfate	mg/L	650	540	570 J	370 J	570	700	580	690	710	690
Total Dissolved Solids	mg/L	1100	1100	1100	1100	1100	1200	1100	1200	1300	1200
pH	SU	6.73	7.19		7.09	7.21	7.14	7.11	7.38	7.31	6.79
Appendix IV Parameters											
Antimony	mg/L	< 0.0020 U	< 0.01 U	0.00048 J	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.0030 J	0.0028 J	0.0036 J	0.0034 J	0.0037 J	0.0033 J	0.0034 J	0.0044 J	0.0039 J	
Barium	mg/L	0.19	0.18	0.19	0.2	0.17	0.19	0.17	0.18	0.2	
Beryllium	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	< 0.0020 U	< 0.01 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	0.00016 J	< 0.005 U	0.00068 J	0.00062 J	0.00068 J	0.00039 J	< 0.001 U	< 0.001 U	< 0.001 U	
Fluoride	mg/L	0.36 J	0.32 J	0.36 J	3.3 J	0.4 J	0.33 J	0.24 J	< 20 U	0.25 J	0.37 J
Lead	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00016 J	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	0.0041 J	0.0078 J	0.0069 J	0.0074 J	0.009	0.009	0.01	< 0.04 U	0.0084 J+	
Mercury	mg/L	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	
Molybdenum	mg/L	0.17	0.17	0.087 J+	0.13 J+	0.13	0.19	0.29	0.23	0.23	
Radium 226 + 228	pci/l	2.52	2.23	3.14	2.43	1.93	2.07	1.5	1.58	2.59	
Radium-226	pci/l	1.41	1.69 J+	1.5 J	1.05 J	0.956	1.08	0.935	0.995	1.24	
Radium-228	pci/l	1.11	0.542	1.64 J+	1.38 J+	0.977	0.989	0.566	0.582	1.36	
Selenium	mg/L	< 0.0050 U	< 0.025 U	0.00081 J	0.00048 J	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	
Thallium	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters											
Dissolved Oxygen	mg/L	0.45	0.14		0.25	0.12	0.1	0.26	0.16	0.33	0.17
Oxidation-Reduction Potential	millivolts	-81.2	-80.9		-36.3	-80.7	-90.6	-93	-94.7	-79.1	8.2
pH	SU	6.73	7.19		7.09	7.21	7.14	7.11	7.38	7.31	6.79
Specific Conductance	uS/cm	1172	1476		1444	1444	1116	1238	1493	1558	1519
Temperature	deg c	16.12	9.01		10.44	9.96	9.58	9.8	13.91	16.32	17.1
Turbidity	NTU	4.85	4.32		4.97	4.78	4.52	3.41	3.94	1.32	0.91

Note:
mg/L = milligram per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

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"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.
"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 2: CCR Analytical Results
CCR Unit Schahfer Landfill Phase V and V
NIPSCO Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW28B										
		2016-11-10	2016-12-08	2017-01-09	2017-03-01	2017-03-27	2017-03-27	2017-04-27	2017-06-27	2017-08-23	2017-08-23	2017-10-03
		N	N	N	N	FD	N	N	N	FD	N	N
Appendix III Parameters												
Boron	mg/L	3.6	4.3	4.3	4	4.2	4.1	4.5	4.8	5.9	5.8	7.2
Calcium	mg/L	250	280	280	240	230	230	230	260	300	280	300
Chloride	mg/L	120	130	130	130	150	160	100	190	160	170	160
Fluoride	mg/L	< 20 U	< 1 U	< 20 U	< 10 U	< 20 U	< 20 U	< 20 U	< 50 U	< 20 U	< 20 U	< 20 U
Sulfate	mg/L	1800	1900	1900	1900	2200	2200	1600	2200	2700	2700	2500
Total Dissolved Solids	mg/L	2900	3700	3900	3200	3800	3800	2700	3700	4600	4600	5700
pH	SU	6.8	7.13	7.1	7.43		7.08	7.26	7.17		7.07	6.62
Appendix IV Parameters												
Antimony	mg/L	< 0.0020 U	< 0.01 U	0.0016 J	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.00091 J	< 0.025 U	0.0013 J	< 0.005 U	0.00065 J	0.00061 J	0.00097 J	< 0.025 U	< 0.005 U	< 0.005 U	
Barium	mg/L	0.061	0.074	0.08	0.081	0.082	0.082	0.074	0.061	0.08	0.076	
Beryllium	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Chromium	mg/L	< 0.0020 U	< 0.01 U	< 0.002 U	< 0.002 U	0.00028 J	0.00032 J	< 0.002 U	< 0.01 U	< 0.002 U	< 0.002 U	
Cobalt	mg/L	< 0.0010 U	< 0.005 U	0.00034 J	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.005 U	< 0.001 U	< 0.001 U	
Fluoride	mg/L	< 20 U	< 1 U	< 20 U	< 10 U	< 20 U	< 20 U	< 20 U	< 50 U	< 20 U	< 20 U	< 20 U
Lead	mg/L	< 0.0010 U	< 0.005 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00018 J	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	0.0071 J	0.011 J	0.01	0.0094	0.01	0.011	0.01	0.011 J	0.013 J+	0.011 J+	
Mercury	mg/L	< 0.00020 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 UJ	< 0.0002 UJ	
Molybdenum	mg/L	0.4	0.51	0.5 J+	0.55	0.57	0.56	0.38	0.41	0.74	0.7	
Radium 226 + 228	pci/l	2.25	3.67	3.62	2.28	2.55	2.73	1.26	1.84	2.74	3.02	
Radium-226	pci/l	1.13	1.77 J+	1.33	0.901	1	1.21	0.756	0.904	1.26	1.21	
Radium-228	pci/l	1.12	1.9	2.29 J+	1.37	1.55	1.52	0.504	0.937	1.48	1.81	
Selenium	mg/L	< 0.0050 U	< 0.025 U	0.0021 J	< 0.005 U	0.0009 J	0.00065 J	< 0.005 U	< 0.025 U	< 0.005 U	< 0.005 U	
Thallium	mg/L	< 0.0010 U	< 0.005 U	0.00042 J	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Field Parameters												
Dissolved Oxygen	mg/L	0.33	0.33	0.31	0.27		0.15	0.2	0.1		0.5	0.28
Oxidation-Reduction Potential	millivolts	-100	-49.9	-96	-117.7		-104.4	-96.8	-86.3		-42.2	-15.7
pH	SU	6.8	7.13	7.1	7.43		7.08	7.26	7.17		7.07	6.62
Specific Conductance	uS/cm	2847	4258	4601	4337		3203	2900	4663		4926	5011
Temperature	deg c	13.96	12.32	12.39	11.87		11.55	11.21	12.79		13.35	14.14
Turbidity	NTU	0.8	0.83	0.59	0.6		2.17	1.26	0.93		0.78	1

Prepared by: DFS
Checked by: SHL
Reviewed by: MAH

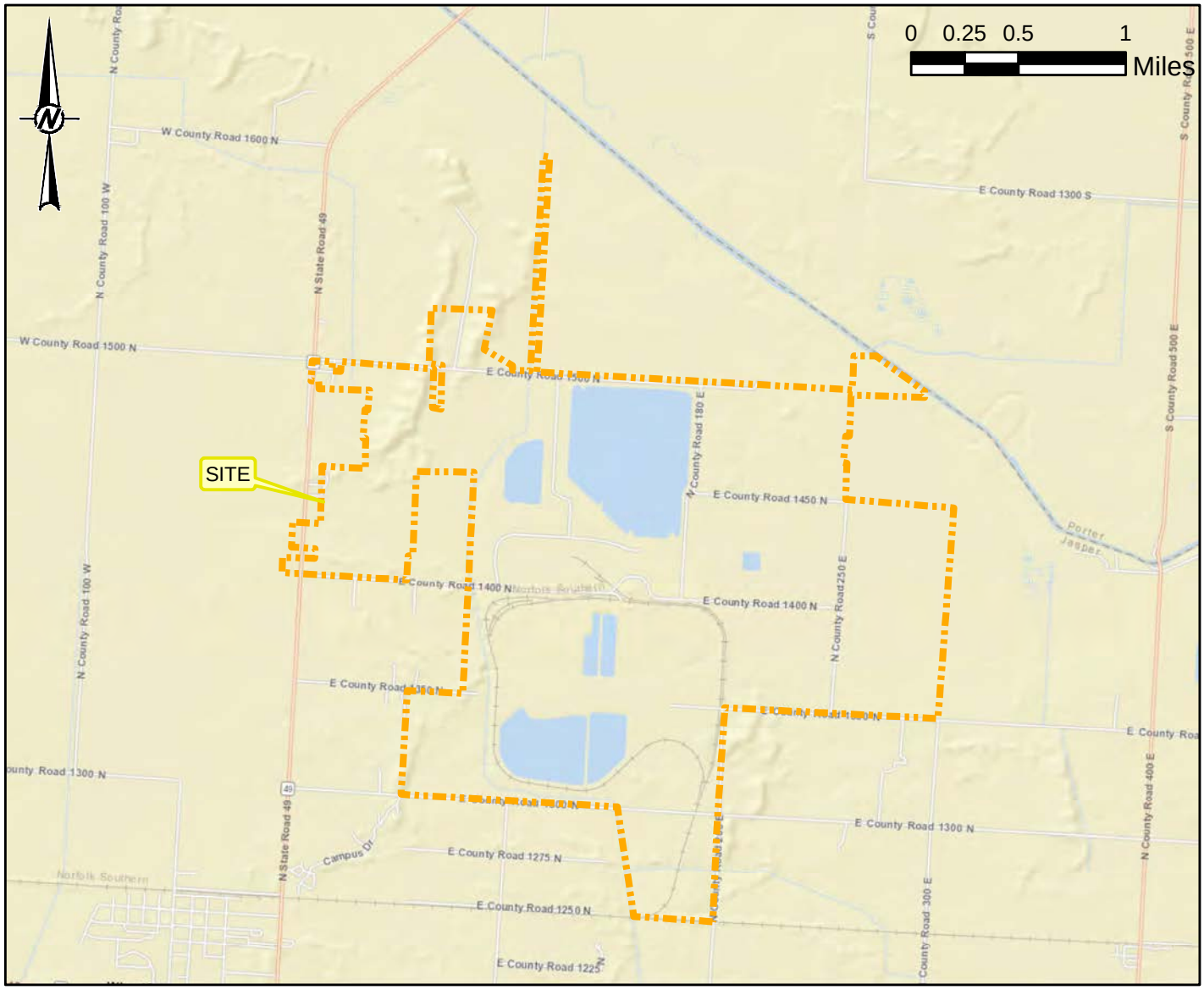
Note:
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pci/l = picocuries per liter
"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

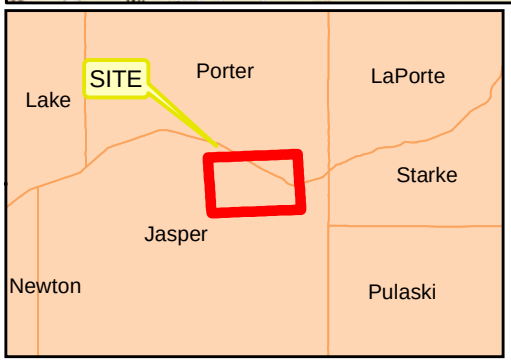
"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

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FIGURES







REFERENCE(S)
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NORTHERN INDIANA PUBLIC SERVICE COMPANY

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REVIEWED	DFS
APPROVED	MAH

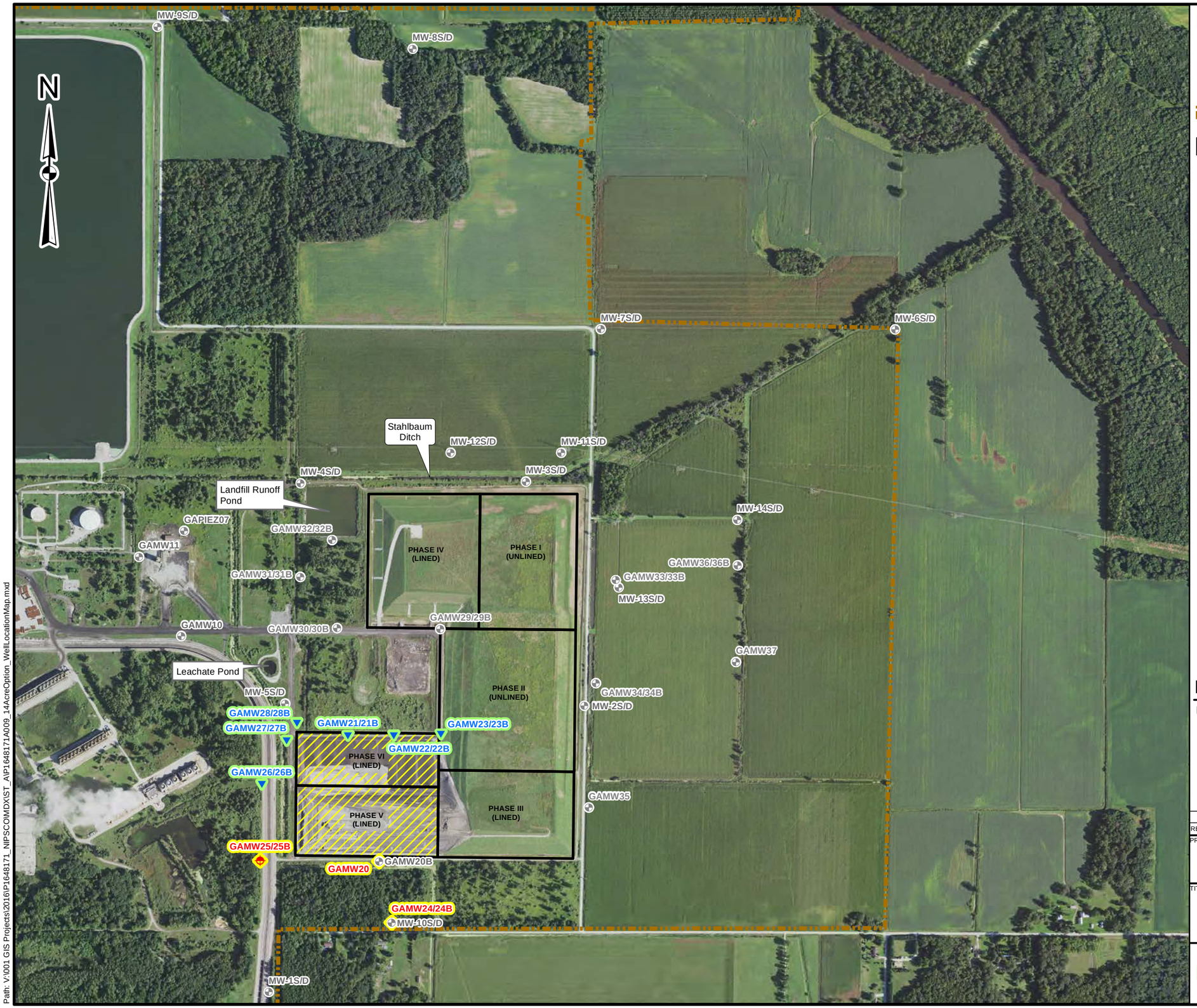
PROJECT
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
SITE LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
164-8171	B	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

PATH: V:\001 GIS Projects\00164\PI 64\8171_NIPSCO\MXDs\ B Figure 1\s164s8171r8002.mxd



LEGEND

- Non-CCR Well
- CCR Backgound Monitoring Well
- CCR Downgradient Monitoring Well
- Approximate Property Line
- PHASE V — Landfill Cell Designation

840 420 0 840
Feet

REFERENCES

IMAGERY: USDA Farm Service Agency 2016 NAIP

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

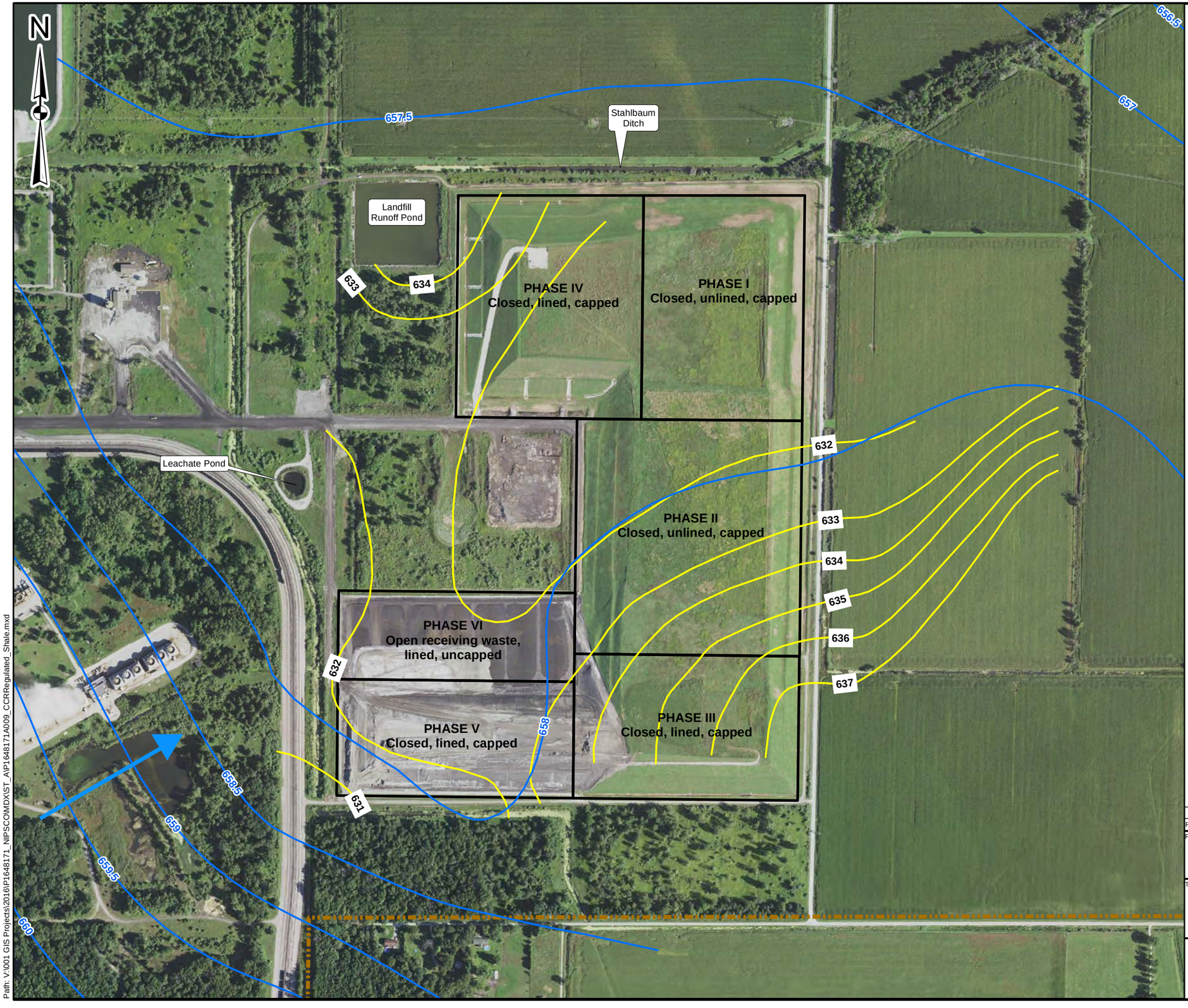
TITLE
WELL LOCATION MAP

GOLDER
Manchester, New Hampshire

PROJECT No.		164-8174	FILE No. 1648171A009_14AcreOption_WellLocationMap
DESIGN	JSP	4/11/2018	SCALE: AS SHOWN REV. 0
GIS	SHL	4/11/2018	
CHECK	JSP	4/11/2018	
REVIEW	MAH	4/11/2018	

FIGURE 2

Path: V:\001 GIS Projects\2016\P1648171_NIPSCO\MDX\ST_AIP1648171A009_14AcreOption_WellLocationMap.mxd



LEGEND

- August 2017 Groundwater Elevation Contour (ft-amsl)
- Approximate Shale Elevation Contour
- Approximate Property Line
- PHASE V — Landfill Cell Designation (Circa 1998)
- Groundwater Flow Direction

500 250 0 500
Feet

FIGURE NARRATIVE

This figure shows the approximate top of bedrock contours based on borings advanced as part of the CCR Final Rule and landfill permit programs and also depicts the groundwater elevation, as measured in the monitoring wells screened within the upper portion of the surficial aquifer, and is intended to represent the approximate elevation of the groundwater potentiometric surface. The posted data were calculated from depth to water measurements made by Golder on August 21, 2017. The direction of horizontal groundwater flow at and near the potentiometric surface can be generally interpreted as being perpendicular to the groundwater elevation contours.

Golder inferred the elevation contours based on the data illustrated. The actual elevation of the potentiometric surface is likely more heterogeneous than shown and actual conditions will vary. Other interpretations are possible. The depth to groundwater is known to vary with time.

REFERENCES

IMAGERY: USDA Farm Service Agency 2016 NAIP

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
SHALE AND GROUNDWATER ELEVATION CONTOUR MAP

GOLDER
Manchester, New Hampshire

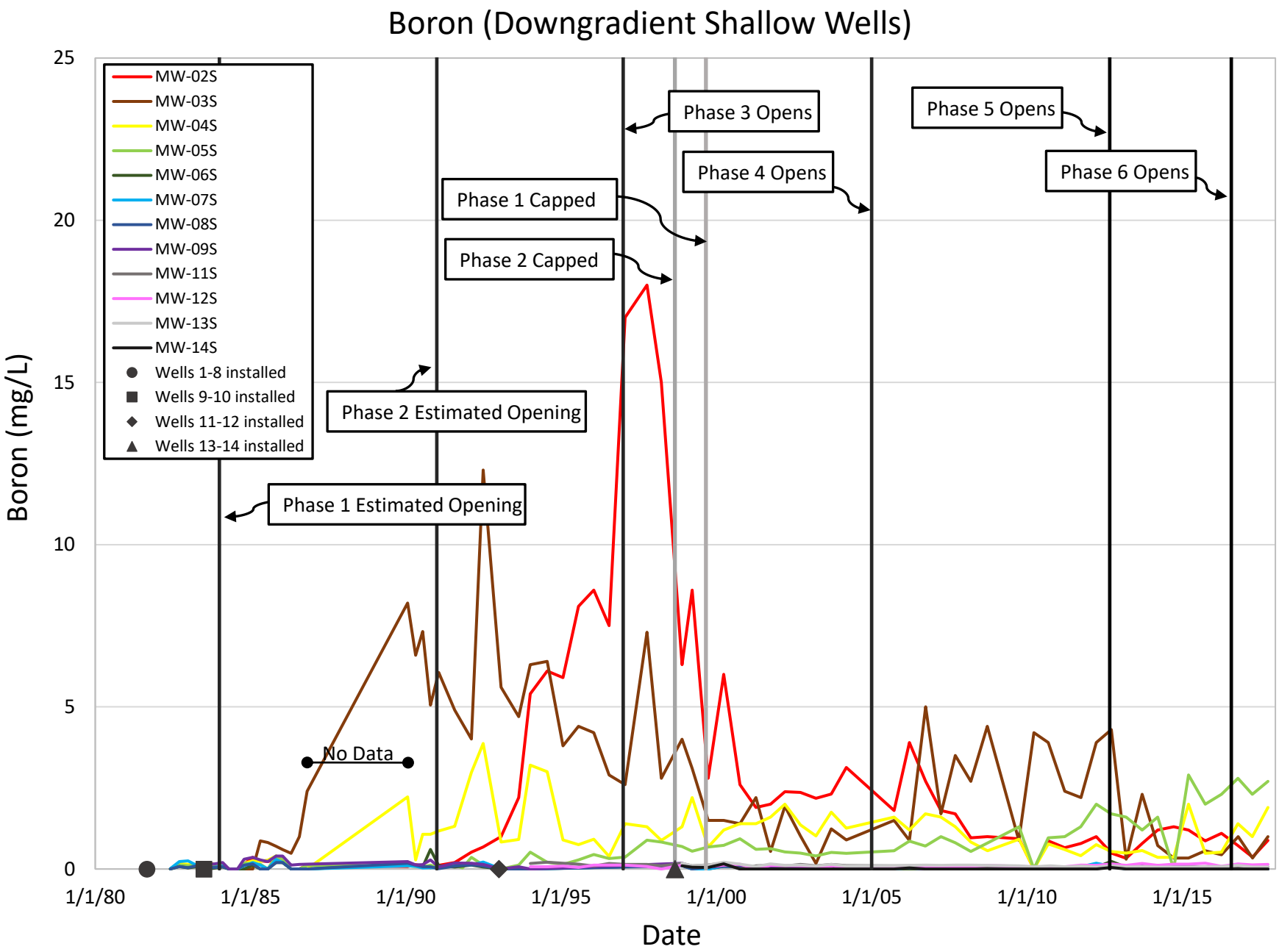
PROJECT No.		164-8174	FILE No. P1648171A009_CCRRegulated_Shale
DESIGN	JSP	4/11/2018	SCALE: AS SHOWN REV. 0
GIS	SHL	4/11/2018	
CHECK	JSP	4/11/2018	
REVIEW	MAH	4/11/2018	

FIGURE 3

Path: V:\001 GIS Projects\2016\P1648171_NIPSCO\MDX\ST_AIP1648171A009_CCRRegulated_Shale.mxd

Figure 4

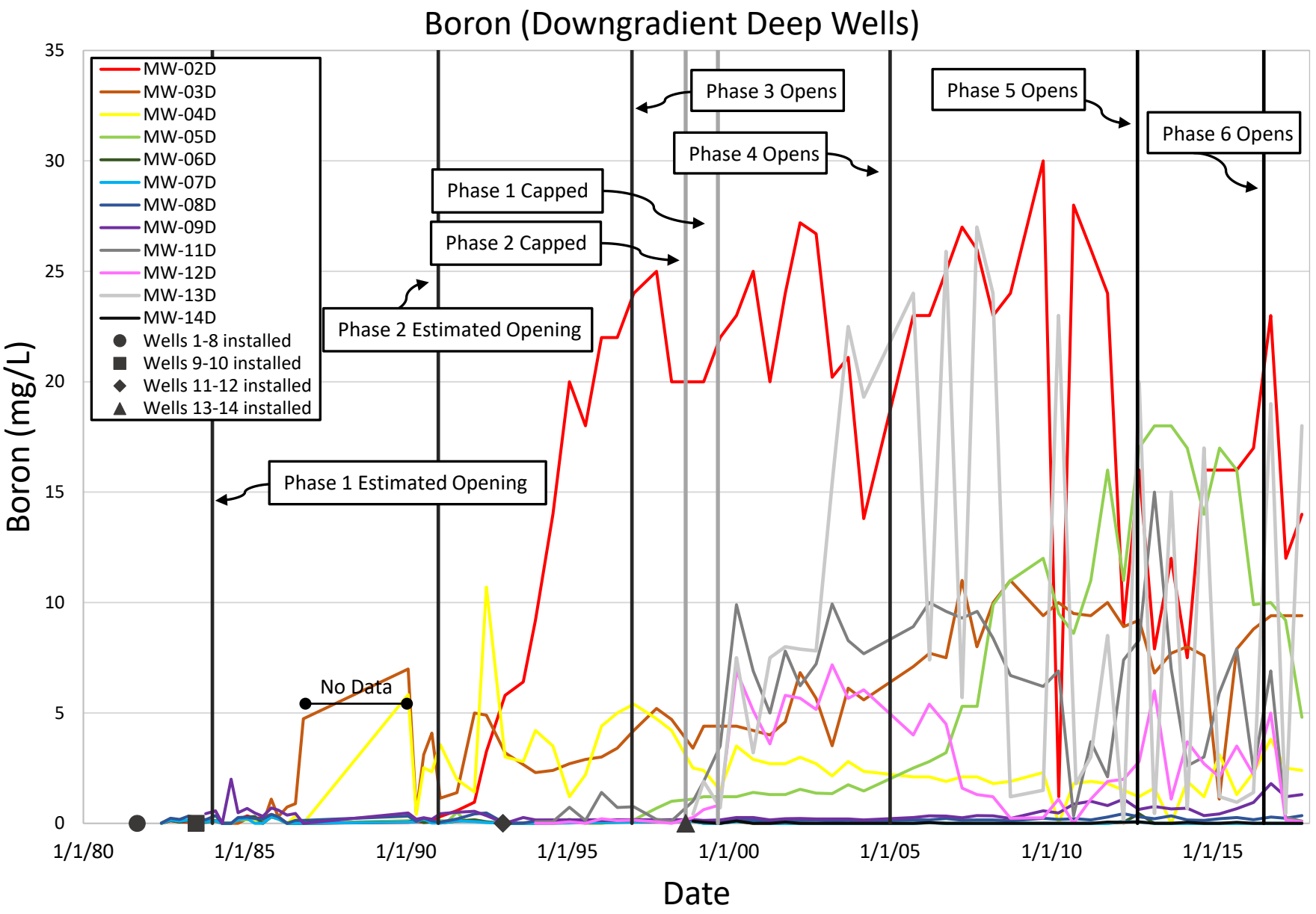
Project No: 164-8171



GOLDER

Figure 5

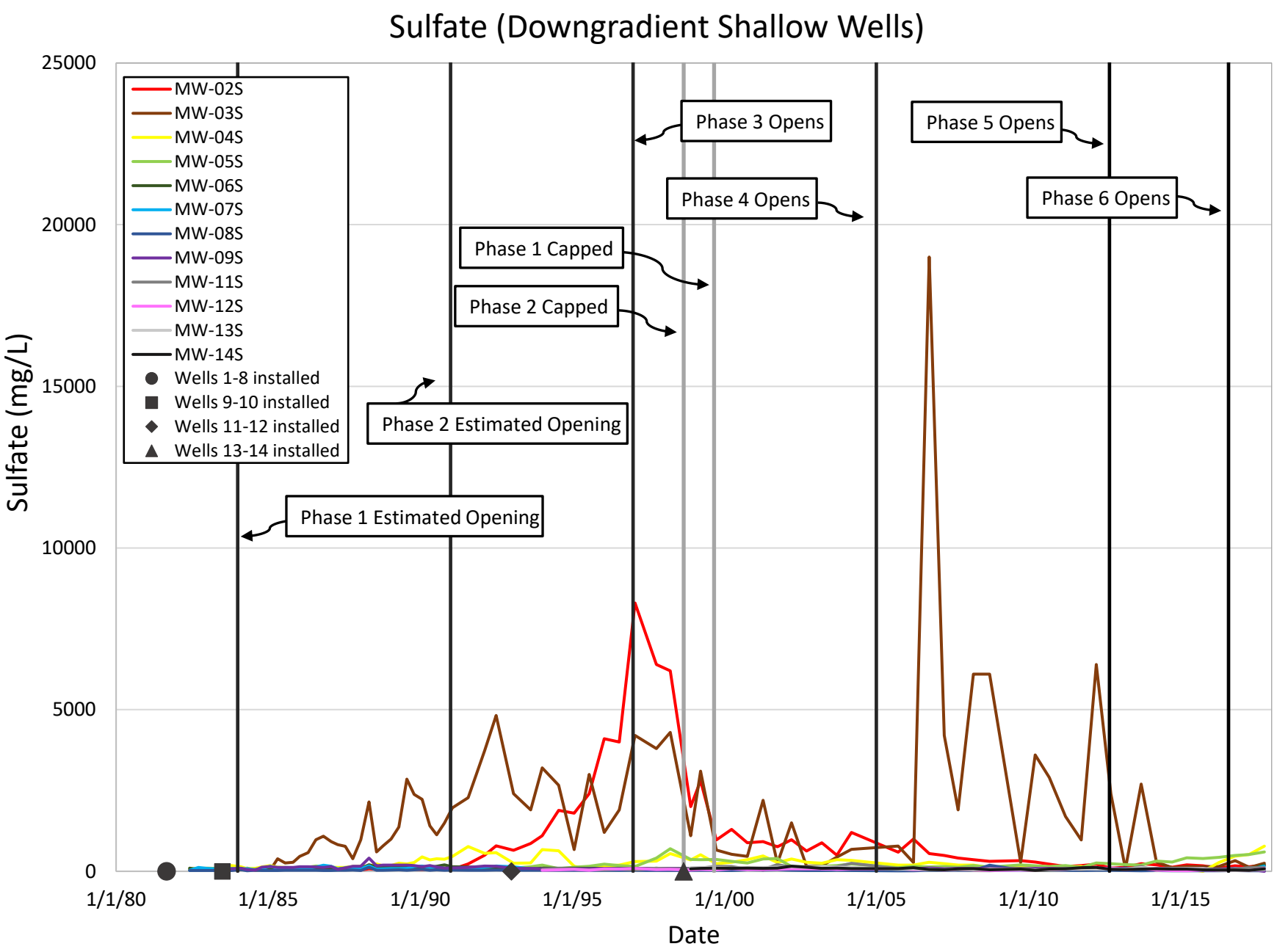
Project No: 164-8171



GOLDER

Figure 6

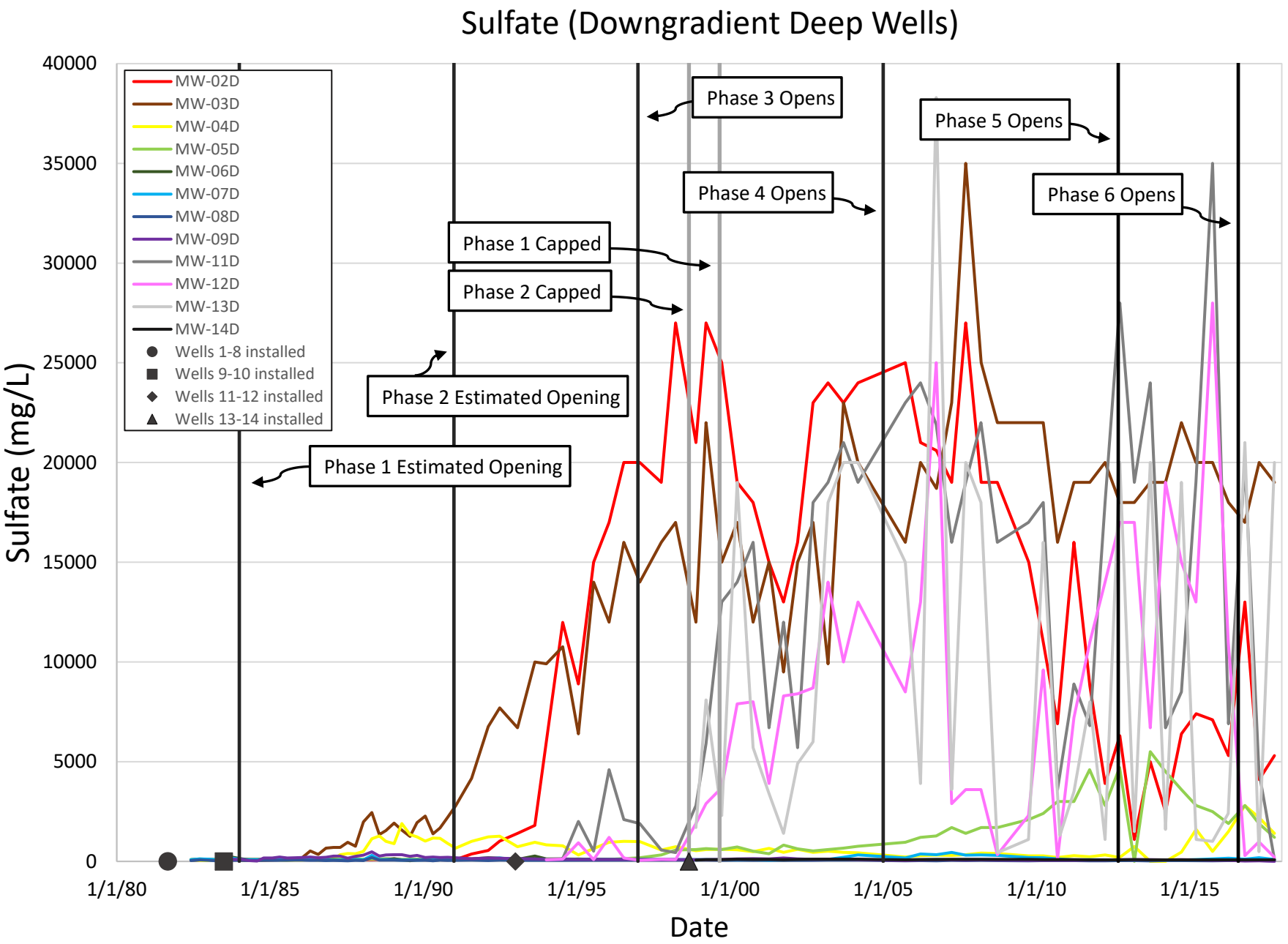
Project No: 164-8171



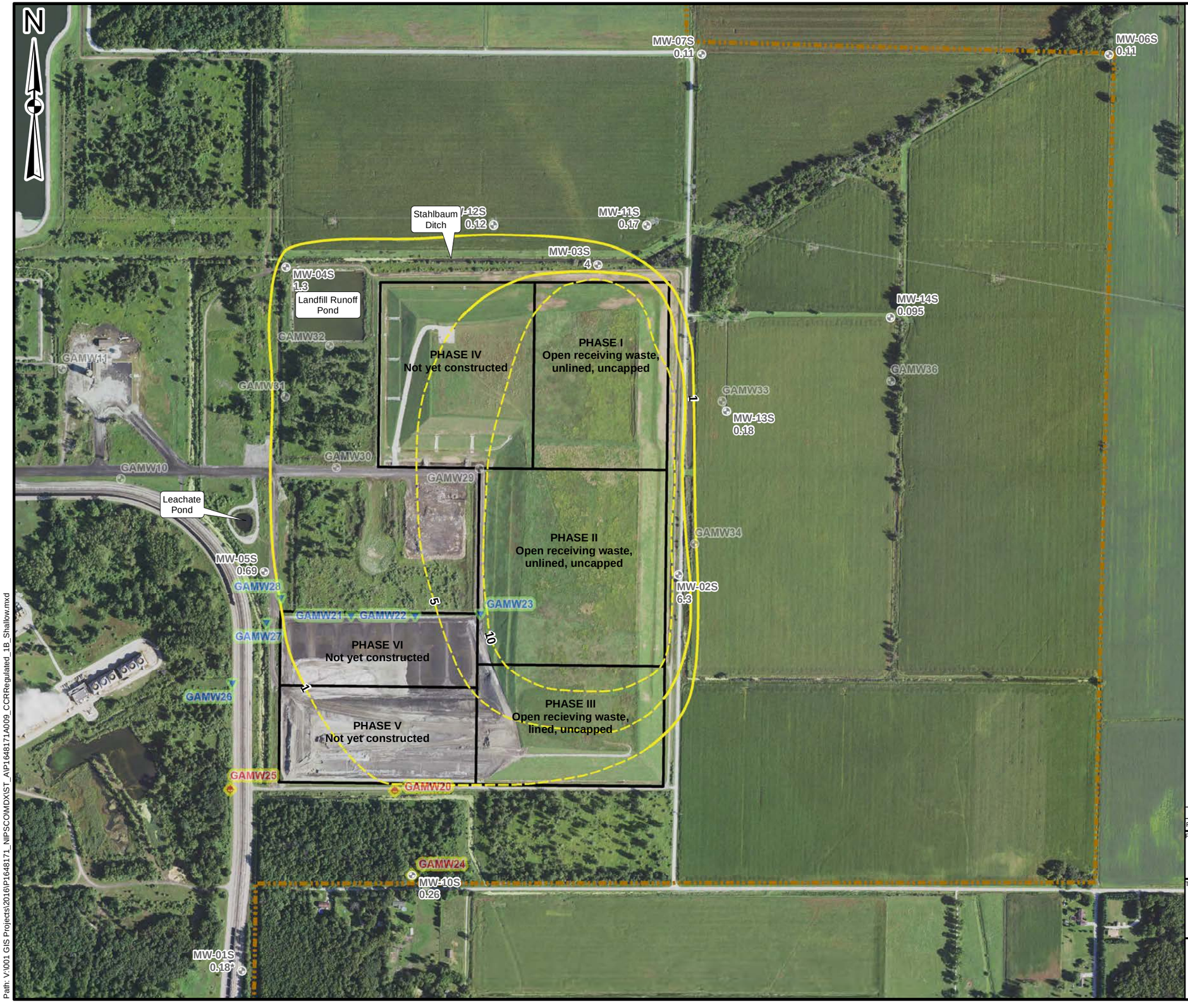
GOLDER

Figure 7

Project No: 164-8171



GOLDER



LEGEND

- <0.050 November 1998 Boron Concentration (mg/L)
- Non-CCR Monitoring Well
- CCR Backgound Monitoring Well
- CCR Downgradient Monitoring Well
- November 1998 Shallow Boron Contour (mg/L)
- Inferred November 1998 Shallow Boron Contour (mg/L)
- Approximate Property Line
- PHASE V Landfill Cell Designation (Circa 1998)

600 300 0 600
Feet

FIGURE NARRATIVE

This figure shows the interpreted boron isoconcentration contours based on groundwater analytical data from the November 1998 sampling event for shallow wells screened in the surficial aquifer. The isoconcentration contours are intended to depict the inferred distribution of boron in groundwater on the basis of the data illustrated. The distribution is likely more heterogeneous than shown, and the actual conditions will vary. Other interpretations are possible. Boron distribution in groundwater is known to vary with time.

NOTES

1. Transparent wells were installed after November 1998.
2. All values shown are milligrams per liter (mg/L).
3. "<" indicates boron was not detected, reporting limit is provided.
4. Data included are publically available on the Indiana Virtual File Cabinet. Golder did not collect or validate the results.
5. "*" indicates well not used for contouring.

REFERENCES

IMAGERY: USDA Farm Sevice Agency 2016 NAIP.

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
BORON ISOCONCENTRATION CONTOUR MAP
NOVEMBER 1998
SHALLOW

GOLDER
Manchester, New Hampshire

PROJECT No.		164-8174	FILE No	P1648171A009_CCRRegulated_1B_Shallow
DESIGN	DFS	4/11/2018	SCALE: AS SHOWN	REV. 0
GIS	SHL	4/11/2018		
CHECK	JSP	4/11/2018		
REVIEW	MAH	4/11/2018		

FIGURE 8

Path: V:\001 GIS Projects\2016\P1648171_NIPSCO\MDX\ST_AIP1648171A009_CCRRegulated_1B_Shallow.mxd



Path: V:\001 GIS Projects\2016\P1648171_NIPSCO\MDX\ST_AIP1648171A009_CCRRegulated_1A_Deep.mxd

LEGEND

- <0.050 November 1998 Boron Concentration (mg/L)
- Non-CCR Monitoring Well
- CCR Backgound Monitoring Well
- CCR Downgradient Monitoring Well
- November 1998 Deep Boron Contour (mg/L)
- Inferred Deep Boron Contour (mg/L)
- Approximate Property Line
- PHASE V Landfill Cell Designation (Circa 1998)

600 300 0 600
Feet

FIGURE NARRATIVE

This figure shows the interpreted boron isoconcentration contours based on groundwater analytical data from the November 1998 sampling event for deep wells screened in the surficial aquifer. The isoconcentration contours are intended to depict the inferred distribution of boron in groundwater on the basis of the data illustrated. The distribution is likely more heterogeneous than shown, and the actual conditions will vary. Other interpretations are possible. Boron distribution in groundwater is known to vary with time.

NOTES

1. Transparent wells were installed after November 1998.
2. All values shown are milligrams per liter (mg/L).
3. "<" indicates boron was not detected, reporting limit is provided.
4. Data included are publically available on the Indiana Virtual File Cabinet. Golder did not collect or validate the results.
5. "*" indicates boron concentration not used for contouring.

REFERENCES

IMAGERY: USDA Farm Sevice Agency 2016 NAIP.

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
BORON ISOCONCENTRATION CONTOUR MAP
NOVEMBER 1998
DEEP

GOLDER
Manchester, New Hampshire

PROJECT No.		164-8174	FILE No. P1648171A009_CCRRegulated_1A_Deep	
DESIGN	DFS	4/11/2018	SCALE: AS SHOWN	REV. 0
GIS	SHL	4/11/2018		
CHECK	JSP	4/11/2018		
REVIEW	MAH	4/11/2018		

FIGURE 9



LEGEND

- <0.050 September 2011 Boron Concentration (mg/L)
- Non-CCR Monitoring Well
- CCR Backgound Monitoring Well
- CCR Downgradient Monitoring Well
- September 2011 Shallow Boron Contour (mg/L)
- Inferred September 2011 Shallow Boron Contour (mg/L)
- Approximate Property Line
- PHASE V Landfill Cell Designation (Circa 2011)

600 300 0 600
Feet

FIGURE NARRATIVE

This figure shows the interpreted boron isoconcentration contours based on groundwater analytical data from the September 2011 sampling event for shallow wells screened in the surficial aquifer. The isoconcentration contours are intended to depict the inferred distribution of boron in groundwater on the basis of the data illustrated. The distribution is likely more heterogeneous than shown, and the actual conditions will vary. Other interpretations are possible. Boron distribution in groundwater is known to vary with time.

NOTES

1. Transparent wells were installed after September 2011.
2. All values shown are milligrams per liter (mg/L).
3. "<" indicates boron was not detected, reporting limit is provided.
4. Data included are publically available on the Indiana Virtual File Cabinet. Golder did not collect or validate the results.
5. "*" indicates well not used for contouring.

REFERENCES

IMAGERY: USDA Farm Sevice Agency 2016 NAIP.

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

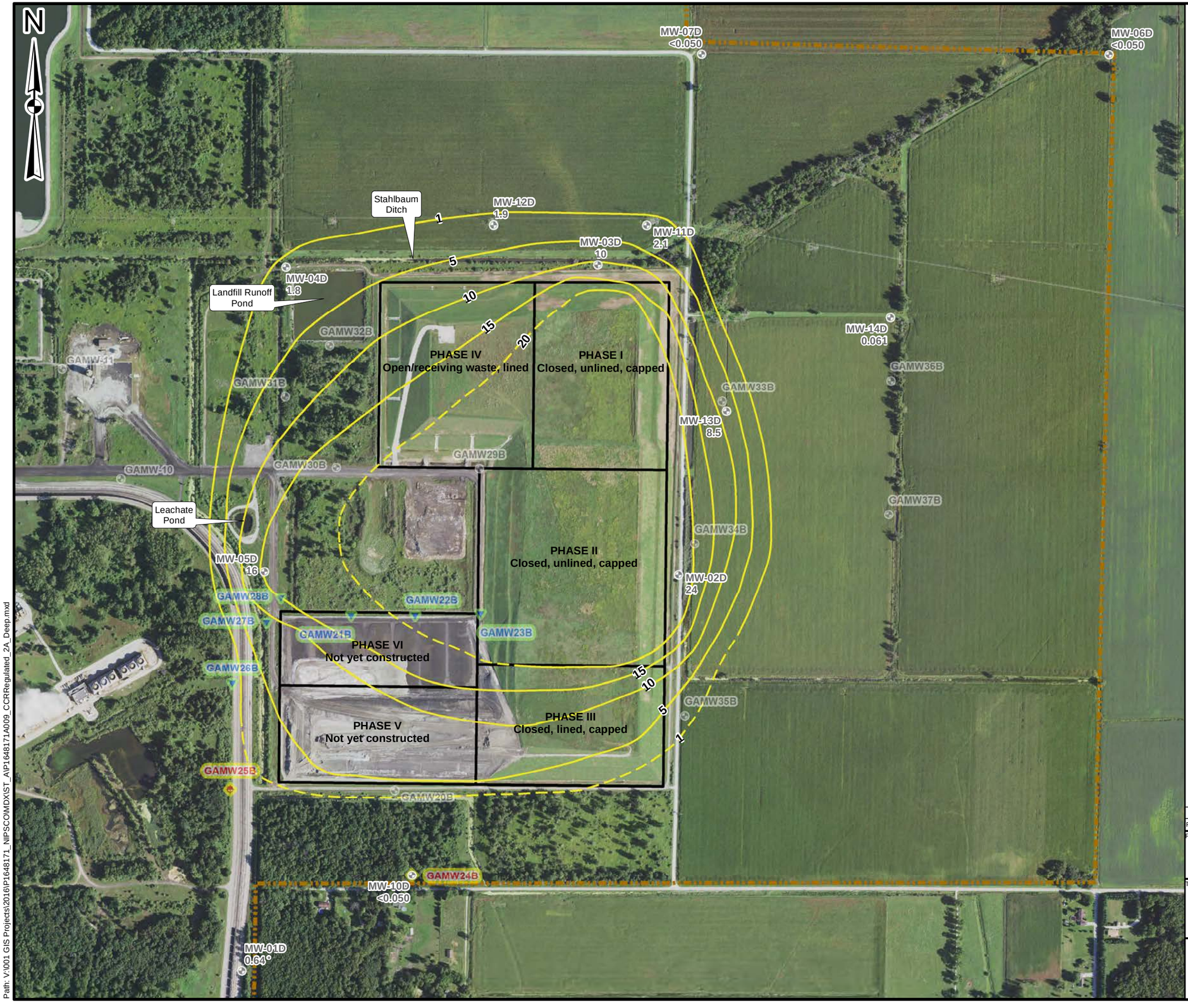
TITLE
BOREON ISOCONCENTRATION CONTOUR MAP
SEPTEMBER 2011
SHALLOW

GOLDER
Manchester, New Hampshire

PROJECT No.		164-8174	FILE No	P1648171A009_CCRRegulated_2B_Shallow
DESIGN	DFS	4/11/2018	SCALE: AS SHOWN	REV. 0
GIS	SHL	4/11/2018		
CHECK	JSP	4/11/2018		
REVIEW	MAH	4/11/2018		

FIGURE 10

Path: V:\001 GIS Projects\2016\P1648171_NIPSCO\MDX\ST_AIP1648171A009_CCRRegulated_2B_Shallow.mxd



LEGEND

- <0.050 — September 2011 Boron Concentration (mg/L)
- Non-CCR Monitoring Well
- CCR Backgound Monitoring Well
- CCR Downgradient Monitoring Well
- September 2011 Boron Deep contour (mg/L)
- Inferred September 2011 Boron Deep contour (mg/L)
- Approximate Property Line
- PHASE V — Landfill Cell Designation (Circa 2011)

600 300 0 600
Feet

FIGURE NARRATIVE

This figure shows the interpreted boron isoconcentration contours based on groundwater analytical data from the September 2011 sampling event for deep wells screened in the surficial aquifer. The isoconcentration contours are intended to depict the inferred distribution of boron in groundwater on the basis of the data illustrated. The distribution is likely more heterogeneous than shown, and the actual conditions will vary. Other interpretations are possible. Boron distribution in groundwater is known to vary with time.

NOTES

1. Transparent wells were installed after September 2011.
2. All values shown are milligrams per liter (mg/L).
3. "<" indicates boron was not detected, reporting limit is provided.
4. Data included are publically available on the Indiana Virtual File Cabinet. Golder did not collect or validate the results.
5. "*" indicates boron concentration not used for contouring.

REFERENCES

IMAGERY: USDA Farm Sevice Agency 2016 NAIP.

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
BORON ISOCONCENTRATION CONTOUR MAP
SEPTEMBER 2011
DEEP

GOLDER
Manchester, New Hampshire

PROJECT No.		164-8174	FILE No.	P1648171A009_CCRRegulated_2A_Deep
DESIGN	DFS	4/11/2018	SCALE: AS SHOWN	REV. 0
GIS	SHL	4/11/2018		
CHECK	JSP	4/11/2018		
REVIEW	MAH	4/11/2018		

FIGURE 11

Path: V:\001 GIS Projects\2016\P1648171_NIPSCO\MDX\ST_AIP1648171A009_CCRRegulated_2A_Deep.mxd



LEGEND

- <0.050 March/April 2017 Boron Concentration (mg/L)
- Non-CCR Monitoring Well
- CCR Backgound Monitoring Well
- CCR Downgradient Monitoring Well
- March/April 2017 Shallow Boron Contour (mg/L)
- Inferred March/April 2017 Shallow Boron Contour (mg/L)
- Approximate Property Line
- PHASE V Landfill Cell Designation (Circa 2017)

600 300 0 600
Feet

FIGURE NARRATIVE

This figure shows the interpreted boron isoconcentration contours based on groundwater analytical data from the March/April 2017 sampling event for shallow wells screened in the surficial aquifer. The isoconcentration contours are intended to depict the inferred distribution of boron in groundwater on the basis of the data illustrated. The distribution is likely more heterogeneous than shown, and the actual conditions will vary. Other interpretations are possible. Boron distribution in groundwater is known to vary with time.

NOTES

1. "<" indicates boron was not detected, reporting limit is provided.
2. All values shown are milligrams per liter (mg/L).
3. "*" indicates value not used for contouring.
4. "NS" indicates well not sampled during March/April 2017 sampling event.

REFERENCES

IMAGERY: USDA Farm Sevice Agency 2016 NAIP.

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

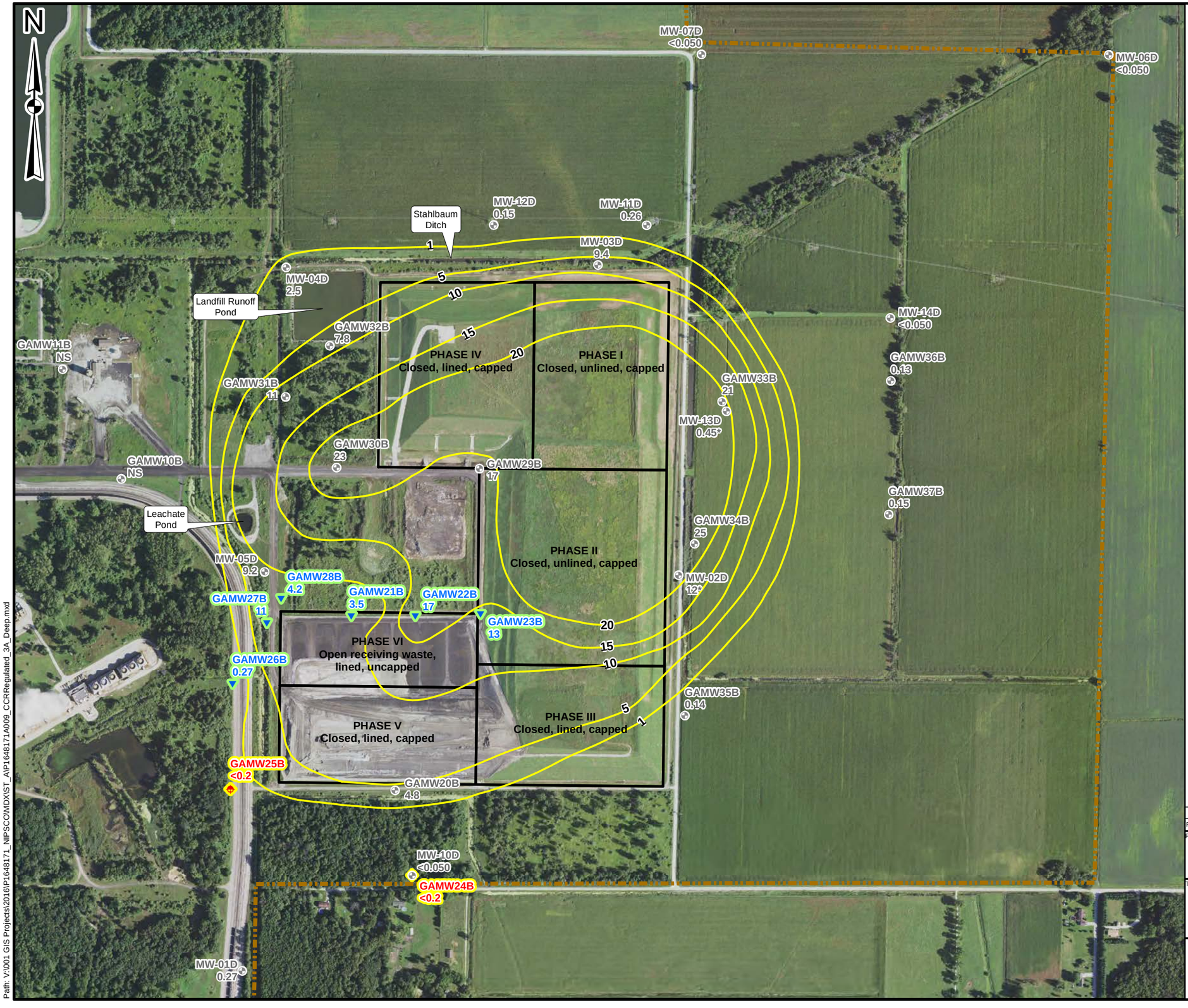
TITLE
BORON ISOCONCENTRATION CONTOUR MAP
MARCH/APRIL 2017
SHALLOW

GOLDER
Manchester, New Hampshire

PROJECT No.		164-8174	FILE No	P1648171A009_CCRRegulated_3B_Shallow
DESIGN	DFS	4/12/2018	SCALE: AS SHOWN	REV. 0
GIS	SHL	4/12/2018		
CHECK	JSP	4/12/2018		
REVIEW	MAH	4/12/2018		

FIGURE 12

Path: V:\001 GIS Projects\2016\P1648171_NIPSCO\MDX\ST_AIP1648171A009_CCRRegulated_3B_Shallow.mxd



Path: V:\001 GIS Projects\2016\P1648171_NIPSCO\MDX\ST_AIP1648171A009_CCRRegulated_3A_Deep.mxd

LEGEND

- <0.050 — March/April 2017 Boron Concentration (mg/L)
- Non-CCR Monitoring Well
- CCR Backgound Monitoring Well
- CCR Downgradient Monitoring Well
- March/April 2017 Deep Boron Contour (mg/L)
- Inferred March/April 2017 Deep Boron Contour (mg/L)
- Approximate Property Line
- PHASE V — Landfill Cell Designation (Circa 2017)

600 300 0 600
Feet

FIGURE NARRATIVE

This figure shows the interpreted boron isoconcentration contours based on groundwater analytical data from the March/April 2017 sampling event for deep wells screened in the surficial aquifer. The isoconcentration contours are intended to depict the inferred distribution of boron in groundwater on the basis of the data illustrated. The distribution is likely more heterogeneous than shown, and the actual conditions will vary. Other interpretations are possible. Boron distribution in groundwater is known to vary with time.

NOTES

1. All values shown are milligrams per liter (mg/L).
2. "<" indicates boron was not detected, reporting limit is provided.
3. "*" indicates boron concentration not used for contouring.
4. "NS" indicates well not sampled during March/April 2017 sampling event.

REFERENCES

IMAGERY: USDA Farm Sevice Agency 2016 NAIP.

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT
NORTHERN INDIANA PUBLIC SERVICE COMPANY
R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE
BORON ISOCONCENTRATION CONTOUR MAP
MARCH/APRIL 2017
DEEP

GOLDER
Manchester, New Hampshire

PROJECT No.	164-8174		FILE No.	P1648171A009_CCRRegulated_3A_Deep	
DESIGN	DFS	4/11/2018	SCALE: AS SHOWN	REV.	0
GIS	SHL	4/11/2018			
CHECK	JSP	4/11/2018			
REVIEW	MAH	4/11/2018			

FIGURE 13

APPENDIX A
SARGENT AND LUNDY BORING LOGS

EXHIBIT 22

SARGENT & LUNDY ENGINEERS CHICAGO

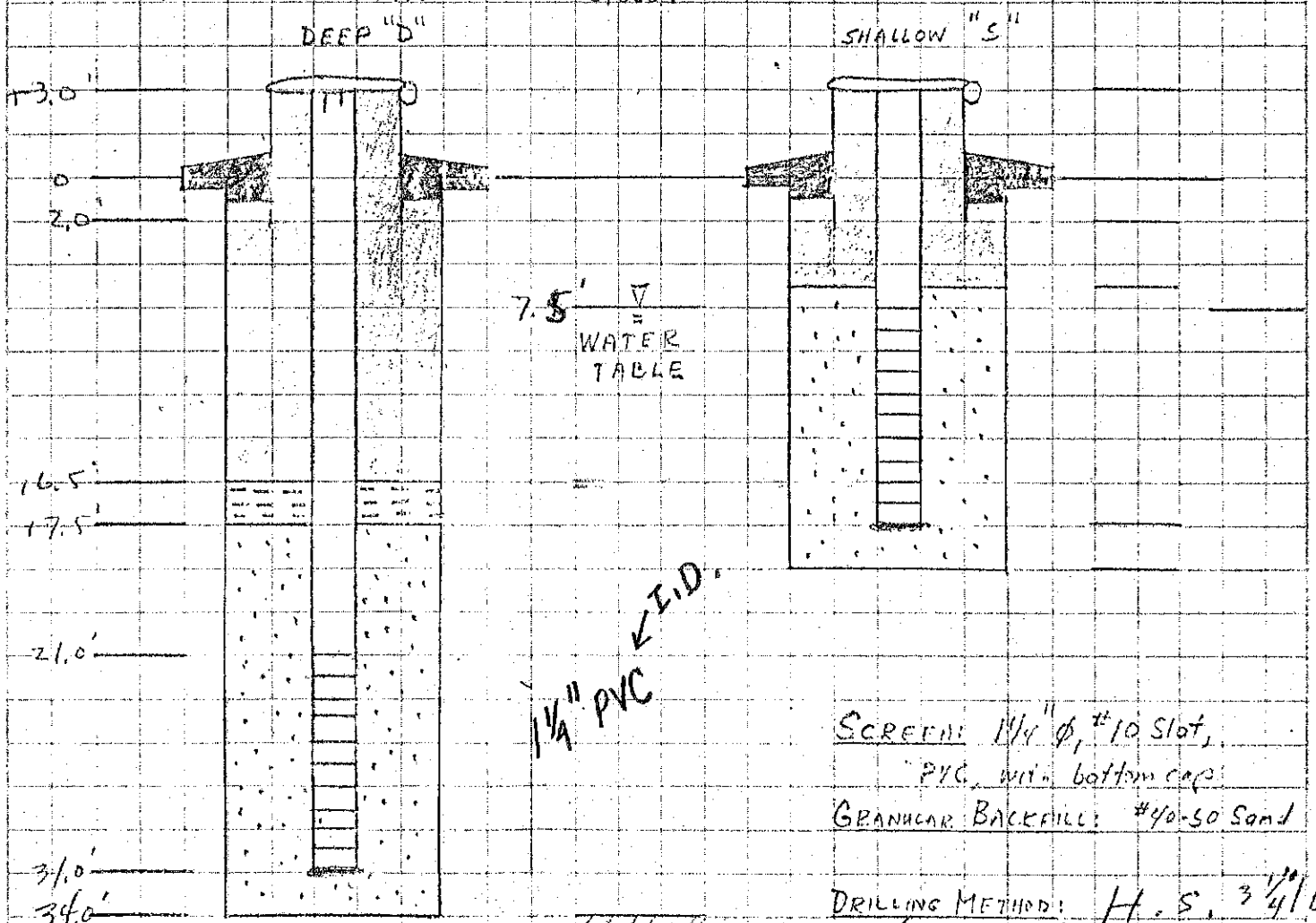
Calcs. For MONITORING WELL M-1D FGD PRODUCT DISPOSAL AREA		Calc. No.
		Rev. / Date
Safety–Related / Non–Safety–Related		Page / of

Client NIPSCo	Prepared by B.K.	Date 10-1-81
Project SCHAHFER 17/18	Reviewed by	Date
Proj. No. 5740-07 Equip. No.	Approved by	Date

LOCATION COORDINATES: S 33+00 & E 41+00

GROUND ELEVATION: 667.0

TOP OF PVC ELEVATION: 670.0±



SCREEN: 1¼" ϕ, #10 Slot, PVC w/ bottom cap

GRANULAR BACKFILL: #40-50 Sand

DRILLING METHOD: H.S. 3¼" ID w/ Fluid Coupling

TEMPORARY CASING: 6" OD 3¼" ID

HOLE DIAMETER: 6" OD

STANDPIPE LENGTH/DIAMETER: 5' x 4"

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW OUT	RECOVERY	FINAL
DATE: 10-1-81					
TIME: 12:30 PM					
LEVEL:					

Form GQ-3.08.1 Rev. 2

EXHIBIT 23

SARGENT & LUNDY ENGINEERS CHICAGO

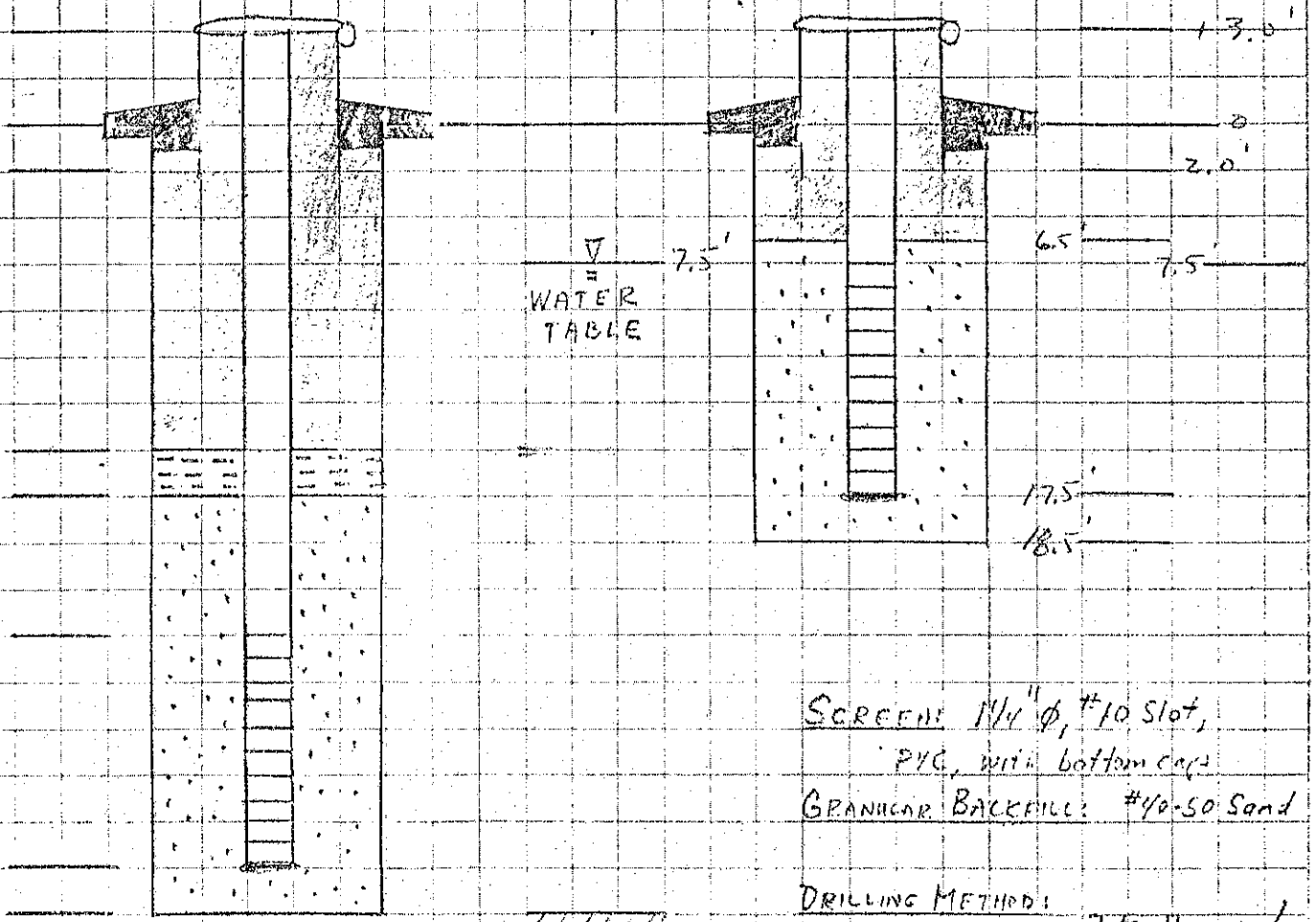
Calcs. For MONITORING WELL M-1S FGD PRODUCT DISPOSAL AREA		Calc. No.
		Rev. / Date
Safety–Related	Non–Safety–Related	Page / of

Client NIPSCo	Prepared by B K.	Date 10-1-81
Project SCHAHFER 17/18	Reviewed by	Date
Proj. No. 5740-07 Equip. No.	Approved by	Date

LOCATION COORDINATES: S 33+00 & E 41+00 (OR NEAR).

GROUND ELEVATION: 667.0

TOP OF PVC ELEVATION: 670.0±



SCREEN: 4" ϕ, #10 Slot, PVC, with bottom cap

GRANULAR BACKFILL: #40-50 Sand

DRILLING METHOD: H.S. Augers 3¼" w/ Intermittent Delays.

TEMPORARY CASING: 6"

HOLE DIAMETER: 6"

STANDPIPE LENGTH / DIAMETER: 5' X 4"

WATER LEVELS

	AT Completion	12 Hours	Blow Out	Recovery	Final
DATE:	10-1-81				
TIME:	2:30 PM				
LEVEL:					

Form GO-3.08.1 Rev. 2

EXHIBIT 24

SARGENT & LUNDY ENGINEERS CHICAGO

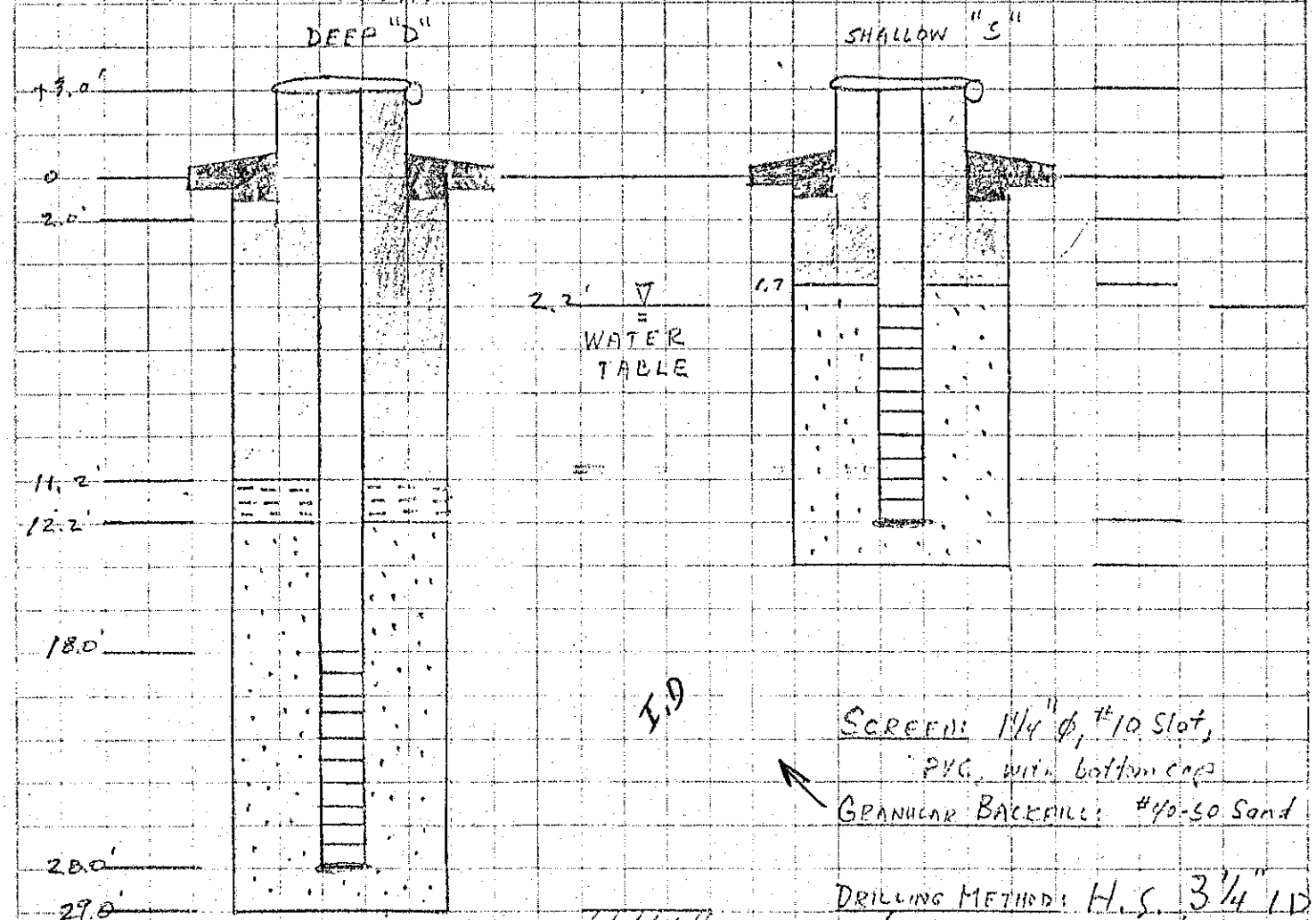
Calcs. For MONITORING WELL M-2D
FGD PRODUCT DISPOSAL AREA
Safety-Related | Non-Safety-Related

Calc. No.
Rev. | Date
Page | of

Client NIPSCo
Project SCHAHFER 17/18
Proj. No. 5740-07 Equip. No.

Prepared by BK | Date 9-22-81
Reviewed by | Date
Approved by | Date

LOCATION COORDINATES: S 8+00 & E 67+70
GROUND ELEVATION: 663.0
TOP OF PVC ELEVATION: 666.0+



1.9

SCREEN: 1¼" ϕ, #10 Slot, PVC, with bottom cap
GRANULAR BACKFILL: #40-80 Sand

DRILLING METHOD: H.S. 3¼" I.D. w/fluid coupling
TEMPORARY CASING: 6" O.D.
HOLE DIAMETER: 6" O.D.
STANDPIPE LENGTH/DIAMETER: 5' X 4"

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW OUT	RECOVERY	FINAL
DATE:	9-22-81				
TIME:	12:45				
LEVEL:	2.2				

Form GQ-3.08.1 Rev. 2

EXHIBIT 25

SARGENT & LUNDY ENGINEERS CHICAGO

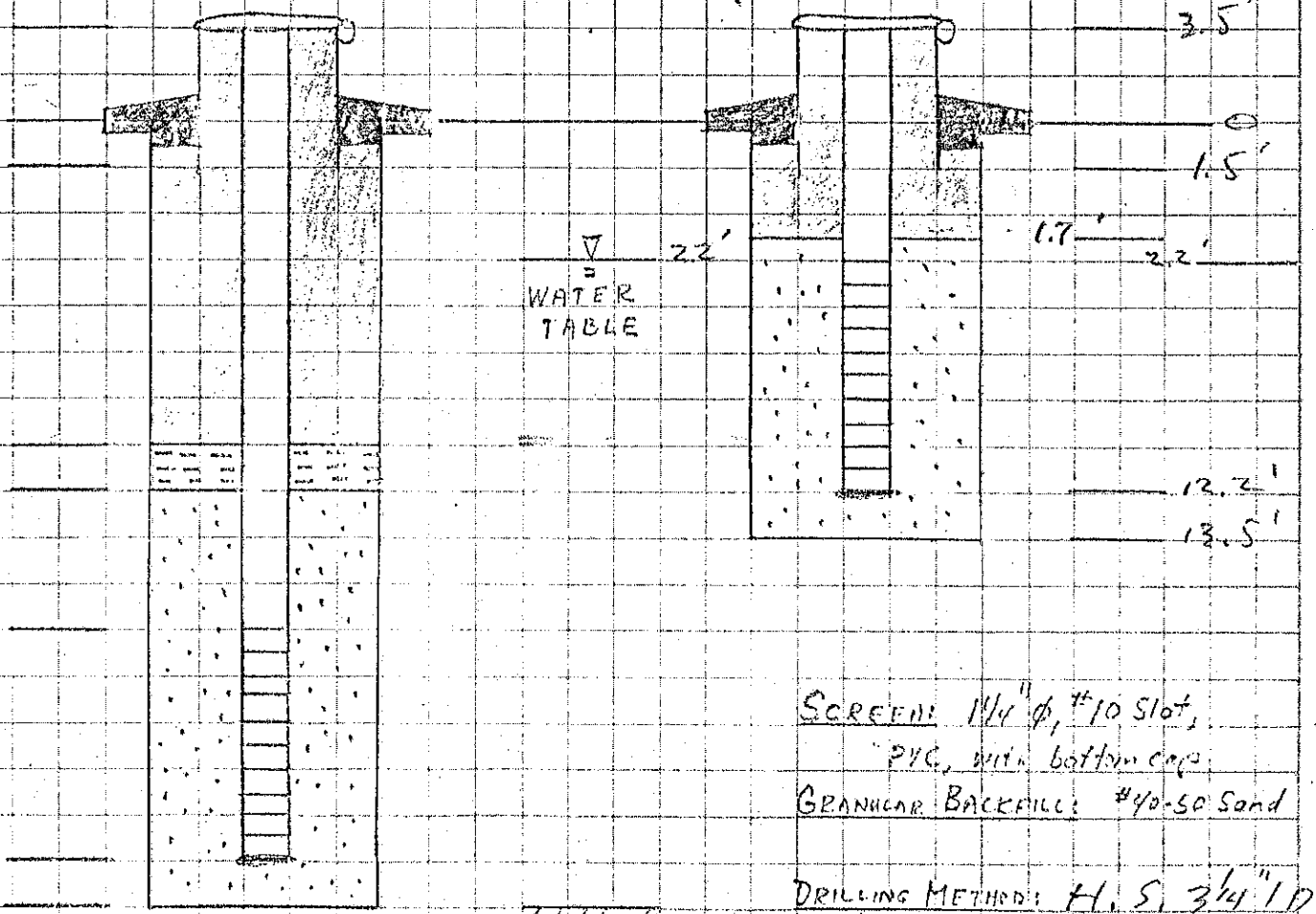
Calcs. For MONITORING WELL M-2S FGD PRODUCT DISPOSAL AREA		Calc. No.
		Rev. / Date
Safety–Related	Non–Safety–Related	Page / of

Client NIPSCo	Prepared by B.K.	Date 9-22-81
Project SCHAHFER 17/18	Reviewed by	Date
Proj. No. 5740-07 Equip. No.	Approved by	Date

LOCATION COORDINATES: S 8+00 & E 67+70 (OR NEAR)

GROUND ELEVATION: 663.0

TOP OF PVC ELEVATION: 666.5+



SCREEN: 1¼" ϕ, #10 SLOT, PVC, WITH BOTTOM CAP

GRANULAR BACKFILL: #40-50 SAND

DRILLING METHOD: H.S. 3¼" ID W/ FLUID COUPLING

TEMPORARY CASING: 6" O.D.

HOLE DIAMETER: 6" O.D.

STANDPIPE LENGTH / DIAMETER: 5' x 4"

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW OUT	RECOVERY	FINAL
DATE: 9-22-81					
TIME: 2:00					
LEVEL: 2.2'					

Form GQ-3.08.1 Rev. 2

EXHIBIT 26

SARGENT & LUNDY ENGINEERS CHICAGO

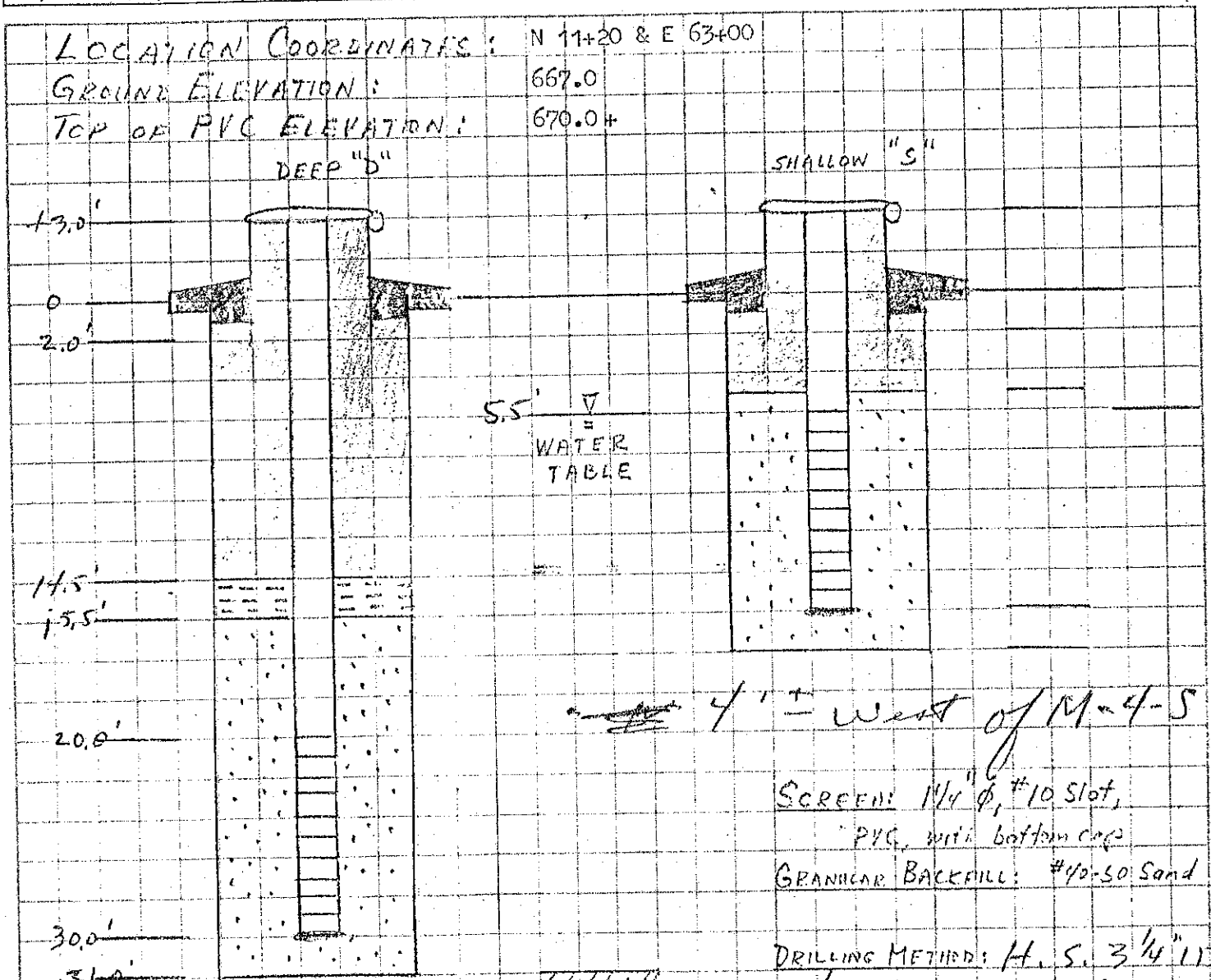
Calcs. For MONITORING WELL M-3-D
FGD PRODUCT DISPOSAL AREA
Safety-Related | Non-Safety-Related

Calc. No.
Rev. | Date 9-21-81
Page of

Client NIPSCo
Project SCHAEFER 17/18
Proj. No. 5740-07 Equip. No.

Prepared by B.K. | Date 9-21-81
Reviewed by | Date
Approved by | Date

LOCATION COORDINATES: N 11+20 & E 63+00
GROUND ELEVATION: 667.0
TOP OF PVC ELEVATION: 670.0 ±



4' ± West of M-4-S

SCREEN: 1¼" ϕ, #10 Slot, PVC, with bottom cap
GRANULAR BACKFILL: #40-50 Sand

DRILLING METHOD: H.S. 3¼" ID w/ Fluid coupling
TEMPORARY CASING: 6" O.D
HOLE DIAMETER: 6" O.D
STANDPIPE LENGTH / DIAMETER: 5' x 4"

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW RECOVERY	FINAL
DATE:	9-21-81			
TIME:	12:40 PM			
LEVEL:				

Form GQ-3.08.1 Rev. 2

SARGENT & LUNDY ENGINEERS CHICAGO

Calcs. For MONITORING WELL M-5 D
FGD PRODUCT DISPOSAL AREA

Safety-Related | Non-Safety-Related

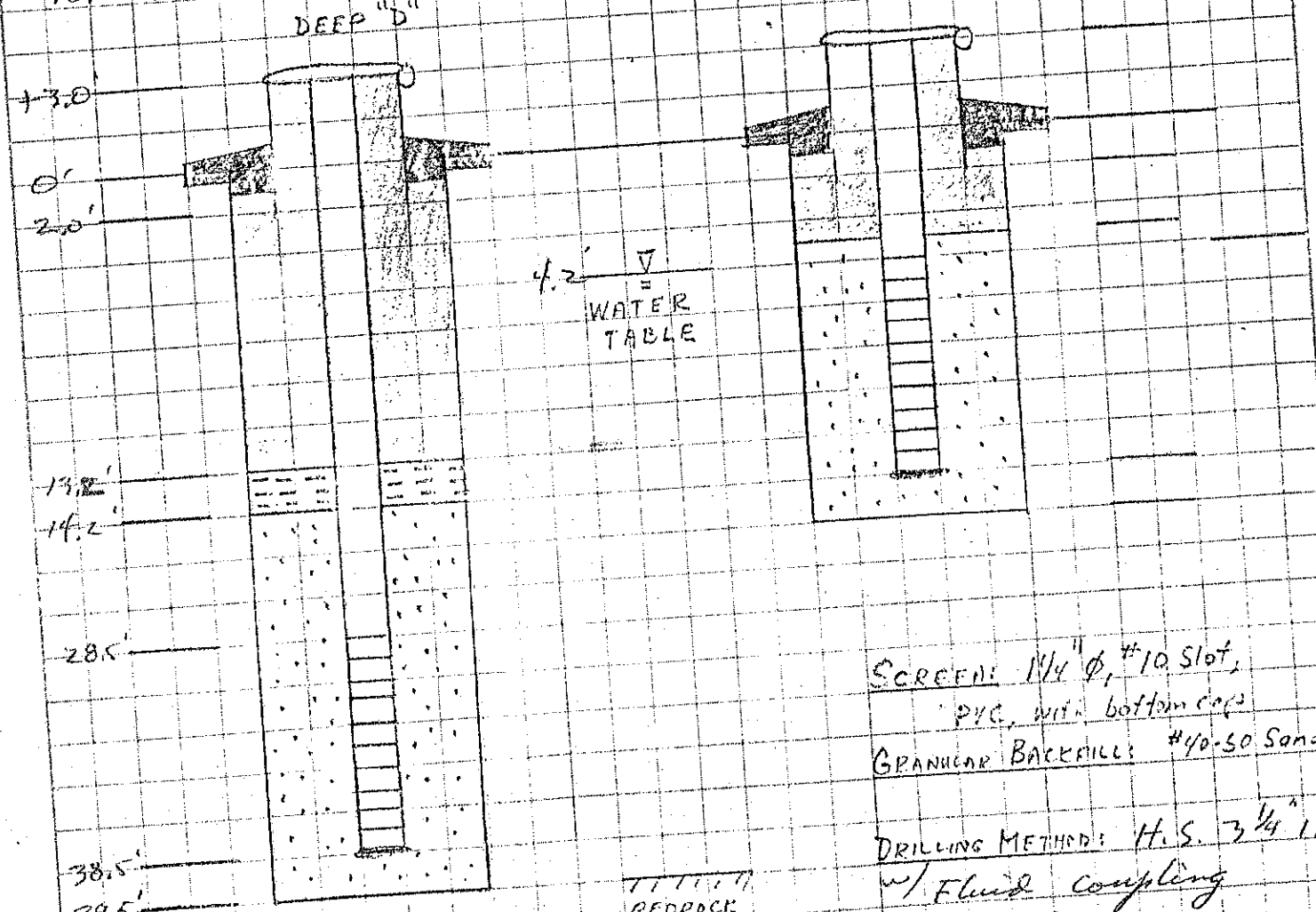
Rev. | Date

Page of

Client NIPSCo
Project SCHAEFER 17/18
Proj. No. 5740-07 Equip. No.

Prepared by B.K. Date 9-30-81
Reviewed by Date
Approved by Date

LOCATION COORDINATES: S 8+00 & E 42+00
GROUND ELEVATION: 662.0
TOP OF PVC ELEVATION: 665.0±



SCREEN: 1¼" ϕ, #10 SLOT, PVC, WITH BOTTOM CAP
GRANULAR BACKFILL: #40-50 SAND

DRILLING METHOD: H.S. 3¼" I.D. W/ FLUID COUPLING

TEMPORARY CASING: 6" O.D.

HOLE DIAMETER: 6" O.D.

STANDPIPE LENGTH / DIAMETER: 5' X 4"

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW OUT RECOVERY	FINAL
DATE:	9-30-81			
TIME:	1 PM			
LEVEL:				

Form GQ-3.08.1 Rev. 2

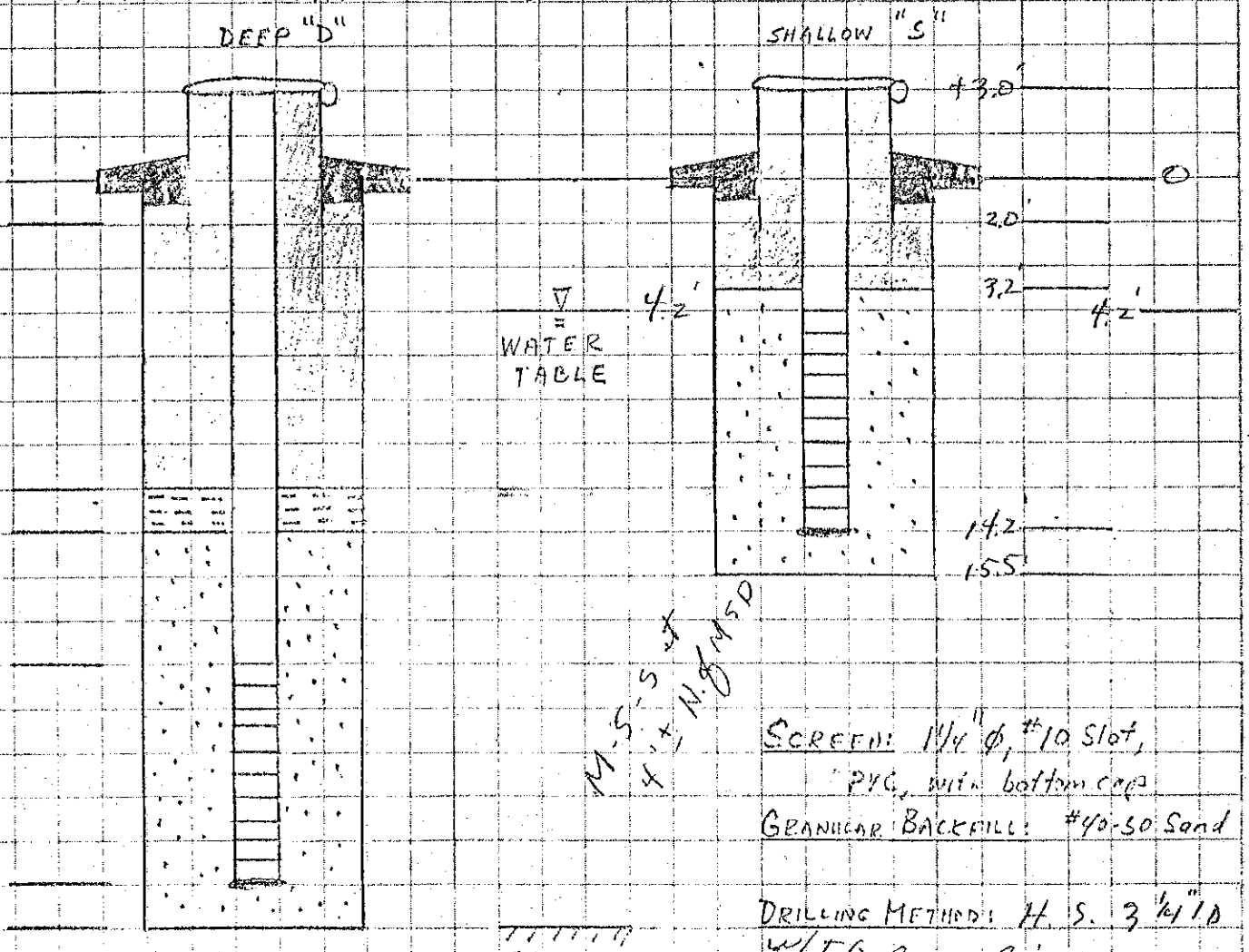
EXHIBIT 31

SARGENT & LUNDY ENGINEERS CHICAGO

Calcs. For MONITORING WELL M-5S FGD PRODUCT DISPOSAL AREA Safety-Related / Non-Safety-Related	Calc. No.	
	Rev.	Date
	Page	of

Client NIPSCo	Prepared by BJK	Date 9-30-81
Project SCHAHFER 17/18	Reviewed by	Date
Proj. No. 5740-07 Equip. No.	Approved by	Date

LOCATION COORDINATES: S 8+00 & E 42+00 (OR NEAR)
GROUND ELEVATION: 662.0
TOP OF PVC ELEVATION: 665.0+



M.S.S. 4"x N.S.M.S.P.

SCREEN: 1¼" ϕ, #10 Slot, PVC, with bottom cap
GRANULAR BACKFILL: #40-50 Sand

DRILLING METHOD: H.S. 3¼" ID w/ Flush coupling
TEMPORARY CASING: 6" OD
HOLE DIAMETER: 6" OD
STANDPIPE LENGTH/DIAMETER: 5' X 4"

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW OUT	DRY/WET	FINAL
DATE:	9-30-81				
TIME:	2:30PM				
LEVEL:					

Form GQ-3.08.1 Rev. 2

EXHIBIT 32

SARGENT & LUNDY ENGINEERS CHICAGO

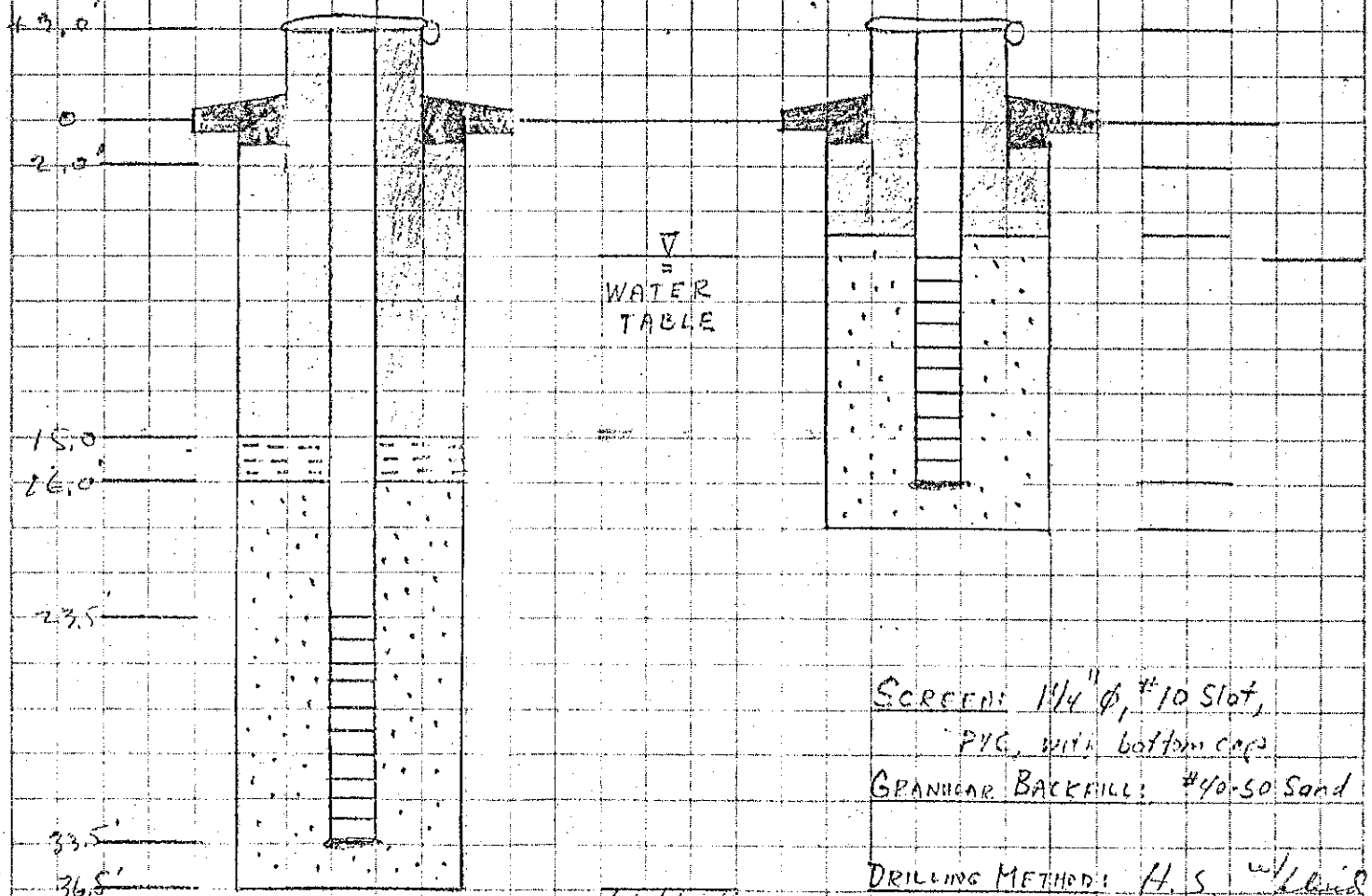
Calcs. For MONITORING WELL M-6D FGD PRODUCT DISPOSAL AREA		Calc. No.
Safety–Related	Non–Safety–Related	Rev. / Date
		Page / of

Client NIPSCO	Prepared by B.K.	Date 9-15-81
Project SCHAEFER 17/18	Reviewed by	Date
Proj. No. 5740-07 Equip. No.	Approved by	Date

LOCATION COORDINATES: N 24+30 & E 94+80

GROUND ELEVATION: 663.0

TOP OF PVC ELEVATION: 666.0+



SCREEN: 1¼" ϕ, #10 Slot, PVC, with bottom cap

GRANULAR BACKFILL: #40-50 Sand

DRILLING METHOD: H.S. w/ plug coupling 36.5'

TEMPORARY CASING: O.D. 6" I.D. 3¼"

HOLE DIAMETER: 6

STANDPIPE LENGTH / DIAMETER: 5' x 4" I.D.

WATER LEVELS	AT COMPLETION	12 HOURS	BLOW OUT	RECOVERY	FINAL
DATE:	9-15-81				
TIME:	11:00 AM				
LEVEL:	6.0				

Form GQ-3.08.1 Rev. 2

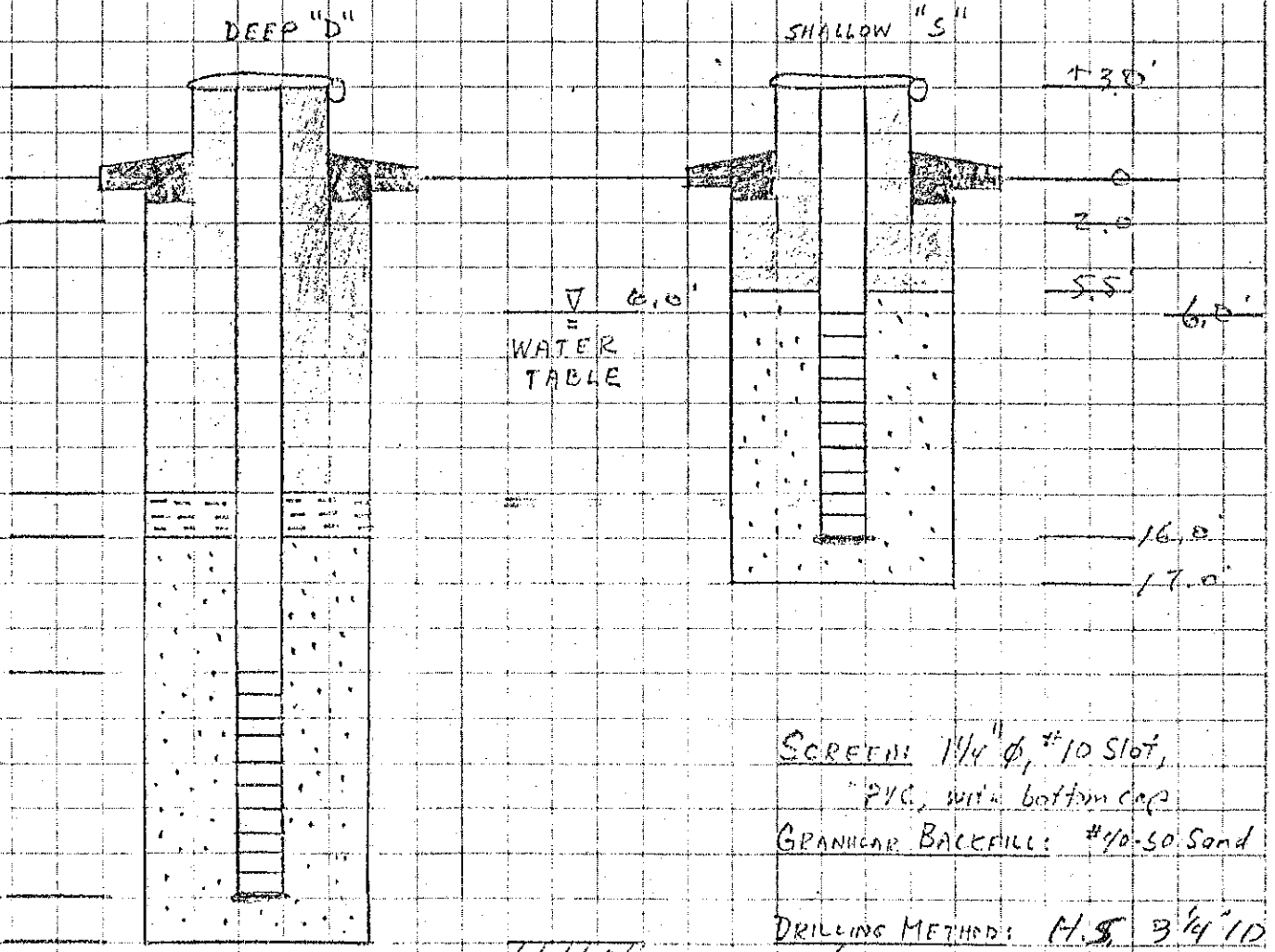
EXHIBIT 33

SARGENT & LUNDY ENGINEERS CHICAGO

Calcs. For MONITORING WELL M-6-S FGD PRODUCT DISPOSAL AREA	Calc. No.	
Safety-Related / Non-Safety-Related	Rev.	Date
	Page	of

Client NIPSCO	Prepared by B.K.	Date 9-16-81
Project SCHAEFER 17/18	Reviewed by	Date
Proj. No. 5740-07 Equip. No.	Approved by	Date

LOCATION COORDINATES: N 24+30 & E 94+80 (OR NEAR)
GROUND ELEVATION: 663.0
TOP OF PVC ELEVATION: 666.0±



SCREEN: 1¼" ϕ, #10 SLOT, PVC, with bottom cap
GRANULAR BACKFILL: #10-50 Sand

DRILLING METHOD: H.S. 3¼" ID w/ Fluid coupling
TEMPORARY CASING: 6" O.D
HOLE DIAMETER: 6" OD
STANDPIPE LENGTH / DIAMETER: 5' x 4"

WATER LEVELS	AT COMPLETION	12 HOURS	24 HOURS	RECOVERY	FINAL
DATE:	9-16-81				
TIME:	10 AM				
LEVEL:	6.0'				

Form GQ-3.08.1 Rev. 2

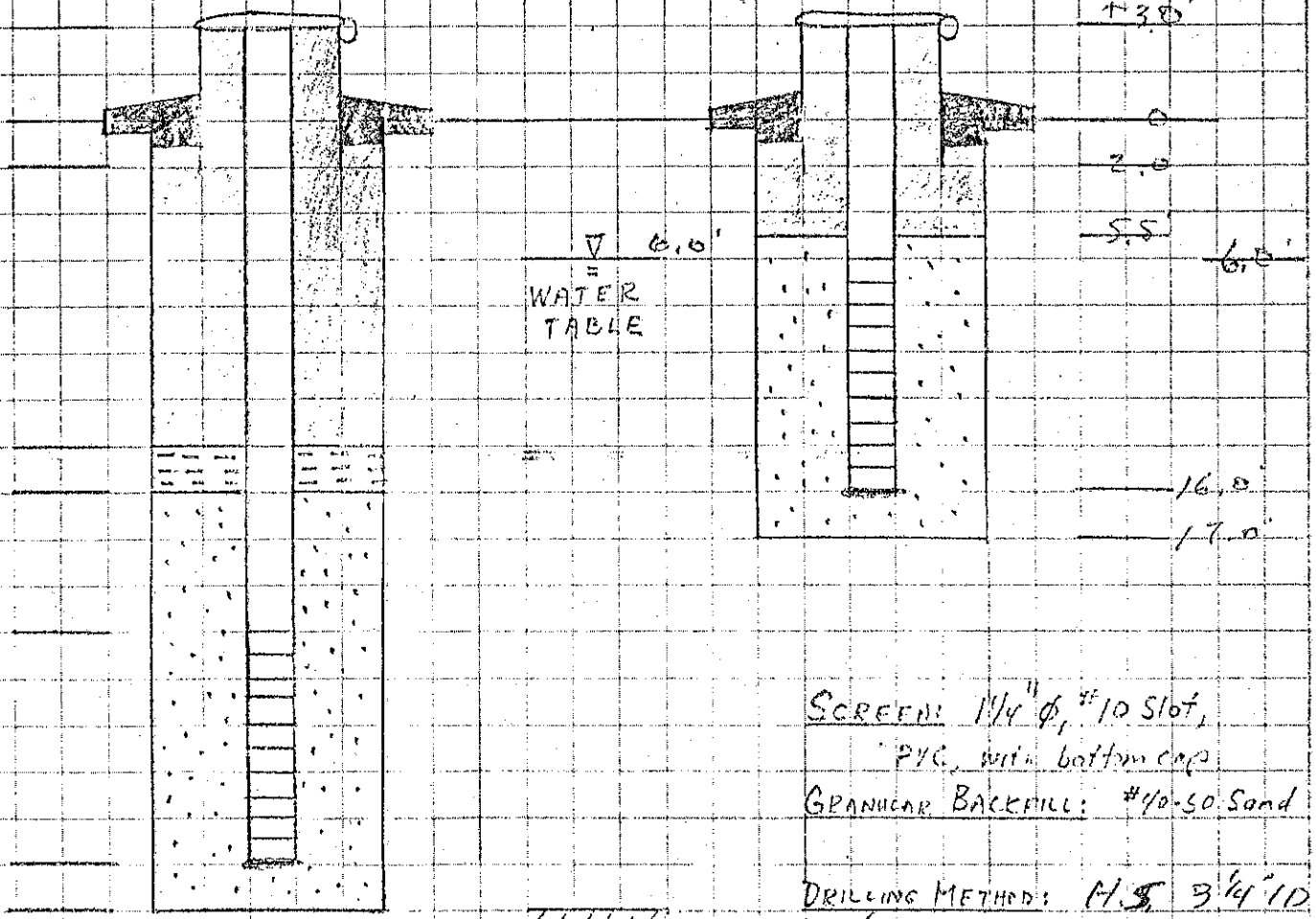
EXHIBIT 33

SARGENT & LUNDY ENGINEERS CHICAGO

Calcs. For MONITORING WELL M-6-S FGD PRODUCT DISPOSAL AREA	Calc. No.	
	Rev.	Date
Safety-Related / Non-Safety-Related	Page	of

Client NIPSCo	Prepared by B.K.	Date 9-16-81
Project SCHAEFER 17/18	Reviewed by	Date
Proj. No. 5740-07 Equip. No.	Approved by	Date

LOCATION COORDINATES: N 24+30 & E 94+80 (OR NEAR)
GROUND ELEVATION: 663.0
TOP OF PVC ELEVATION: 666.0±



SCREEN: 1¼" ϕ, #10 SLOT, PVC, WITH BOTTOM CAP
GRANULAR BACKFILL: #40-50 SAND

DRILLING METHOD: HS 3¼" ID W/ FLUID COUPLING
TEMPORARY CASING: 6" O.D.
HOLE DIAMETER: 6" OD
STANDPIPE LENGTH/DIAMETER: 5' x 4"

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW OUT	RECOVERY	FINAL
DATE:	9-16-81				
TIME:	10:AM				
LEVEL:	6.0'				

Form GQ-3.08.1 Rev. 2

EXHIBIT 34

SARGENT & LUNDY ENGINEERS CHICAGO

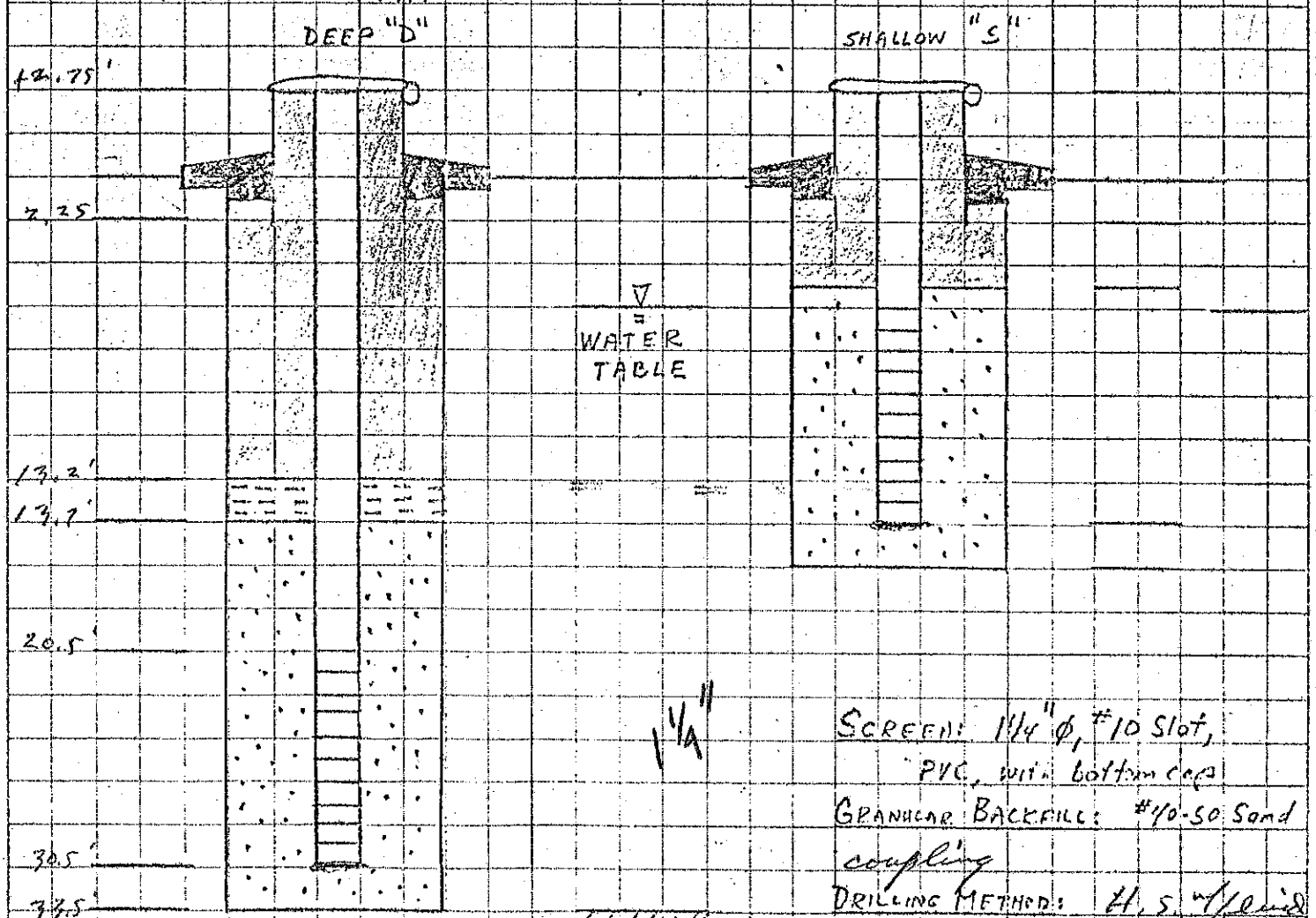
Calcs. For MONITORING WELL M-7 D
FGD PRODUCT DISPOSAL AREA
Safety–Related | Non–Safety–Related

Calc. No.
Rev. | Date
Page of

Client NIPSCo
Project SCHAHFER 17/18
Proj. No. 5740-07 Equip. No.

Prepared by | Date
Reviewed by | Date
Approved by | Date

LOCATION COORDINATES: N 24+30 & E 69+50
GROUND ELEVATION: 664.0
TOP OF PVC ELEVATION: 666.8±



SCREEN: 1¼" ϕ, #10 Slot, PVC, with bottom cap
GRANULAR BACKFILL: #10-50 Sand
coupling
DRILLING METHOD: H.S. w/ mud coupling + water to 33.5'
TEMPORARY CASING:
O.D. 6" I.D. 5¾"
HOLE DIAMETER:
6"
STANDPIPE LENGTH / DIAMETER:
5' x 4" I.D.

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW OUT	RECOVERY	FINAL
DATE:	8-14-81				
TIME:	11:AM				
LEVEL:	3.7'				

Form GO-3.05.1 Rev. 2

EXHIBIT 35

SARGENT & LUNDY ENGINEERS CHICAGO

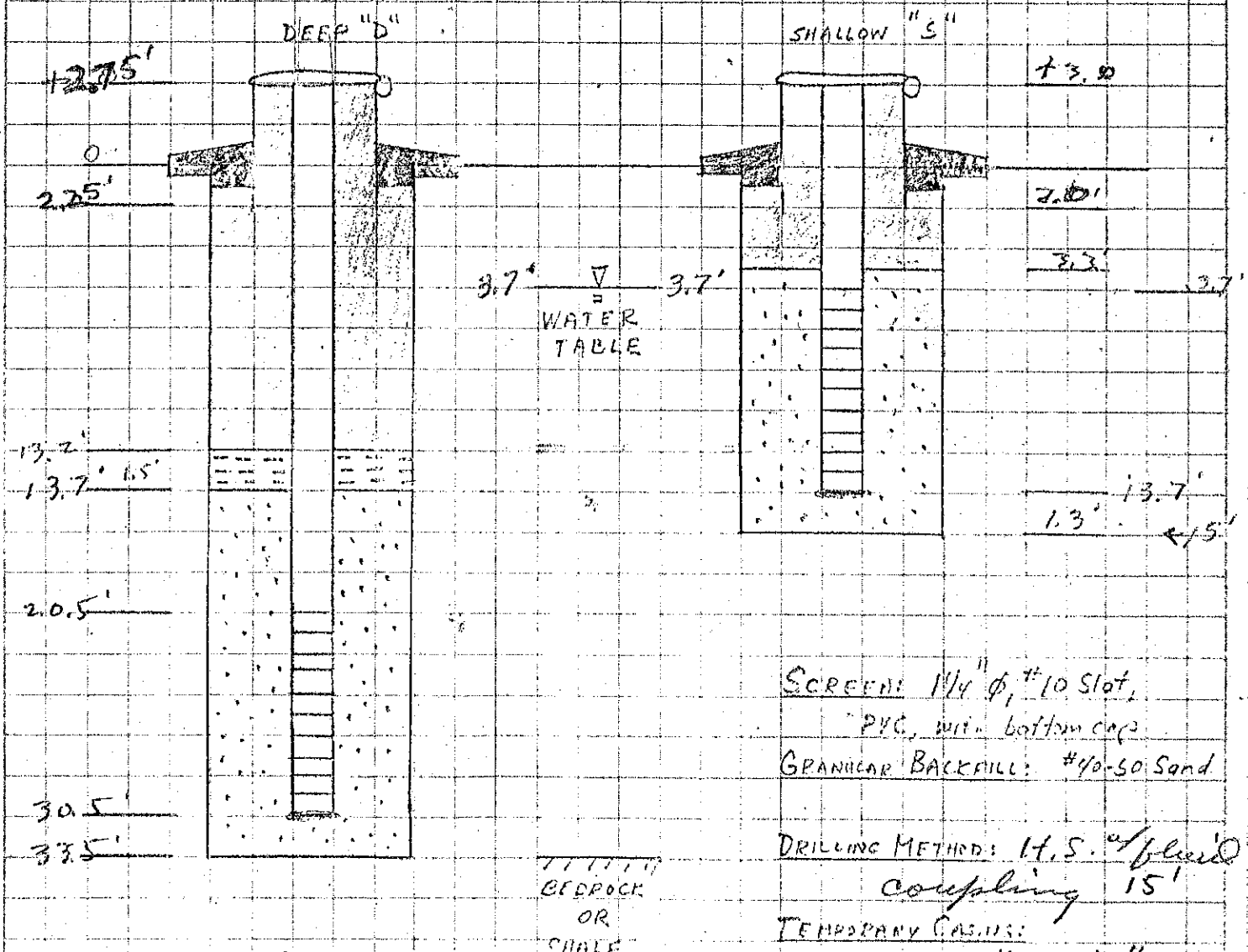
Calcs. For MONITORING WELL M-7 S
FGD PRODUCT DISPOSAL AREA
Safety-Related | Non-Safety-Related

Calc. No.
Rev. | Date
Page of

Client NIPSCO
Project SCHAHFER 17/18
Proj. No. 5740-07 Equip. No.

Prepared by BK. Date
Reviewed by Date
Approved by Date

LOCATION COORDINATES: N 24+30 & E 69+50 (OR NEAR)
GROUND ELEVATION: 664.0
TOP OF PVC ELEVATION: 667.0±



SCREEN: 1¼" ϕ, #10 Slot, PVC, with bottom cap
GRANULAR BACKFILL: #10-50 Sand

DRILLING METHOD: 14.5" I.D. Hollow stem auger
coupling 15'

TEMPORARY CASING:
O.D. 6". 3¼" I.D.

HOLE DIAMETER:
6"

STANDPIPE LENGTH / DIAMETER:
5' X 4" O.D.

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW OUT	RECOVERY	FINAL
DATE:	9-11-81				
TIME:	11:00 AM				
LEVEL:	4.10				
15 MIN.	3.7				

Form GQ-3.08.1 Rev. 2

EXHIBIT 36

SARGENT & LUNDY ENGINEERS CHICAGO

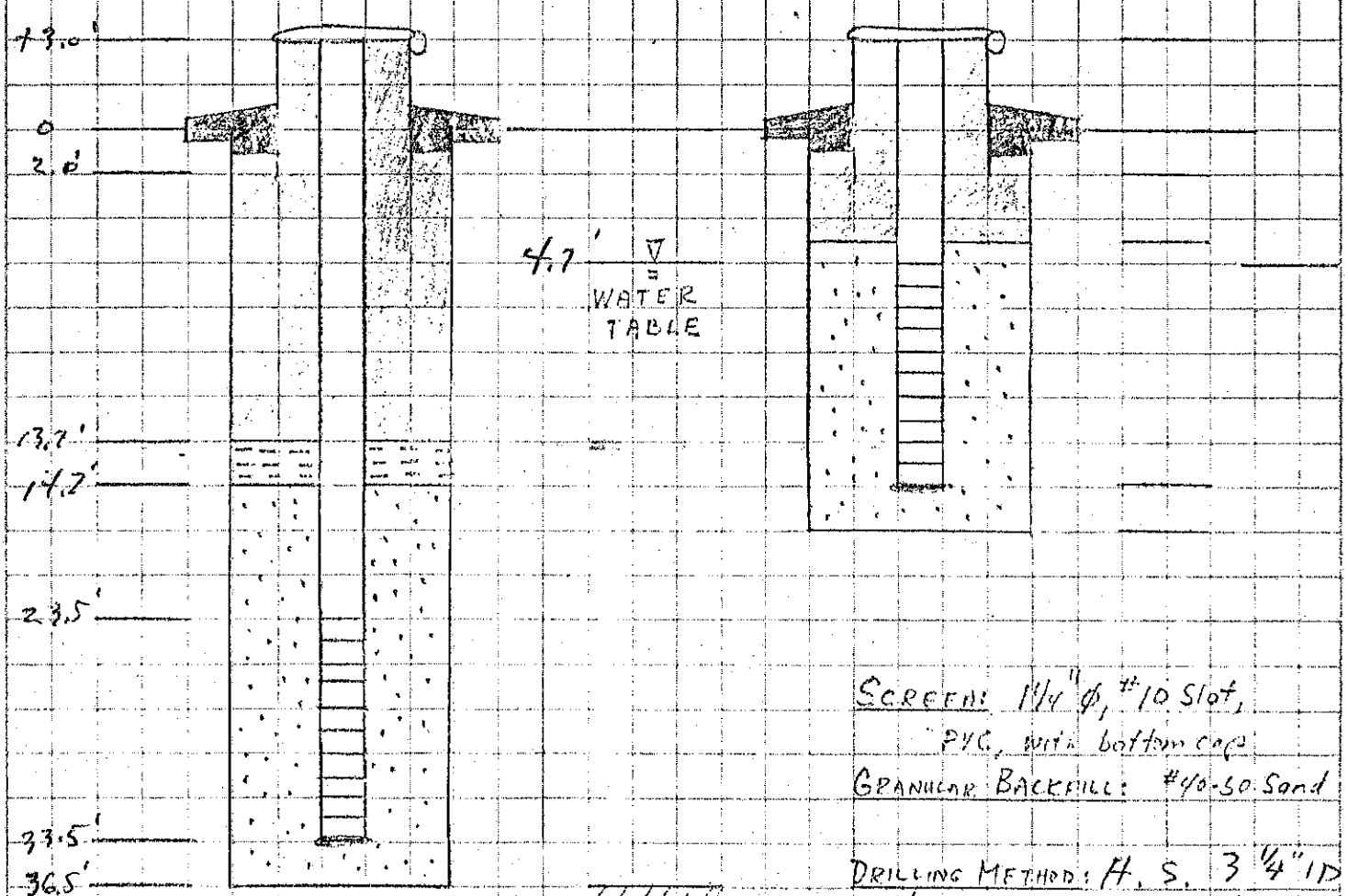
Calcs. For MONITORING WELL M-8D
FGD PRODUCT DISPOSAL AREA
Safety-Related | Non-Safety-Related

Calc. No.
Rev. | Date
Page of

Client NIPSCO
Project SCHAEFER 17/18
Proj. No. 5740-07 Equip. No.

Prepared by B. K. | Date 9-22-81
Reviewed by | Date
Approved by | Date

LOCATION COORDINATES: N 50+70 & E 51+30
GROUND ELEVATION: 661.0
TOP OF PVC ELEVATION: 664.0+



SCREEN: 1¼" ϕ, #10 Slot, PVC, with bottom cap
GRANULAR BACKFILL: #40-50 Sand

DRILLING METHOD: H. S. 3¼" ID w/ Fluid Coupling
TEMPORARY CASING: 6" OD
HOLE DIAMETER: 6" OD
STANDPIPE LENGTH/DIAMETER: 5' x 4"

Water Levels	AT Completion	12 Hours	Blow Out	Recovery	Final
DATE:					
TIME:					
LEVEL:					

Form GO-3.08.1 Rev. 2

EXHIBIT 37

SARGENT & LUNDY ENGINEERS CHICAGO

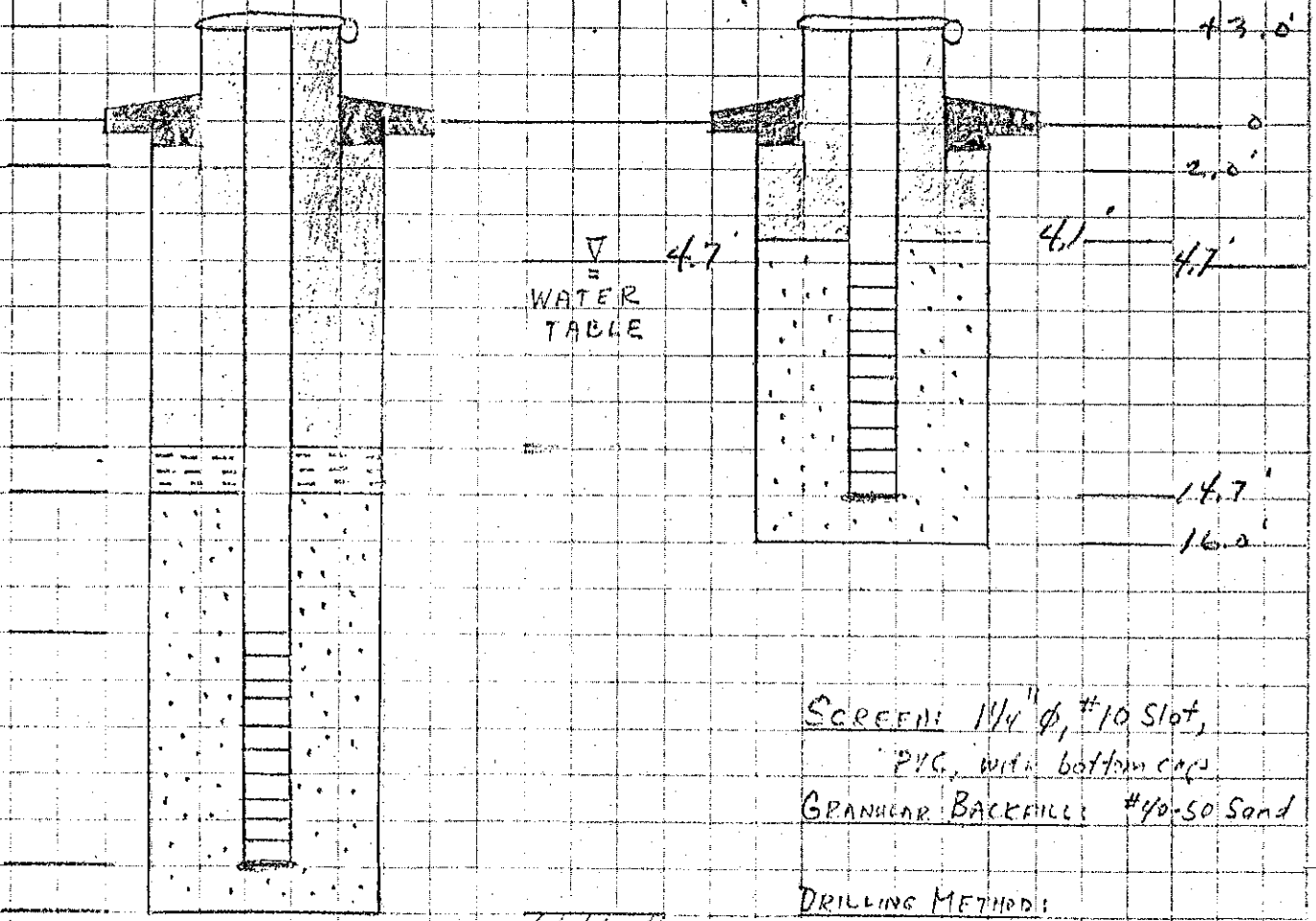
Calcs. For MONITORING WELL M-8S
FGD PRODUCT DISPOSAL AREA
Safety-Related | Non-Safety-Related

Calc. No.
Rev. | Date
Page | of

Client NIPSCo
Project SCHAHFER 17/18
Proj. No. 5740-07 Equip. No.

Prepared by B.K. | Date 9-23-91
Reviewed by | Date
Approved by | Date

LOCATION COORDINATES: N 50+70 & E 51+30 (OR NEAR)
GROUND ELEVATION: 661.0
TOP OF PVC ELEVATION: 664.0+



SCREEN: 1¼" ϕ, #10 Slot, PVC, with bottom cap
GRANULAR BACKFILL: #10-50 Sand

DRILLING METHOD:

TEMPORARY CASING:

HOLE DIAMETER:

STANDPIPE LENGTH/DIAMETER:

WATER LEVELS

	AT COMPLETION	12 HOURS	BLOW OUT	RECOVERY	FINAL
DATE:					
TIME:					
LEVEL:					

Form GQ-3.08.1 Rev. 2

APPENDIX B
SUPPORTING DOCUMENTATION

2005 IDEM PHASE II MONITORING CORRESPONDENCE

37-01 Jasper Co. NIPSCO Schahfer Station RWS I

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We make Indiana a cleaner, healthier place to live.

Mitchell E. Daniels, Jr.
Governor

Thomas W. Easterly
Commissioner

100 North Senate Avenue
Indianapolis, Indiana 46204
(317) 232-8603
(800) 451-6027
www.IN.gov/idem

VIA CERTIFIED MAIL 7002 0510 0004 0388 1014

June 2, 2005

Mr. Greg Costakis
Northern Indiana Public Service Company (NIPSCO)
RM Schahfer Generating Station
2723 East 1500 North
Wheatfield, IN 46392

Dear Mr. Costakis:

RE: Copy of Review Letter for Semi-Annual Ground Water Reports from October 2000 through November 2004
NIPSCO Schahfer Station RWS I, FP# 37-01, Jasper County

Enclosed is a copy of the certified letter that was sent to NIPSCO March 17, 2005. It was addressed to a location apparently no longer associated with NIPSCO to an employee who apparently is no longer with NIPSCO. The certified letter discusses Phase II ground water monitoring at the landfill. It stated that the April sampling event needed to have the Phase II monitoring changes implemented. However, due to the addressing discussed above, the changes can be incorporated into the next semi-annual sampling event in October/November.

If you have any questions concerning this matter, please contact Marty Harmless at 317/234-0597 or at 800/451-6027, extension 0597, or by email at mharmles@idem.in.gov.

Sincerely,

Karyl K. Schmidt, L.P.G.
Chief, Geology Section
Permits Branch
Office of Land Quality

for KKS

Enclosure: copy of certified letter to NIPSCO dated March 17, 2005

cc: Jasper Co. Health Department
Northwest Indiana Solid Waste Management District
Northwest Regional Office

bcc: 2C1e w/enclosures
Karyl K. Schmidt
John Guerrettaz
Tom Brown
Melissia Hawkins
Marty Harmless/w enclosures

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We make Indiana a cleaner, healthier place to live.

Joseph E. Kernan
Governor

Lori F. Kaplan
Commissioner

100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015
(317) 232-8603
(800) 451-6027
www.in.gov/idem

March 17, 2005

VIA CERTIFIED MAIL 7002 0510 0004 0408 4988

Mr. Robert Huffman
Northern Indiana Public Service Company
5265 Hohman Avenue
Hammond, IN 46320-1775

Dear Mr. Huffman:

RE: Review Letter for Semi-Annual Ground Water Reports from October, 2000 through November, 2004
Schahfer Station RWS I, FP# 37-01
Jasper County

Staff of the Geology Section reviewed the following ground water monitoring reports: 2000 Semi-Annual Ground Water Report Dated October 21, 2000; 2001 Semi-Annual Ground Water Report Dated May 25, 2001; 2001 Semi-Annual Ground Water Report Dated November 21, 2001; 2002 Semi-Annual Ground Water Report Dated May 15, 2002; 2002 Semi-Annual Ground Water Report Dated November 22, 2002; 2003 Semi-Annual Ground Water Report Dated May 9, 2003; 2003 Semi-Annual Ground Water Report Dated November 13, 2003; 2004 Semi-Annual Ground Water Report Dated May 11, 2004; and 2004 Semi-Annual Ground Water Report Dated November 10, 2004.

These reviews concluded that a Phase II monitoring program under 329 IAC 10-29-7 is necessary. A Phase II monitoring program is required whenever statistically significant increases (SSI) over background have been detected between background and downgradient monitoring devices for two (2) or more of the Phase I parameters under 329 IAC 10-29-6, and must continue until sampling results over a one (1) year period do not show a SSI in the constituents to be monitored under subsection (b) or (d).

In both of the 2004 sampling events, monitoring wells: MW-2D, MW-3S, MW3D, MW-11D, MW-12D, and MW-13D had SSI's for Chloride, (field) Specific Conductivity, Sulfate, Sodium, Fluoride, Barium, Boron, Silver, and Selenium. Staff has the highest concern for the Chloride, (field) Specific Conductivity, Sulfate, and Sodium SSI's. Monitoring wells: MW-2S, MW-4S, MW-4D, MW-5D, and MW-7D had SSI's for various combinations of the above stated parameters. Additionally, the increasing trends with these parameters have been consistent for multiple sampling events. Therefore, in accordance with 329 IAC 10-29-7(d), the following will comprise the facilities Phase II ground water parameter list.

(1) (field) pH
(2) (field) Specific Conductance
(14) Silver (dissolved)
(15) Sodium (dissolved)

(3) Chloride
(4) Fluoride
(5) Sulfate
(6) Arsenic (dissolved)
(7) Barium (dissolved)
(8) Boron (dissolved)
(9) Cadmium (dissolved)
(10)Chromium (dissolved)
(11)Lead (dissolved)
(12)Mercury (dissolved)
(13)Selenium (dissolved)
(16) Copper (dissolved)
(17) Iron (dissolved)
(18) Manganese (dissolved)
(19) Total Dissolved Solids
(20) Zinc (dissolved)
(21) Cyanide (total)
(22) Molybdenum (dissolved)
(23) Nickel (dissolved)
(24) Potassium (dissolved)
(25) Sulfide (total)
(26) Nitrate

Chloride, (field) Specific Conductivity, Sulfate, and Sodium have repeatedly yielded ground water concentrations that exceeded their corresponding secondary maximum contaminant levels (SMCL's) or background levels by two times. Please note that under 329 IAC 10-29-9, a corrective action program may be initiated at the commissioner's discretion whenever these levels are reached for Chloride and Sulfate.

As part of the Phase II monitoring program, the surface water body, Stahlbaum Ditch, needs monitoring for impacts for the Phase II parameters. Therefore, the facility needs to monitor upstream and downstream in the ditch. The upstream sampling point must be chosen in an area that cannot be impacted by the facility. A permanent staff gauge will need to be installed at the upstream monitoring location and the downstream monitoring location. The surface water elevation data must be collected each sampling event and values must be incorporated into potentiometric maps for all future sampling events. Surface water quality data must be evaluated for the same statistical criteria required under 329 IAC 10-29-5 for ground water evaluations and included in future semi-annual ground water reports.

To be consistent with other flyash disposal facilities in the region, staff will be comparing Phase II results to either a statistical background or any of the following: MCL's, SMCL's, EPA Removal Action Levels, or EPA Drinking Water Equivalent Levels. Future decisions to address ground water reports may be based on these comparisons.

Previous ground water reports did not contain a discussion of the results. Future ground water reports must include a discussion concerning statistical results and exceedances above regulatory levels. Additionally, in order to assist in the evaluation of data, it is requested the facility submit a tabulated comparison of ground water and surface water quality results compared to the regulatory levels and protection standards noted in the above paragraph.

The sampling and analysis plan (SAP) must be updated to include any new ground water and surface water sampling procedures as a result of the Phase II monitoring requirement for review and approval. This updated SAP must be submitted within sixty (60) days of receipt of this letter.

The facility must implement the above stated Phase II requirements and those discussed in 329 IAC 10-29 for the next sampling event in April of 2005. A Phase II monitoring plan incorporating these requirements must be submitted for review and approval after thirty (30) days of receiving the analytical results.

Thank you for your attention to this matter. If you have any questions, please contact Marty Harmless of my staff at 317/234-0597, or via email *mharmles@dem.state.in.us*.

Sincerely,

For KKS

Karyl K. Schmidt, L.P.G.
Chief, Geology Section
Permits Branch
Office of Land Management

cc: Jasper Co. Health Department
Northwest Indiana Solid Waste Management District
Northwest Regional Office

NIPSCO RESPONSE TO IDEM CAP LETTER, DATED DECEMBER 14, 1993

March 18, 1994

Mr. David Wersan
Assistant Commissioner
Solid and Hazardous Wastes
Indiana Department of Environmental Management
100 North Senate Avenue
P. O. Box 6015
Indianapolis, IN 46206-6015

Re:Response to December 14, 1993 letter
concerning a corrective action plan
for the Schahfer Generating Station,
Jasper County, Indiana

Dear Mr. Wersan:

The captioned letter responded to a geohydrochemical investigation performed for Northern Indiana by Radian Corporation and submitted to you in September, 1993. Your letter offered several comments on and interpretations of the study and requested that Northern Indiana propose to IDEM for approval "a Corrective Action Plan (CAP) that describes what operational changes are planned to correct the impact of the landfill on the groundwater". This letter responds to some of your comments and suggestions and offers a CAP for IDEM's approval.

First, two new monitoring wells have been installed at the site. These wells are located about 300 feet north of Stahlbaum Ditch, and were installed near transmission towers. The wells were located close to the towers to lessen the likelihood of damage caused by farming operations. These wells were included in the routine sampling of wells conducted January 5, 1994. The results of the sampling and analysis will be transmitted to the Geology Section in the near future. For your records, we are including as an attachment to this letter a log of the well installation.

In your letter of December 14, 1993, IDEM concurs with NIPSCO that wells 6,7,8, and 9 are poorly placed to monitor the impact of the landfill on the local groundwater quality and that monitoring can be suspended. However, we realize that a permit modification is required. Therefore, per agreement with your staff, all twelve wells in the network were sampled in January. It is our expectation that the permit will be modified to the new configuration by the July, 1994 sampling event. Monitoring Wells 6,7,8 and 9 will be used for level monitoring only after the permit is modified.

In your letter you suggested that Monitoring Well 5 be re-surveyed. Following the installation of the two new wells all twelve wells were resurveyed. The data showed that Well 5 was indeed mis-surveyed in the past, although slight adjustments were made to all the wells. In the report to the Geology Section we will include contour maps prepared with the old levels, the new levels, and the new levels with the two new wells added.

A permanent level gage has been installed in Stahlbaum Ditch, and the levels are now being recorded on a regular basis.

Your letter states that "under the right hydraulic conditions the ditch would not intercept the entire plume". This is a slight misinterpretation of the Radian study. The study included speculation that under the right hydraulic conditions the ditch ***may*** not intercept the entire plume. In addition, it is entirely possible that even if some of the plume temporarily escaped the ditch the flow would reverse when hydraulic conditions returned to normal. That is one of the reasons for the decision to install two new wells 300 feet north of the ditch.

The data is, we believe, too sparse to support the hypothesis that "episodic" increases in sulfates in Monitoring Well 6 can be attributed to the operation of the landfill. All of the wells not located immediately adjacent to the landfill, including the background wells, have shown fluctuations in inorganic constituent concentrations. The data from Monitoring Well 6 is consistent with these patterns.

NIPSCO has studied the results of the groundwater monitoring and believes that the statistically significant increases in the perimeter monitoring wells is being caused by infiltration of water through the runoff ditches that surround the landfill area. These ditches have experienced sedimentation from the erosion of certain areas in the landfill. This sedimentation and the runoff water from the landfill then mix and permeate into the groundwater. NIPSCO will control this infiltration by modifying certain operating procedures and equipment as outlined in this 7 part plan.

1. The east slope of Phase 2 is uncovered and is experiencing erosion which causes sedimentation in the adjacent perimeter drainage ditch. This is adjacent to Monitoring Well 2. This east slope will be regraded, covered with soil and seeded to prevent further erosion. We estimate that this task will be completed by June 15, 1994 but is dependant upon weather being suitable to perform the work.

2. The western slope of the closed phase of the landfill is not covered and is also eroded. This area will be regraded and a temporary cover will be applied consisting of either 6 inches of seeded topsoil or a chemical treatment such as Soil Sement (product literature for Soil Sement is attached). This area is very near the Monitoring Well 3. We estimate that this task will be completed by June 15, 1994 but is dependent on weather conditions.

3. The sediment in the perimeter ditches of the landfill will be excavated and the ditches will be backfilled with soil to a level above that of the underlying groundwater. NIPSCO expects to complete this by June 30, 1994 dependent on weather conditions.

4. FGD product removed from the secondary pond and disposed of in the landfill is a possible contributor to the sedimentation problem. The pond is periodically dredged and the relatively wet materials are disposed of in the landfill. A large working face is required to manage this waste, and the potential for runoff and/or leachate generation is increased. We will reduce the amount of material that is discharged to the secondary pond. Engineering work is in progress to recycle the majority of the material that is now regularly routed to the secondary pond. This work is expected to be completed by July 15, 1994.

5. In addition to Item 4 above, methods to dewater the material dredged from the secondary pond before it is placed in the landfill are being investigated. One possible option being studied is to subdivide an area of the secondary pond and modify the existing piping. This will permit an inactive side of the pond where the wastes can be more completely dewatered while the other side of the pond is actively receiving material.

6. The active disposal area will be targeted for reduction. The landfill currently has an active disposal area of 42 acres which is subject to erosion and causes sedimentation in the surrounding ditches. Reducing the working area will reduce erosion and subsequent sedimentation. The amount of reduction of the active area and the timing of this reduction will be dependent on the results that the above Items 4 and 5 have on the landfill operating conditions.

7. Temporary cover for the inactive portion of the landfill will be provided to control erosion during the inactive period. A cover of material such as the polymer based material Soil Sement will be used in such quantities to stabilize the inactive area.

NIPSCO believes that the above program will result in significant decreases in the concentrations of dissolved solids in the three monitoring wells located in close proximity to the landfill. Even though improvements in the quality of groundwater are accomplished slowly due to the nature of groundwater movement, Northern Indiana expects the trend in the concentrations of dissolved solids will be reversed as early as the January, 1995, sampling event. If you have any questions or comments regarding the Corrective Action Plan or this letter please contact Mr. John Ross at (219) 647-5240.

Very truly yours,

Arthur E. Smith, Jr.
Principal Executive and Counsel
Environmental Affairs

Karen - make up a bc sheet

bc:
Dunn
Elliott
Spring
Mulchay
Tarpley
Hasselbring
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File: FGD Landfill



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LF C R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- August 2018

GOLDER

TECHNICAL MEMORANDUM

DATE August 28, 2018 **Project No.** 164-8171.01

TO Dan Sullivan
NiSource

CC Marc Okin, Sasha Reyes, Maureen Turman, Craig Myers, Joe Kutch, Mark Haney, Jim Peace

FROM Danielle Sylvia **EMAIL dsylvia@golder.com**

R.M. SCHAHFER LANDFILL PHASE V AND VI ALTERNATIVE SOURCE DEMONSTRATION

On behalf of Northern Indiana Public Service Company (NIPSCO), Golder Associates Inc. (Golder) performed a statistical evaluation of groundwater analytical results from the second (February-March 2018) groundwater Detection Monitoring event at the Rollin M. Schahfer Generating Station (RMSGS) Landfill Phase V and Phase VI in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, "Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule" (CCR Final Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

The statistical analyses of Appendix III groundwater Detection Monitoring results indicated statistically significant increases (SSIs) for six analytes in downgradient wells compared to background levels. Although determination of an SSI generally indicates that the groundwater monitoring program should transition from Detection Monitoring to Assessment Monitoring, 40 CFR §257.94(e)(2) allows the owner or operator (i.e., NIPSCO) to demonstrate that a source other than the CCR unit or another condition caused the apparent SSI(s). Golder identified similar SSIs after the first (October 2017) RMSGS Landfill Phase V and Phase VI Detection Monitoring event and prepared an Alternative Source Demonstration (ASD), dated April 13, 2018. As described in the ASD, the conceptual site model, historical groundwater data, and historical landfill phased construction indicate that a release from the non-CCR regulated, unlined landfill Phases I and II, is the source of the identified SSIs.

1.0 SUMMARY OF RESULTS

The results of the second Detection Monitoring event are included in the 2018 Annual Report and the results of the statistical analysis are summarized below. SSIs were detected in groundwater samples collected from monitoring wells downgradient of the RMSGS Landfill Phase V and Phase VI, for all Appendix III parameters except fluoride. Overall, the second Detection Monitoring event results are consistent with those collected previously and indicate few differences from the SSIs detected during the first Detection Monitoring event. The SSI differences are likely due to normal or temporal fluctuations in groundwater quality. The second Detection Monitoring event SSI results are summarized by well number and compared to the results from the first Detection Monitoring event (i.e., ninth-sample round) in the table below.

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Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
GAMW21							
GAMW21B	1,2	1,2	1		1,2		1,2
GAMW22		2					
GAMW22B	1,2	1,2	1,2		1,2		1,2
GAMW23	1,2	1,2			1,2	1,2	1,2
GAMW23B	1,2	1,2	1,2		1,2	1,2	1,2
GAMW26				1			2
GAMW26B		1			1		1
GAMW27	1,2	1,2			1,2		1,2
GAMW27B	1,2	1,2	1,2		1,2		1,2
GAMW28	1,2	1,2	1		1,2		1,2
GAMW28B	1,2	1,2	1,2		1,2		1,2

"1" Indicates a statistically significant increase detected in the first Detection Monitoring event
"2" Indicates a statistically significant increase detected in the second Detection Monitoring event

2.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSION

As shown in the table above, analytical results from the second Detection Monitoring event are similar to the first Detection Monitoring event and support the rationale for implementation of the ASD, dated April 13, 2018. As described in the ASD, the conceptual site model, historical groundwater data, and historical landfill phased construction indicate that a release from the non-CCR regulated, unlined landfill Phases I and II is the source of the identified SSIs. Therefore, the RMSGS Landfill Phases V and VI will remain in Detection Monitoring as Assessment Monitoring is not warranted.

3.0 REFERENCES

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI- Alternative Source Demonstration", April 13, 2018.

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Northern Indiana Public Service Company

R. M. Schahfer Generating Station

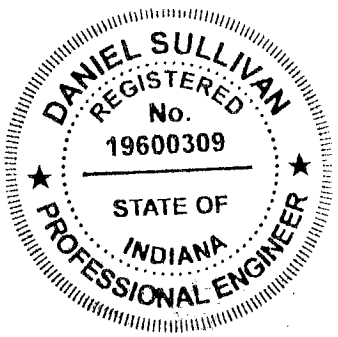
Wheatfield, Indiana

Schahfer Landfill Phase V and Phase VI

Certification of Alternative Source Demonstration

40 CFR §257.94{e)(2) & Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

I, Daniel Sullivan, being a Professional Engineer in accordance with the laws of the State of Indiana, and having experience in the design, construction, and operation of restricted waste landfills and groundwater monitoring systems for them, do hereby state that I am qualified in the subject matter of CCR management, groundwater monitoring, data interpretation, and groundwater impacts. I have personally examined and am familiar with this alternative source demonstration (ASD), the subject of which is non-CCR regulated landfill cells located at the NIPSCO R. M. Schahfer Generating Station, prepared by Golder, and dated August 2018. Based on an inquiry of those individuals immediately responsible, and on supporting data which I understand to be true, accurate and complete, I verify the information in this ASD is accurate and meets the applicable requirements of the CCR Final Rule. In consideration of the above, I certify to the best of my knowledge, information, and belief, that the ASD for the regulated CCR management unit referred to as Phase V and Phase VI has been prepared and meets the applicable requirements of 40 CFR §257.94(e)(2) and corresponding State of Indiana requirements.



Daniel Sullivan
Indiana Professional Engineer
License # 19600309

8-28-18

Date

LF D R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- March 2019

Northern Indiana Public Service Company

R. M. Schahfer Generating Station

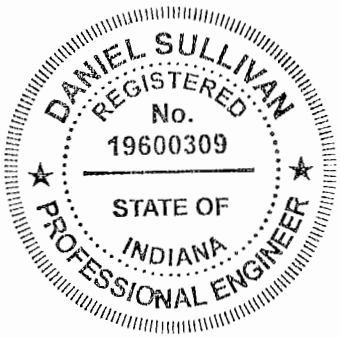
Wheatfield, Indiana

Schahfer Landfill Phase V and Phase VI

Certification of Alternative Source Demonstration

40 CFR §257.94(e)(2) & Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

I, Daniel Sullivan, being a Professional Engineer in accordance with the laws of the State of Indiana, and having experience in the design, construction, and operation of restricted waste landfills and groundwater monitoring systems for them, do hereby state that I am qualified in the subject matter of CCR management, groundwater monitoring, data interpretation, and groundwater impacts. I have personally examined and am familiar with this alternative source demonstration (ASD), the subject of which is non-CCR regulated landfill cells located at the NIPSCO R. M. Schahfer Generating Station, prepared by Golder, and dated March 2019. Based on an inquiry of those individuals immediately responsible, and on supporting data which I understand to be true, accurate and complete, I verify the information in this ASD is accurate and meets the applicable requirements of the CCR Final Rule. In consideration of the above, I certify to the best of my knowledge, information, and belief, that the ASD for the regulated CCR management unit referred to as Phase V and Phase VI has been prepared and meets the applicable requirements of 40 CFR §257.94(e)(2) and corresponding State of Indiana requirements.



Daniel Sullivan
Indiana Professional Engineer
License # 19600309

3-21-19
Date

TECHNICAL MEMORANDUM

DATE March 21, 2019 **Project No.** 164817101

TO Marc Okin, Dan Sullivan, NiSourceNiSource

CC Sasha Reyes, Maureen Turman, Craig Myers, Joe Kutch, Mark Haney, Jim Peace

FROM Danielle Sylvia **EMAIL dsylvia@golder.com**

RE: R.M. SCHAHFER LANDFILL PHASE V AND VI ALTERNATIVE SOURCE DEMONSTRATION

On behalf of Northern Indiana Public Service Company (NIPSCO), Golder Associates Inc. (Golder) performed a statistical evaluation of groundwater analytical results from the third (September 2018) groundwater Detection Monitoring event at the Rollin M. Schahfer Generating Station (RMSGS) Landfill Phase V and Phase VI (CCR Unit) in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, "Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule" (CCR Final Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

The statistical analyses of Appendix III groundwater Detection Monitoring results indicated statistically significant increases (SSIs) for seven analytes in downgradient wells compared to background levels. Although determination of an SSI generally indicates that the groundwater monitoring program should transition from Detection Monitoring to Assessment Monitoring, 40 CFR §257.94(e)(2) allows the owner or operator (i.e., NIPSCO) to demonstrate that a source other than the CCR unit or another condition caused the apparent SSI(s). Golder identified similar SSIs after the first (October 2017) Detection Monitoring event at the RMSGS Landfill Phase V and Phase VI and submitted an Alternative Source Demonstration (ASD) on April 13, 2018. As described in the ASD, the conceptual site model, historical groundwater data, and landfill design indicate that the source of the identified SSIs is the non-regulated, unlined portion of the landfill, Phases I and II. Golder recertified the ASD based on the second (February/March 2018) Detection Monitoring Event, on August 28, 2018.

NIPSCO began construction of a new landfill cell (Phase VII) immediately north of Phase VI in 2018. Due to the proximity of Phase VII to Phase VI, Golder decommissioned monitoring wells GAMW-21/21B, GAMW-22/22B, GAMW-23/23B, and GAMW-28/28B, which were part of the original landfill monitoring network. Golder collected groundwater samples from these four well pairs from July 2016 to March 2018. To replace the decommissioned wells, Golder installed monitoring wells GAMW-38/38B, GAMW-39/39B, GAMW-40/40B, and GAMW-41/41B downgradient and along the waste boundary of Phase VII in April and May 2018.

Golder collected groundwater samples from the existing and newly-installed monitoring wells during the September 2018 semi-annual monitoring event with the exception of GAMW-41/41B, which were inaccessible due to landfill construction activities. Groundwater analytical data obtained from groundwater samples collected from the downgradient wells in September 2018 were consistent with historical analytical results, therefore, collection of groundwater samples from GAMW-41/41B were not considered necessary at this time and no further action was taken. Golder plans to collect groundwater samples from GAMW-41/41B during the next semi-annual groundwater monitoring event scheduled for February/March 2019.

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1.0 SUMMARY OF RESULTS

The results of the third Detection Monitoring event were included in the 2018 Annual Report and the results of the statistical analysis are summarized below. SSIs were detected in groundwater samples collected from monitoring wells downgradient of the RMSGS Landfill Phase V and Phase VI, for all Appendix III parameters. Overall, results are consistent with those collected previously and indicate few differences from the SSIs detected during the first and second Detection Monitoring events. The differences are likely due to normal or temporal fluctuations in groundwater quality. The third Detection Monitoring event SSI results are summarized by well number and compared to the results from the previous sample rounds in the table below.

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
GAMW21*							
GAMW21B*	1,2	1,2	1		1,2		1,2
GAMW22*		2					
GAMW22B*	1,2	1,2	1,2		1,2		1,2
GAMW23*	1,2	1,2			1,2	1,2	1,2
GAMW23B*	1,2	1,2	1,2		1,2	1,2	1,2
GAMW26				1,3			2
GAMW26B		1,3	3		1,3	3	1,3
GAMW27	1,2,3	1,2,3			1,2,3		1,2,3
GAMW27B	1,2,3	1,2,3	1,2,3		1,2,3	3	1,2,3
GAMW28*	1,2	1,2	1		1,2		1,2
GAMW28B*	1,2	1,2	1,2		1,2		1,2
GAMW38							
GAMW38B	3	3	3		3		3
GAMW39	3	3			3		3
GAMW39B	3	3	3		3		3
GAMW40	3	3			3		3
GAMW40B	3	3	3		3	3	3

"1" Indicates a statistically significant increase detected in the first Detection Monitoring event
"2" Indicates a statistically significant increase detected in the second Detection Monitoring event
"3" Indicates a statistically significant increase detected in the third Detection Monitoring event
"*" Indicates monitoring well was decommissioned prior to the third Detection Monitoring event

2.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSION

The preceding information indicates the results of the third Detection Monitoring event were similar to those from the first and second Detection Monitoring events, and the ASD dated April 13, 2018 is still applicable. Golder prepared the ASD in accordance with 40 CFR 257.94(e)(2) and supports the finding that the SSIs determined on December 23, 2018 are not due to release from the CCR Unit. As described in the ASD, the conceptual site model, historical groundwater data, and landfill design indicate that a release from the non-regulated, unlined portion of the landfill, Phases I and II, is the source of the identified SSIs. Therefore, no further action (i.e., Assessment Monitoring) is warranted, and the Schahfer Landfill Phases V and VI will remain in Detection Monitoring.

3.0 REFERENCES

Golder Associates, “Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration”, August 28, 2018.

Golder Associates, “Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration”, April 13, 2018.

LF E R. M. Schahfer Landfill
Phase V and Phase VI
Alternative Source
Demonstration- September 2019

Northern Indiana Public Service Company

R. M. Schahfer Generating Station

Wheatfield, Indiana

Schahfer Landfill Phase V and Phase VI

Certification of Alternative Source Demonstration

40 CFR §257.94{e)(2) & Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

I, Daniel Sullivan, being a Professional Engineer in accordance with the laws of the State of Indiana, and having experience in the design, construction, and operation of restricted waste landfills and groundwater monitoring systems for them, do hereby state that I am qualified in the subject matter of CCR management, groundwater monitoring, data interpretation, and groundwater impacts. I have personally examined and am familiar with this alternative source demonstration (ASD), the subject of which is non-CCR regulated landfill cells located at the NIPSCO R. M. Schahfer Generating Station, prepared by Golder, and dated September 2019. Based on an inquiry of those individuals immediately responsible, and on supporting data which I understand to be true, accurate and complete, I verify the information in this ASD is accurate and meets the applicable requirements of the CCR Final Rule. In consideration of the above, I certify to the best of my knowledge, information, and belief, that the ASD for the regulated CCR management unit referred to as Phase V and Phase VI has been prepared and meets the applicable requirements of 40 CFR §257.94(e)(2) and corresponding State of Indiana requirements.

Daniel Sullivan

Daniel Sullivan
Indiana Professional Engineer
License # 19600309

9-6-19

Date



TECHNICAL MEMORANDUM

DATE September 6, 2019 **Project No.** 19126075

TO Marc Okin, Dan Sullivan NIPSCO

CC Sasha Reyes, Maureen Turman, Craig Myers, Joe Kutch, Mark Haney, Jim Peace

FROM Danielle Sylvia **EMAIL dsylvia@golder.com**

RE: R.M. SCHAHFER LANDFILL PHASES V AND VI ALTERNATIVE SOURCE DEMONSTRATION

On behalf of Northern Indiana Public Service Company (NIPSCO), Golder Associates Inc. (Golder) performed a statistical evaluation of groundwater analytical results from the fourth (March 2019) groundwater Detection Monitoring event at the Rollin M. Schahfer Generating Station (RMSGS) Landfill Phase V and Phase VI (CCR Unit) in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, “Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule” (CCR Final Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

Statistical analyses of Appendix III groundwater Detection Monitoring results indicated statistically significant increases (SSIs) for six analytes detected in groundwater samples collected from downgradient wells compared to background levels. Although determination of an SSI generally indicates that the groundwater monitoring program should transition from Detection Monitoring to Assessment Monitoring, 40 CFR §257.94(e)(2) allows the owner or operator (i.e., NIPSCO) to demonstrate that a source other than the CCR unit or another condition caused the apparent SSI(s). Golder identified similar SSIs after the first (October 2017) Detection Monitoring event at the RMSGS Landfill Phase V and Phase VI and submitted an Alternative Source Demonstration (ASD) on April 13, 2018. As described in that ASD, the conceptual site model, historical groundwater data, and landfill design indicate the source of the identified SSIs is the unlined portion of the landfill, Phases I and II, which is not regulated by the CCR Final Rule. Golder recertified the ASD based on the second (February/March 2018) Detection Monitoring Event, on August 28, 2018 and the third (September 2018) Detection Monitoring Event, on March 21, 2019.

NIPSCO began construction of a new landfill cell (Phase VII) immediately north of Phase VI in 2018. Due to the proximity of Phase VII to Phase VI and landfill construction activities, Golder decommissioned monitoring wells GAMW-21/21B, GAMW-22/22B, GAMW-23/23B, and GAMW-28/28B, which were part of the original CCR Rule-required landfill monitoring network. Golder collected groundwater samples from these four well pairs from July 2016 to March 2018. To replace the decommissioned wells, Golder installed monitoring wells GAMW-38/38B, GAMW-39/39B, GAMW-40/40B, and GAMW-41/41B downgradient and along the waste boundary of Phase VII in April and May 2018.

Golder collected groundwater samples from the existing and newly-installed monitoring wells during the March 2019 semi-annual monitoring event. Groundwater analytical data obtained from groundwater samples collected from the downgradient wells in March 2019 were consistent with historical analytical results. Golder reviewed the analytical data collected to date and considered the option to update the prediction limits. The Groundwater Monitoring Program Implementation Manual (GMPIM, 2017) and the Unified Guidance allow for updating

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statistical limits after a minimum of four “new measurements” are available. The periodic update of background datasets improves statistical power and accuracy by providing a more complete approximation of the true background population. Based on the relatively short period of time (i.e., less than 16 months) in which the background samples were collected, it is likely that the changes being observed in data population are due to natural variability. The analytical data collected, and groundwater flow directions observed to date, indicate that the chosen background wells are still representative of background conditions. Consequently, Golder calculated new prediction limits in June 2019 using all background data collected to date. The table below provides the original prediction limits calculated in January 2018 and the revised prediction limits calculated in June 2019. Golder will re-evaluate the background dataset following collection of an additional four rounds of groundwater data from the background wells.

1.0 SUMMARY OF RESULTS

The results of the fourth Detection Monitoring event are included in the 2019 Annual Report and the results of the statistical analysis are summarized below. SSIs were detected in groundwater samples collected from monitoring wells downgradient of the RMSGS Landfill Phase V and Phase VI, for all Appendix III parameters. Overall, results are consistent with those collected previously and indicate few differences from the SSIs detected during the previous Detection Monitoring events. The differences are likely due to normal or temporal fluctuations in groundwater quality. The SSI results are summarized in the table below by well location and timeframe of the SSI exceedance.

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
Prediction Level (January 2018)	**1.7**	**116.1**	**34.91**	**2.3**	**300**	**6.465-7.739**	**653.4**
Prediction Level (June 2019)	**3.2**	**130.9**	**39.93**	**2.3**	**470**	**6.353-7.82**	**1100**
GAMW21*							
GAMW21B*	1,2	1,2	1		1,2		1,2
GAMW22*		2					
GAMW22B*	1,2	1,2	1,2		1,2		1,2
GAMW23*	1,2	1,2			1,2	1,2	1,2
GAMW23B*	1,2	1,2	1,2		1,2	1,2	1,2
GAMW26				1,3			2
GAMW26B		1,3	3		1,3	3	1,3
GAMW27	1,2,3,4	1,2,3,4			1,2,3,4		1,2,3,4
GAMW27B	1,2,3,4	1,2,3	1,2,3,4		1,2,3,4	3	1,2,3,4

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
Prediction Level (January 2018)	**1.7**	**116.1**	**34.91**	**2.3**	**300**	**6.465-7.739**	**653.4**
Prediction Level (June 2019)	**3.2**	**130.9**	**39.93**	**2.3**	**470**	**6.353-7.82**	**1100**
GAMW28*	1,2	1,2	1		1,2		1,2
GAMW28B*	1,2	1,2	1,2		1,2		1,2
GAMW38							
GAMW38B	3,4	3,4	3,4		3,4		3,4
GAMW39	3	3,4			3		3
GAMW39B	3,4	3,4	3,4		3,4		3,4
GAMW40	3,4	3,4			3		3,4
GAMW40B	3,4	3,4	3,4		3,4	3,4	3,4
GAMW41	4	4	4		4		4
GAMW41B	4	4	4		4		4

"1" Indicates a statistically significant increase detected in the first Detection Monitoring event
"2" Indicates a statistically significant increase detected in the second Detection Monitoring event
"3" Indicates a statistically significant increase detected in the third Detection Monitoring event
"4" Indicates a statistically significant increase detected in the fourth Detection Monitoring event
"*" Indicates monitoring well was decommissioned prior to the third Detection Monitoring event

2.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSION

The preceding information indicates the results of the fourth Detection Monitoring event are consistent with the previous Detection Monitoring events, and the rationale behind the ASD dated April 13, 2018 is still applicable. Golder prepared the ASD in accordance with 40 CFR 257.94(e)(2) and it supports the finding that the SSIs determined on June 8, 2019 are not due to a release from the CCR Unit. As described in that ASD, the conceptual site model, historical groundwater data, and landfill design indicate that a release from the unlined portion of the landfill not subject to the CCR Final Rule, Phases I and II, is the source of the identified SSIs. Therefore, no further action (i.e., Assessment Monitoring) is warranted, and the Schahfer Landfill Phases V and VI will remain in Detection Monitoring.

3.0 REFERENCES

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", March 31, 2019.

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", August 28, 2018.

Golder Associates, “Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration”, April 13, 2018.

https://golderassociates.sharepoint.com/sites/nipscoccrgwmonitoring/shared documents/r.m. schahfer generating station/reports/landfill asd recertification september 2019/final/landfill asd recertification 090619.docx

LF F R. M. Schahfer Landfill Phase V and Phase VI Alternative Source Demonstration- May 2020

Northern Indiana Public Service Company LLC
(NIPSCO LLC)

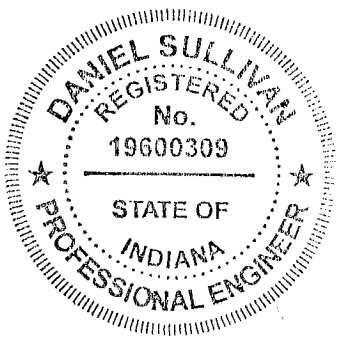
R. M. Schahfer Generating Station

Wheatfield, Indiana

Schahfer Landfill Phase V and Phase VI

Certification of Alternative Source Demonstration

I, Daniel Sullivan, being a Professional Engineer in accordance with the laws of the State of Indiana, and having experience in the design, construction, and operation of restricted waste landfills and groundwater monitoring systems for them, do hereby state that I am qualified in the subject matter of CCR management, groundwater monitoring, data interpretation, and groundwater impacts. I have personally examined and am familiar with this alternative source demonstration (ASD) for the NIPSCO LLC R. M. Schahfer Generating Station, prepared by Golder, and dated May 2020. Based on an inquiry of those individuals immediately responsible, and on supporting data which I understand to be true, accurate and complete, I verify the information in this ASD is accurate and meets the applicable requirements of the CCR Rule. In consideration of the above, I certify to the best of my knowledge, information, and belief, that the ASD for the regulated CCR management unit referred to as Phase V and Phase VI has been prepared and meets the applicable requirements of 40 CFR §257.94(e)(2).



Daniel Sullivan
Indiana Professional Engineer
License # 19600309

5-7-2020
Date

TECHNICAL MEMORANDUM

DATE May 7, 2020 **Project No.** 19121567

TO Marc Okin, Dan Sullivan NIPSCO LLC

CC Maggie Rice, Maureen Turman, Craig Myers, Joe Kutch, Mark Haney, Jim Peace

FROM Danielle Sylvia Cofelice **EMAIL dsylvia@golder.com**

RE: R.M. SCHAHFER LANDFILL PHASES V AND VI ALTERNATIVE SOURCE DEMONSTRATION

On behalf of Northern Indiana Public Service Company LLC (NIPSCO LLC), Golder Associates Inc. (Golder) performed a statistical evaluation of groundwater analytical results from the fifth (October 2019) groundwater Detection Monitoring event at the Rollin M. Schahfer Generating Station (RMSGS) Landfill Phase V and Phase VI (CCR Unit) in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, “Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule” (CCR Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

Statistical analyses of Appendix III groundwater Detection Monitoring results indicated statistically significant increases (SSIs) for seven analytes detected in groundwater samples collected from downgradient wells compared to background levels. Although determination of an SSI generally indicates that the groundwater monitoring program should transition from Detection Monitoring to Assessment Monitoring, 40 CFR §257.94(e)(2) allows the owner or operator (i.e., NIPSCO LLC) to demonstrate that a source other than the CCR unit or another condition caused the apparent SSI(s). Golder identified similar SSIs after the first (October 2017) Detection Monitoring event at the RMSGS Landfill Phase V and Phase VI and submitted an Alternative Source Demonstration (ASD) on April 13, 2018. As described in that ASD, the conceptual site model, historical groundwater data, and landfill design indicate the source of the identified SSIs is the unlined portion of the landfill, Phases I and II, which is not regulated by the CCR Rule. Golder recertified the ASD based on the second (February/March 2018) Detection Monitoring Event, on August 28, 2018, the third (September 2018) Detection Monitoring Event, on March 21, 2019, and the fourth (March 2019) Detection Monitoring Event, on September 6, 2019.

NIPSCO constructed a new landfill cell (Phase VII) immediately north of Phase VI in 2018. Due to the proximity of Phase VII to Phase VI and landfill construction activities, Golder decommissioned monitoring wells GAMW-21/21B, GAMW-22/22B, GAMW-23/23B, and GAMW-28/28B, which were part of the original CCR Rule-required landfill monitoring network. Golder collected groundwater samples from these four well pairs from July 2016 to March 2018. To replace the decommissioned wells, Golder installed monitoring wells GAMW-38/38B, GAMW-39/39B, GAMW-40/40B, and GAMW-41/41B downgradient and along the waste boundary of Phase VII in April and May 2018.

Golder collected groundwater samples from existing and replacement monitoring wells during the October 2019 semi-annual monitoring event. Samples were not collected from monitoring wells GAMW-39 and GAMW-39B in October 2019; however, Golder collected samples from these monitoring wells in December 2019 and included those results along with the results from all other monitoring well samples in the statistical analysis. Groundwater

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670 North Commercial Street, Suite 103, Manchester, NH 03101 T: +1 603 668-0880 F: +1 603 668-1199

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analytical data obtained from groundwater samples collected from the downgradient wells in October and December 2019 were consistent with historical analytical results. As discussed in the ASD recertification dated September 6, 2019, Golder calculated new prediction limits in June 2019 using all background data collected through March 2019. The table below provides the original prediction limits calculated in January 2018 and the revised prediction limits calculated in June 2019. Golder will re-evaluate the background dataset following collection of an additional four rounds of groundwater data from the background wells.

1.0 SUMMARY OF RESULTS

The results of the fifth Detection Monitoring event are included in the 2019 Annual Report and the results of the statistical analysis are summarized below. SSIs were detected in groundwater samples collected from monitoring wells downgradient of the RMSGS Landfill Phase V and Phase VI, for all Appendix III parameters. Overall, results are consistent with those collected previously and indicate few differences from the SSIs detected during the previous Detection Monitoring events. The differences are likely due to normal or temporal fluctuations in groundwater quality. The SSI results are summarized in the table below by well location and timeframe of the SSI exceedance.

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
Prediction Level (January 2018)	**1.7**	**116.1**	**34.91**	**2.3**	**300**	**6.465-7.739**	**653.4**
Prediction Level (June 2019)	**3.2**	**130.9**	**39.93**	**2.3**	**470**	**6.353-7.82**	**1100**
GAMW21*							
GAMW21B*	1,2	1,2	1		1,2		1,2
GAMW22*		2					
GAMW22B*	1,2	1,2	1,2		1,2		1,2
GAMW23*	1,2	1,2			1,2	1,2	1,2
GAMW23B*	1,2	1,2	1,2		1,2	1,2	1,2
GAMW26				1,3,5			2
GAMW26B		1,3	3		1,3	3	1,3
GAMW27	1,2,3,4,5	1,2,3,4,5			1,2,3,4		1,2,3,4
GAMW27B	1,2,3,4,5	1,2,3,5	1,2,3,4,5		1,2,3,4,5	3	1,2,3,4,5
GAMW28*	1,2	1,2	1		1,2		1,2
GAMW28B*	1,2	1,2	1,2		1,2		1,2

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
Prediction Level (January 2018)	**1.7**	**116.1**	**34.91**	**2.3**	**300**	**6.465-7.739**	**653.4**
Prediction Level (June 2019)	**3.2**	**130.9**	**39.93**	**2.3**	**470**	**6.353-7.82**	**1100**
GAMW38							
GAMW38B	3,4,5	3,4,5	3,4		3,4,5		3,4,5
GAMW39	3	3,4,5			3	5	3
GAMW39B	3,4,5	3,4,5	3,4,5		3,4,5	5	3,4,5
GAMW40	3,4	3,4,5			3		3,4,5
GAMW40B	3,4,5	3,4,5	3,4,5		3,4,5	3,4	3,4,5
GAMW41	4,5	4,5	4,5		4,5		4,5
GAMW41B	4,5	4	4,5		4,5		4,5

"1" Indicates a statistically significant increase detected in the first Detection Monitoring event
"2" Indicates a statistically significant increase detected in the second Detection Monitoring event
"3" Indicates a statistically significant increase detected in the third Detection Monitoring event
"4" Indicates a statistically significant increase detected in the fourth Detection Monitoring event
"5" Indicates a statistically significant increase detected in the fifth Detection Monitoring event
"*" Indicates monitoring well was decommissioned prior to the third Detection Monitoring event

2.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSION

The preceding information indicates the results of the fifth Detection Monitoring event are consistent with the previous Detection Monitoring events, and the rationale behind the ASD dated April 13, 2018 is still applicable. Golder prepared the ASD in accordance with 40 CFR 257.94(e)(2) and it supports the finding that the SSIs determined on February 9, 2020 are not due to a release from the CCR Unit. As described in that ASD, the conceptual site model, historical groundwater data, and landfill design indicate that a release from the unlined portion of the landfill not subject to the CCR Final Rule, Phases I and II, is the source of the identified SSIs. Therefore, no further action (i.e., Assessment Monitoring) is warranted, and the Schahfer Landfill Phases V and VI will remain in Detection Monitoring.

3.0 REFERENCES

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", September 6, 2019.

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", March 31, 2019.

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", August 28, 2018.

Golder Associates, “Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration”, April 13, 2018.

https://golderassociates.sharepoint.com/sites/nipscoccrgwmonitoring/shared documents/rmsgs/reports/landfill asd recertifications/2020-may/draft landfill asd recertification 050920 - copy.docx

LF G R. M. Schahfer Landfill
Phase V and Phase VI
Alternative Source
Demonstration- September 2020

Northern Indiana Public Service Company LLC
(NIPSCO LLC)

R. M. Schahfer Generating Station

Wheatfield, Indiana

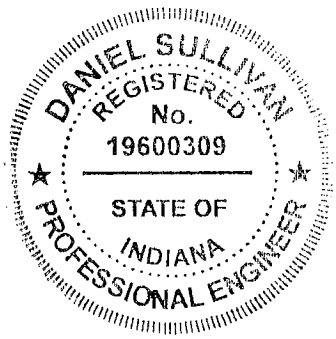
Schahfer Landfill Phase V and Phase VI

Certification of Alternative Source Demonstration

I, Daniel Sullivan, being a Professional Engineer in accordance with the laws of the State of Indiana, and having experience in the design, construction, and operation of restricted waste landfills and groundwater monitoring systems for them, do hereby state that I am qualified in the subject matter of CCR management, groundwater monitoring, data interpretation, and groundwater impacts. I have personally examined and am familiar with this alternative source demonstration (ASD) for the NIPSCO LLC R. M. Schahfer Generating Station, prepared by Golder, and dated October 2020. Based on an inquiry of those individuals immediately responsible, and on supporting data which I understand to be true, accurate and complete, I verify the information in this ASD is accurate and meets the applicable requirements of the CCR Rule. In consideration of the above, I certify to the best of my knowledge, information, and belief, that the ASD for the regulated CCR management unit referred to as Phase V and Phase VI has been prepared and meets the applicable requirements of 40 CFR §257.94(e)(2).

Daniel Sullivan

Daniel Sullivan
Indiana Professional Engineer
License # 19600309



9-29-2020

Date

TECHNICAL MEMORANDUM

DATE September 29, 2020 **Project No.** 19121567

TO Marc Okin, Dan Sullivan NIPSCO LLC

CC Maggie Rice, Maureen Turman, Craig Myers, Joe Kutch, Mark Haney, Jim Peace

FROM Danielle Sylvia Cofelice **EMAIL dsylvia@golder.com**

RE: R.M. SCHAHFER LANDFILL PHASES V AND VI ALTERNATIVE SOURCE DEMONSTRATION

On behalf of Northern Indiana Public Service Company LLC (NIPSCO LLC), Golder Associates Inc. (Golder) performed a statistical evaluation of groundwater analytical results from the sixth (March 2020) groundwater Detection Monitoring event at the Rollin M. Schahfer Generating Station (RMSGS) Landfill Phase V and Phase VI (CCR Unit) in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, "Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule" (CCR Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

Statistical analyses of Appendix III groundwater Detection Monitoring results indicated statistically significant increases (SSIs) for seven analytes detected in groundwater samples collected from downgradient wells compared to background levels. Although determination of an SSI generally indicates that the groundwater monitoring program should transition from Detection Monitoring to Assessment Monitoring, 40 CFR §257.94(e)(2) allows the owner or operator (i.e., NIPSCO LLC) to demonstrate that a source other than the CCR unit or another condition caused the apparent SSI(s). Golder identified similar SSIs after the first (October 2017) Detection Monitoring event at the RMSGS Landfill Phase V and Phase VI and submitted an Alternative Source Demonstration (ASD) on April 13, 2018. As described in that ASD, the conceptual site model, historical groundwater data, and Phase V and Phase VI landfill design indicate the source of the identified SSIs is the unlined portion of the landfill, Phases I and II, which is not regulated by the CCR Rule. Golder recertified the ASD based on the second (February/March 2018) Detection Monitoring Event, on August 28, 2018; the third (September 2018) Detection Monitoring Event, on March 21, 2019; the fourth (March 2019) Detection Monitoring Event, on September 6, 2019; and the fifth (October 2019) Detection Monitoring Event, on May 7, 2020.

NIPSCO constructed a new landfill cell (Phase VII) immediately north of Phase VI in 2018. Due to the proximity of Phase VII to Phase VI and landfill construction activities, Golder decommissioned monitoring wells GAMW-21/21B, GAMW-22/22B, GAMW-23/23B, and GAMW-28/28B, which were part of the original CCR Rule-required landfill monitoring network. Golder collected groundwater samples from these original four well pairs from July 2016 to March 2018. To replace the decommissioned wells, Golder installed monitoring wells GAMW-38/38B, GAMW-39/39B, GAMW-40/40B, and GAMW-41/41B downgradient and along the waste boundary of Phase VII in April and May 2018.

Golder collected groundwater samples from existing and replacement monitoring wells during the October 2019 and March 2020 semi-annual monitoring events. Groundwater analytical data obtained from groundwater samples collected from the downgradient wells in these subsequent events were consistent with historical analytical results. As discussed in the ASD recertification dated September 6, 2019, Golder calculated new prediction limits in June 2019 using all background data collected through March 2019. The table below provides the original prediction limits calculated in January 2018 and the revised prediction limits calculated in June 2019. Golder will

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re-evaluate the background dataset following collection of an additional four rounds of groundwater data from the background wells.

1.0 SUMMARY OF RESULTS

The results of the sixth Detection Monitoring event are included in the 2020 Annual Report and the results of the statistical analysis are summarized below. SSIs were detected in groundwater samples collected from monitoring wells downgradient of the RMSGS Landfill Phase V and Phase VI, for all Appendix III parameters. Overall, results are consistent with those collected previously and indicate few differences from the SSIs detected during the previous Detection Monitoring events. The differences are likely due to normal or temporal fluctuations in groundwater quality. The SSI results are summarized in the table below by well location and timeframe of the SSI exceedance.

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
Prediction Level (January 2018)	**1.7**	**116.1**	**34.91**	**2.3**	**300**	**6.465-7.739**	**653.4**
Prediction Level (June 2019)	**3.2**	**130.9**	**39.93**	**2.3**	**470**	**6.353-7.82**	**1100**
GAMW21*							
GAMW21B*	1,2	1,2	1		1,2		1,2
GAMW22*		2					
GAMW22B*	1,2	1,2	1,2		1,2		1,2
GAMW23*	1,2	1,2			1,2	1,2	1,2
GAMW23B*	1,2	1,2	1,2		1,2	1,2	1,2
GAMW26				1,3,5,6			2
GAMW26B		1,3	3		1,3	3	1,3
GAMW27	1,2,3,4,5,6	1,2,3,4,5,6			1,2,3,4,6		1,2,3,4,6
GAMW27B	1,2,3,4,5,6	1,2,3,5,6	1,2,3,4,5,6		1,2,3,4,5, 6	3	1,2,3,4,5,6
GAMW28*	1,2	1,2	1		1,2		1,2
GAMW28B*	1,2	1,2	1,2		1,2		1,2
GAMW38							
GAMW38B	3,4,5,6	3,4,5,6	3,4		3,4,5,6		3,4,5,6
GAMW39	3	3,4,5,6			3	5	3
GAMW39B	3,4,5,6	3,4,5,6	3,4,5,6		3,4,5,6	5	3,4,5,6
GAMW40	3,4,6	3,4,5,6			3		3,4,5,6

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
Prediction Level (January 2018)	**1.7**	**116.1**	**34.91**	**2.3**	**300**	**6.465-7.739**	**653.4**
Prediction Level (June 2019)	**3.2**	**130.9**	**39.93**	**2.3**	**470**	**6.353-7.82**	**1100**
GAMW40B	3,4,5,6	3,4,5,6	3,4,5,6		3,4,5,6	3,4,6	3,4,5,6
GAMW41	4,5,6	4,5,6	4,5,6		4,5,6		4,5,6
GAMW41B	4,5,6	4,6	4,5,6		4,5,6	6	4,5,6

"1" Indicates a statistically significant increase detected in the first Detection Monitoring event
"2" Indicates a statistically significant increase detected in the second Detection Monitoring event
"3" Indicates a statistically significant increase detected in the third Detection Monitoring event
"4" Indicates a statistically significant increase detected in the fourth Detection Monitoring event
"5" Indicates a statistically significant increase detected in the fifth Detection Monitoring event
"6" Indicates a statistically significant increase detected in the sixth Detection Monitoring event
"*" Indicates monitoring well was decommissioned prior to the third Detection Monitoring event

2.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSION

The preceding information indicates the results of the sixth Detection Monitoring event are consistent with the previous Detection Monitoring events, and the rationale behind the ASD dated April 13, 2018 is still applicable. Golder prepared the ASD in accordance with 40 CFR 257.94(e)(2) and it supports the finding that the SSIs determined on July 7, 2020 are not due to a release from the CCR Unit. As described in that ASD, the conceptual site model, historical groundwater data, and the Phase V and Phase VI landfill design indicate that a release from the unlined portion of the landfill not subject to the CCR Final Rule, Phases I and II, is the source of the identified SSIs. Therefore, no further action (i.e., Assessment Monitoring) is warranted, and the Schahfer Landfill Phases V and VI will remain in Detection Monitoring.

3.0 REFERENCES

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", April 13, 2018.

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", August 28, 2018.

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", March 31, 2019.

Golder Associates, "Northern Indiana Public Service Company LLC R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", September 6, 2019.

Golder Associates, "Northern Indiana Public Service Company LLC R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", May 7, 2020.

LF H Soil Borings and Monitoring Well Logs 40 CFR Part §257.103(f)(2)(v)(C)(2)(ii)

BOREHOLE LOG: GAMW-10

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK:

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173531.415 E: 2973046.249
GROUND SURFACE ELEV.: 663.99
TOP OF CASING ELEV.: 667.83
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 6/28/2015
END DATE/TIME: 6/28/2015

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown fine to medium SAND, organics, trace silt		1	SS		0.67 / 2	0-2': SAND, fine to medium, poorly-graded, dark brown, organics, trace silt, moist, loose. (SP) SPTs (1-2-4-7)		Cement and bentonite grout mix 0-1 ft-bgs Bentonite chips 1-3 ft-bgs Filter Pack #7 Sand 3-4 ft-bgs Filter Pack #5 Sand 4-15 ft-bgs 2" PVC Screen slot 0.010" 5-15 ft-bgs
660.0			2	SS		1.67 / 2	5-6': SAND, fine to medium, poorly-graded, dark brown, organics, trace silt, moist, loose. (SP) 6-6.5': CLAYEY SAND, gray, cohesive, hard. (SC) 6.5-7': SAND, medium, poorly-graded, light brown, trace silt, moist, loose. (SP) SPTs (2-3-4-6)		
	tan to dark gray fine to medium SAND, trace silt		3	SS		1.75 / 2	10-11': SAND, fine to medium, poorly-graded, dark gray, trace silt, wet, very loose. (SP) 11-12': SAND, fine to medium, poorly-graded, tan to brown, trace silt, wet, very loose. (SP) SPTs (2-1-1-1)		
655.0									
650.0									
645.0									
640.0									
635.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: John
DRILL RIG: CME 75

LOGGED BY: HMV
CHECKED BY: CEM
DATE: 7/27/15

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-11

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK:

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174218.618 E: 2972678.783
GROUND SURFACE ELEV.: 663.60
TOP OF CASING ELEV.: 667.17
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 75
START DATE/TIME: 6/25/2015
END DATE/TIME: 6/25/2015

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown ORGANIC SILT and SAND		1	SS		1.58 / 2	0-1': ORGANIC SILT and SAND, well-graded, some gravel, dark brown, plant roots, non-cohesive, moist. (OL) 1-2': SAND, fine, poorly-graded, dark brown, trace silt, moist, loose. (SP) SPTs (3-5-5-8)		Cement and bentonite grout mix 0-1 ft-bgs
	dark brown fine SAND, trace silt								Bentonite chips 1-3 ft-bgs
660.0									Filter Pack #7 Sand 3-3.5 ft-bgs
	dark brown fine SILTY SAND		2	SS		2 / 2	5-6.25': SILTY SAND, fine, poorly-graded, dark brown, trace silt, moist, compact. (SM) 6.25-7': SAND, fine, poorly-graded, reddish-brown, trace pea-sized gravel, trace silt, wet. (SP) SPTs (5-6-7-7)		Filter Pack #5 Sand 3.5-15 ft-bgs
	reddish-brown fine SAND, trace gravel, trace silt								2" PVC Screen slot 0.010" 5-15 ft-bgs
655.0									
	fine to coarse brown SAND, trace gravel, trace silt		3	SS		1.42 / 2	10-12': SAND, fine to coarse, well-graded, sub-angular to sub-rounded, brown, trace gravel, trace silt, wet, loose. (SW) SPTs (4-5-5-6)		
650.0									
645.0									
640.0									
635.0									

LITHOLOGY LEGEND

USCS Low Plasticity Organic silt or clay (OL)
USCS Well-graded Sand (SW)
USCS Poorly-graded Sand (SP)
USCS Silty Sand (SM)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 75

LOGGED BY: AP
CHECKED BY: CEM
DATE: 7/27/15

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-20

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 16
DEPTH TO BEDROCK: 32.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171579.615 E: 2974761.601
GROUND SURFACE ELEV.: 664.61
TOP OF CASING ELEV.: 667.21
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/27/2016
END DATE/TIME: 5/27/2016

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- SAND, trace gravel, trace fly ash/boiler slag, trace silt		1	SS		1.7 / 2	0-1.8': SAND, organics, fine, poorly-graded; dark brown; trace fly ash/ boiler slag, trace silt, dry, loose. (FILL) 1.8-2': FLY ASH/ BOILER SLAG, moist, loose. (FILL) SPTs (3-4-4-5)		Bentonite grout mix 0-2 ft-bgs
660.0			2	SS		2 / 2	5-5.9': SAND, fine, poorly-graded; dark brown; trace fly ash/ boiler slag, trace silt, dry, loose. (FILL) 5.9-6.2': FLY ASH/ BOILER SLAG, moist, loose. (FILL) 6.2-6.3': SAND, fine, poorly-graded; brown; trace gravel, trace fly ash/ boiler slag, trace silt, dry, loose. (FILL) 6.3-6.7': FLY ASH/ BOILER SLAG, moist, loose. (FILL) 6.7-7': SAND, fine, poorly-graded; brown; trace silt, moist, loose. (FILL) (SP) SPTs (2-2-4-3)		Bentonite chips 2-4 ft-bgs Filter Pack #5 Sand 4-16 ft-bgs 2 PVC Screen slot 0.010 6-16 ft-bgs
655.0	grey fine SAND, trace silt		3	SS		1.5 / 2	10.8-11.1': SAND, clay lens, fine, poorly-graded; grey; trace fly ash/ boiler slag, trace silt, moist, loose. (FILL) 11.1-12': SAND, fine, poorly-graded; grey; trace silt, wet, loose. (SP) SPTs (7-3-3-4)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-20B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32.5
DEPTH TO BEDROCK: 32.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171579.945 E: 2974757.369
GROUND SURFACE ELEV.: 664.48
TOP OF CASING ELEV.: 667.40
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/27/2016 8:48:00 AM
END DATE/TIME: 5/27/2016 9:39:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- SAND, trace gravel, trace fly ash/boiler slag, trace silt		1	SS		1.7 / 2	0-1.8': SAND, organics, fine, poorly-graded; dark brown; trace fly ash/ boiler slag, trace silt, dry, loose. (FILL) 1.8-2': FLY ASH/ BOILER SLAG, moist, loose. (FILL) SPTs (3-4-4-5)		Bentonite grout mix 0-18.5 ft-bgs
660.0			2	SS		2 / 2	5-5.9': SAND, fine, poorly-graded; dark brown; trace fly ash/ boiler slag, trace silt, dry, loose. (FILL) 5.9-6.2': FLY ASH/ BOILER SLAG, moist, loose. (FILL) 6.2-6.3': SAND, fine, poorly-graded; brown; trace gravel, trace fly ash/ boiler slag, trace silt, dry, loose. (FILL) 6.3-6.7': FLY ASH/ BOILER SLAG, moist, loose. (FILL) 6.7-7': SAND, fine, poorly-graded; brown; trace silt, moist, loose. (FILL) (SP) SPTs (2-2-4-3)		
655.0	grey fine SAND, trace silt		3	SS		1.5 / 2	10.8-11.1': SAND, clay lens, fine, poorly-graded; grey; trace fly ash/ boiler slag, trace silt, moist, loose. (FILL) 11.1-12': SAND, fine, poorly-graded; grey; trace silt, wet, loose. (SP) SPTs (7-3-3-4)		
650.0			4	SS		1.8 / 2	15-17': SAND, fine, poorly-graded; grey; trace silt, wet, loose. (SP) SPTs (2-2-3-4)		
645.0			5	SS		2 / 2	20-22': SAND, fine, poorly-graded; grey; trace silt, wet, loose. (SP) SPTs (6-3-5-4)		Bentonite chips 18.5-20.5 ft-bgs Filter Pack #5 Sand 20.5-32.5 ft-bgs 2 PVC Screen slot 0.010 22.5-32.5 ft-bgs
640.0									

LITHOLOGY LEGEND

Fill (made ground)
USCS Low Plasticity Clay (CL)
USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-20B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32.5
DEPTH TO BEDROCK: 32.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171579.945 E: 2974757.369
GROUND SURFACE ELEV.: 664.48
TOP OF CASING ELEV.: 667.40
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/27/2016 8:48:00 AM
END DATE/TIME: 5/27/2016 9:39:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	grey fine to medium SAND, trace gravel, trace silt		6	SS		1.2 / 2	25-27': SAND, fine to medium, well-graded; grey; trace gravel, trace silt, wet, loose. (SW) SPTs (2-4-4-5)		
635.0			7	SS		1.8 / 2	30-30.9': SAND, fine, poorly-graded; grey; trace silt, moist, loose. (SP) 30.9-31.3': SAND, medium, well-graded; grey; trace silt, wet, loose. (SW) 31.3-31.6': SAND, fine, poorly-graded; grey; trace silt, wet, loose. (SP) 31.6-31.9': GRAVEL, angular, well-graded; grey; poorly-graded, fine sand, trace fine sand, trace silt, moist, loose. (GP) 31.9-32': CLAY, trace gravel; grey; cohesive, plastic, soft, moist. (CL) 32.5': auger refusal in SHALE; dark grey to black. SPTs (4-4-5-5)		
	grey CLAY, trace gravel								
	SHALE								
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

Fill (made ground)
USCS Low Plasticity Clay (CL)
USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Doug Carlson
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-24

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 16
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171048.7173 E: 2974868.6827
GROUND SURFACE ELEV.: 662.09
TOP OF CASING ELEV.: 665.39
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/26/2016 3:34:00 PM
END DATE/TIME: 9/26/2016 4:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown to black fine SAND, trace organics, trace silt		1	SS		1.6 / 2	0-1.58': SAND, trace organics, fine, poorly-graded; dark brown to black; trace silt, moist, loose. (SP) SPTs (1-1-1-1)		Bentonite grout mix 0-2 ft-bgs
660.0									Bentonite chips 2-4 ft-bgs
	grey to dark grey fine to medium SAND, trace silt		2	SS		2 / 2	5-7': SAND, fine to medium, poorly-graded; grey to dark grey; trace silt, moist to wet, loose. (SP) SPTs (2-3-4-4)		Filter Pack #4 Sand 4-16 ft-bgs
655.0									2" PVC Screen slot 0.010 6-16 ft-bgs
	light to dark brown fine to medium SAND, trace silt		3	SS		2 / 2	10-11.33': SAND, fine, poorly-graded; light to dark brown; trace silt, moist, compact. (SP) 11.33-12': SILT loam, very fine, light brown sand lenses, well-graded; grey; trace silt, wet, compact. (ML) SPTs (3-5-10-14)		
	grey SILT loam, light brown sand lenses, trace silt								
650.0									
	tan to dark brown SAND, trace silt								
645.0									
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

USCS Silt (ML)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-24B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 31
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171050.6688 E: 2974866.8932
GROUND SURFACE ELEV.: 662.13
TOP OF CASING ELEV.: 665.33
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/26/2016 12:00:00 PM
END DATE/TIME: 9/26/2016 2:02:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown to black SAND, trace organics, trace silt		1	SS		1.6 / 2	0-1.58': SAND, trace organics, fine, poorly-graded; dark brown to black; trace silt, moist, loose. (SP) SPTs (1-1-1-1)		Bentonite grout mix 0-17 ft-bgs
660.0									
	grey to dark grey fine to medium SAND, trace silt		2	SS		2 / 2	5-7': SAND, fine to medium, poorly-graded; grey to dark grey; trace silt, moist to wet, loose. (SP) SPTs (2-3-4-4)		
655.0									
	light to dark brown fine to medium SAND, trace silt		3	SS		2 / 2	10-11.33': SAND, fine to medium, poorly-graded; light to dark brown; trace silt, moist, compact. (SP) 11.33-12': SILT loam, very fine, light brown sand lenses, well-graded; grey; trace silt, wet, compact. (ML) SPTs (3-5-10-14)		
	grey SILT loam, light brown sand lenses, trace silt								
650.0									
	tan to brown to dark brown fine to medium SAND, trace silt		4	SS		1.3 / 2	15-16.25': SAND, fine to medium, poorly-graded; brown to dark brown; trace silt, moist, compact. (SP) SPTs (1-3-9-12)		
645.0									Bentonite chips 17-19 ft-bgs
									Filter Pack #4 Sand 19-31 ft-bgs
			5	SS		1.8 / 2	20-22': SAND, fine to medium, poorly-graded; tan to brown to dark brown; trace silt, moist, dense. (SP) SPTs (3-13-24-24)		2" PVC Screen slot 0.010 21-31 ft-bgs
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Silt (ML) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-24B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 31
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171050.6688 E: 2974866.8932
GROUND SURFACE ELEV.: 662.13
TOP OF CASING ELEV.: 665.33
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/26/2016 12:00:00 PM
END DATE/TIME: 9/26/2016 2:02:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	tan to brown to dark brown fine to medium SAND, trace silt		6	SS		1.6 / 2	25-26.58': SAND, fine to medium with trace gravel from 25'-25'6, poorly-graded; brown to dark brown; trace silt, moist, compact. (SP) SPTs (3-4-22-22)		
635.0									
			7	SS		0.3 / 2	30-30.25': SAND, fine to medium, poorly-graded; brown to dark brown; trace silt, moist, dense. (SP) 31': auger refusal in SHALE; dark grey to black. SPTs (5-15-27-50/5)		
	SHALE								
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Silt (ML) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-25

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 16
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171586.0299 E: 2973730.3404
GROUND SURFACE ELEV.: 665.26
TOP OF CASING ELEV.: 668.05
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/4/2016 4:17:00 PM
END DATE/TIME: 10/5/2016 9:20:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	FILL- light brown to orangey tan, fine SAND, trace fly ash, trace silt		1	SS		0.3 / 2	0-0.33': SAND, fine, poorly-graded; light brown to black; trace silt, dry, loose. (FILL) SPTs (1-2-4-3)		Bentonite grout mix 0-2 ft-bgs
									Bentonite chips 2-4 ft-bgs
									Filter Pack #4 Sand 4-16 ft-bgs
660.0			2	SS		2 / 2	5-7': SAND, fine, poorly-graded; light brown to orange-y tan; trace silt, moist, loose. (FILL) SPTs (1-3-3-3)		2" PVC Screen slot 0.010 6-16 ft-bgs
655.0			3	SS		1.8 / 2	10.25-12': SAND, fine, poorly-graded; light brown to orange-y tan; trace fly ash, trace silt, wet, very loose. (FILL) SPTs (1-1-1-1)		
650.0	light brown to orange-y tan, fine SAND, trace silt								
645.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-25B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 35
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171588.4863 E: 2973730.6633
GROUND SURFACE ELEV.: 665.26
TOP OF CASING ELEV.: 667.95
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/5/2016 9:23:00 AM
END DATE/TIME: 10/5/2016 10:20:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	FILL- light brown to orangey tan, fine SAND, trace fly ash, trace silt		1	SS		0.3 / 2	0-0.33': SAND, fine, poorly-graded; light brown to black; trace silt, dry, loose. (FILL) SPTs (1-2-4-3)		Bentonite grout mix 0-21 ft-bgs
660.0			2	SS		2 / 2	5-7': SAND, fine, poorly-graded; light brown to orange-y tan; trace silt, moist, loose. (FILL) SPTs (1-3-3-3)		
655.0			3	SS		1.8 / 2	10.25-12': SAND, fine, poorly-graded; light brown to orange-y tan; trace fly ash, trace silt, wet, very loose. (FILL) SPTs (1-1-1-1)		
650.0	light brown to orange-y tan, fine SAND, trace silt		4	SS		1.3 / 2	15.67-17': SAND, fine, poorly-graded; light brown to orange-y tan; trace silt, wet, very loose. (SP) SPTs (8-1-2-2)		
645.0	grey, fine SAND, trace silt		5	SS		1.3 / 2	20.75-22': SAND, fine, poorly-graded; grey; trace silt, wet, loose. (SP) SPTs (1-3-4-5)		Bentonite chips 21-23 ft-bgs Filter Pack #4 Sand 23-35 ft-bgs

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Poorly-graded Sand (SP)
USCS Well-graded Gravel (GW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

BOREHOLE LOG: GAMW-25B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 35
DEPTH TO BEDROCK: 35

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2171588.4863 E: 2973730.6633
GROUND SURFACE ELEV.: 665.26
TOP OF CASING ELEV.: 667.95
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/5/2016 9:23:00 AM
END DATE/TIME: 10/5/2016 10:20:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	grey, fine SAND, trace silt								2" PVC Screen slot 0.010 25-35 ft-bgs
	grey fine to medium SAND, trace gravel, trace silt		6	SS		1.2 / 2	25.83-26': SAND, fine, well-graded; grey; trace silt, wet, loose. (SW) 26-26.17': GRAVEL, well-graded; grey; trace silt, wet, loose. (GW) 26.17-27': SAND, fine to medium, well-graded; grey; trace gravel, trace silt, wet, loose. (SP) SPTs (1-2-4-8)		
635.0			7	SS		1.5 / 2	30.5-31.67': SAND, fine to medium, well-graded; grey; trace silt, wet, dense. (SW) 31.67-32': SAND, fine, poorly-graded; grey; trace silt, wet, dense.(SP) 35': auger refusal in SHALE; dark grey to black. SPTs (5-14-23-22)		
	grey fine SAND, trace silt								
630.0	SHALE								
625.0									
620.0									

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Poorly-graded Sand (SP)
USCS Well-graded Gravel (GW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-26

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 16
DEPTH TO BEDROCK: 33

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172243.8327 E: 2973744.7976
GROUND SURFACE ELEV.: 664.89
TOP OF CASING ELEV.: 667.71
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/4/2016 2:54:00 PM
END DATE/TIME: 10/4/2016 3:23:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- fine, light brown to black SAND, trace organics, trace silt		1	SS		1.5 / 2	0.5-1.17': SAND, fine, poorly-graded; dark brown; trace organics, trace silt, dry, loose. (FILL) 1.17-1.46': black FLY ASH/BOILER SLAG. (FILL) 1.46-2': SAND, fine, poorly-graded; light brown to black; trace silt, dry, loose. (FILL) SPTs (1-1-1-1)		Bentonite grout mix 0-2 ft-bgs Bentonite chips 2-4 ft-bgs Filter Pack #4 Sand 4-16 ft-bgs 2" PVC Screen slot 0.010 6-16 ft-bgs
660.0			2	SS		1.5 / 2	5-5.17': SAND, fine, poorly-graded; light brown to black; trace silt, moist, compact. (FILL) 5.17-5.29': GRAVEL, angular, poorly-graded; white; trace silt, moist, compact. (FILL) 5.29-6.58': SAND, fine, poorly-graded; brown; trace silt, wet, compact. (SP) SPTs (2-7-8-9)		
655.0			3	SS		1.3 / 2	10-11.33': SAND, fine, poorly-graded; brown to dark brown to black; trace fly ash, trace silt, wet, compact. (SP) SPTs (2-7-5-7)		
650.0	brown to dark grey, fine SAND, trace gravel, trace silt								
645.0									
640.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-26B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 33
DEPTH TO BEDROCK: 33

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172245.8652 E: 2973744.6631
GROUND SURFACE ELEV.: 664.91
TOP OF CASING ELEV.: 667.75
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/4/2016 12:30:00 PM
END DATE/TIME: 10/4/2016 2:01:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- fine to medium, light brown to black SAND, trace organics, trace silt		1	SS		1.5 / 2	0.5-1.17': SAND, fine, poorly-graded; dark brown; trace organics, trace silt, dry, loose. (FILL) 1.17-1.46': black FLY ASH/BOILER SLAG. (FILL) 1.46-2': SAND, fine, poorly-graded; light brown to black; trace silt, dry, loose. (FILL) SPTs (1-1-1-1)		Bentonite grout mix 0-19 ft-bgs
660.0			2	SS		1.5 / 2	5-5.17': SAND, fine, poorly-graded; light brown to black; trace silt, moist, compact. (FILL) 5.17-5.29': GRAVEL, angular, poorly-graded; white; trace silt, moist, compact. (FILL) 5.29-6.58': SAND, fine, poorly-graded; brown; trace silt, wet, compact. (SP) SPTs (2-7-8-9)		
655.0			3	SS		1.3 / 2	10-11.33': SAND, fine, poorly-graded; brown to dark brown to black; trace fly ash, trace silt, wet, compact. (SP) SPTs (2-7-5-7)		
650.0	brown to dark grey, fine to medium SAND, trace gravel, trace silt		4	SS		2 / 2	15-17': SAND, fine to medium, poorly-graded; brown; trace silt, wet, compact. (SP) SPTs (5-5-8-11)		Bentonite chips 19-21 ft-bgs
645.0			5	SS		1.1 / 2	20.92-22': SAND, fine to medium, well-graded; brown to grey; trace gravel, trace silt, wet, compact. (SW) SPTs (1-6-10-12)		Filter Pack #4 Sand 21-33 ft-bgs 2" PVC Screen slot 0.010 23-33 ft-bgs
640.0									

LITHOLOGY LEGEND

Fill (made ground) | USCS Poorly-graded Sand (SP) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-26B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 33
DEPTH TO BEDROCK: 33

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172245.8652 E: 2973744.6631
GROUND SURFACE ELEV.: 664.91
TOP OF CASING ELEV.: 667.75
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/4/2016 12:30:00 PM
END DATE/TIME: 10/4/2016 2:01:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to dark grey, fine to medium SAND, trace gravel, trace silt		6	SS		1.8 / 2	25.25-27': SAND, fine to medium, well-graded; brown to grey; trace gravel, trace silt, wet, compact. (SW) SPTs (1-5-12-24)		
635.0			7	SS		1.4 / 2	30.58-31.5': SAND, fine, poorly-graded; light grey; trace silt, wet, compact. (SP) 31.5-32': SAND, trace gravel, fine to medium, well-graded; dark grey; trace silt, wet, compact. (SW) 33': auger refusal in SHALE; dark grey to black. SPTs (1-7-20-31)		
	SHALE								
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

Fill (made ground) | USCS Poorly-graded Sand (SP) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

BOREHOLE LOG: GAMW-27

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 16
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172624.6761 E: 2973958.3233
GROUND SURFACE ELEV.: 662.68
TOP OF CASING ELEV.: 665.51
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/3/2016 3:48:00 PM
END DATE/TIME: 10/3/2016 4:34:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- light brown to black fine to medium SAND, FLY ASH/ BOILER SLAG, trace organics, trace silt		1	SS		1.3 / 2	0-1.08': SAND, fine, poorly-graded; dark to light brown; trace organics, trace silt, dry, very loose. (FILL) 1.08-1.17': black FLY ASH/BOILER SLAG. (FILL) 1.17-1.25': SAND, fine, poorly-graded; light brown; trace silt, dry, very loose. (FILL) SPTs (1-1-1-2)		Bentonite grout mix 0-2 ft-bgs
660.0			2	SS		2 / 2	5-5.83': SAND with FLY ASH/BOILER SLAG, fine, well-graded; dark brown to black; trace silt, moist, loose. (FILL) 5.83-7': SAND, fine to medium, well-graded; brown; trace silt, moist, loose. (FILL) SPTs (4-2-2-3)		Bentonite chips 2-4 ft-bgs Filter Pack #4 Sand 4-16 ft-bgs 2" PVC Screen slot 0.010 6-16 ft-bgs
655.0			3	SS		1.8 / 2	10-10.25': FLY ASH/ BOILER SLAG; black; wet. (FILL) 10.25-11.75': SAND, fine to medium, well-graded; dark brown; trace fly ash, trace silt, wet, very loose. (FILL) SPTs (3-1-1-1)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

Fill (made ground)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-27B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 31
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172624.9467 E: 2973960.2089
GROUND SURFACE ELEV.: 662.65
TOP OF CASING ELEV.: 665.44
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/4/2016 8:46:00 AM
END DATE/TIME: 10/4/2016 10:00:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- light brown to black fine to medium SAND, FLY ASH/ BOILER SLAG, trace organics, trace silt		1	SS		1.3 / 2	0-1.08': SAND, fine, poorly-graded; dark to light brown; trace organics, trace silt, dry, very loose. (FILL) 1.08-1.17': black FLY ASH/BOILER SLAG. (FILL) 1.17-1.25': SAND, fine, poorly-graded; light brown; trace silt, dry, very loose. (FILL) SPTs (1-1-1-2)		Bentonite grout mix 0-17 ft-bgs
660.0			2	SS		2 / 2	5-5.83': SAND with FLY ASH/BOILER SLAG, fine, well-graded; dark brown to black; trace silt, moist, loose. (FILL) 5.83-7': SAND, fine to medium, well-graded; brown; trace silt, moist, loose. (FILL) SPTs (4-2-2-3)		
655.0			3	SS		1.8 / 2	10-10.25': FLY ASH/ BOILER SLAG; black; wet. (FILL) 10.25-11.75': SAND, fine to medium, well-graded; dark brown; trace fly ash, trace silt, wet, very loose. (FILL) SPTs (3-1-1-1)		
650.0			4	SS		0 / 2	15-17': No Recovery. SPTs (1-1-1-1)		
645.0			5	SS		1.4 / 2	20.58-22': SAND, fine to medium, well-graded; dark brown to grey; trace silt, wet, loose. (SW) SPTs (2-2-5-7)		Bentonite chips 17-19 ft-bgs Filter Pack #4 Sand 19-31 ft-bgs 2" PVC Screen slot 0.010 21-31 ft-bgs
	dark brown to grey, fine to medium SAND, trace silt								
640.0									

LITHOLOGY LEGEND

Fill (made ground) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-27B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 31
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172624.9467 E: 2973960.2089
GROUND SURFACE ELEV.: 662.65
TOP OF CASING ELEV.: 665.44
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/4/2016 8:46:00 AM
END DATE/TIME: 10/4/2016 10:00:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown to grey, fine to medium SAND, trace silt		6	SS		1.5 / 2	25.5-27': SAND, fine to medium, well-graded; dark brown to grey; trace silt, wet, dense. (SW) SPTs (7-17-20-21)		
635.0									
			7	SS		1.5 / 2	30.5-31': SAND, fine to medium, well-graded; dark brown to grey; trace silt, wet, dense. (SW) 31': auger refusal in SHALE; dark grey to black. SPTs (6-16-23-31)		
	SHALE								
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Well-graded Sand (SW)

Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

BOREHOLE LOG: GAMW-29

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 16
DEPTH TO BEDROCK: 36

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173593.4072 E: 2975290.478
GROUND SURFACE ELEV.: 666.58
TOP OF CASING ELEV.: 669.49
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/3/2016 1:13:00 PM
END DATE/TIME: 10/3/2016 1:50:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	FILL- grey to black fine SAND with FLY ASH/BOILER SLAG, some clay, some gravel, trace silt		1	SS		1.3 / 2	0.67-2': SAND with FLY ASH/BOILER SLAG, some clay, some gravel, fine, angular, poorly-sorted; grey to black; trace silt, dry, loose. (FILL) SPTs (1-1-8-15)		Bentonite grout mix 0-2 ft-bgs Bentonite chips 2-4 ft-bgs Filter Pack #4 Sand 4-16 ft-bgs 2" PVC Screen slot 0.010 6-16 ft-bgs
660.0	grey to white CLAY, some gravel		2	SS		2 / 2	5-7': CLAY, some gravel, stiff, poorly-sorted; grey to white; cohesive, dry to moist, silt-like. (CL) SPTs (1-8-6-4)		
655.0	brown to grey, fine to medium SAND, trace coarser fragments, trace silt		3	SS		1.6 / 2	10.42-10.96': CLAY, silt-like, poorly-sorted; grey to white; trace gravel, cohesive, dry to moist, firm. (CL) 10.96-12': SAND, fine, well-graded; tan to brown; trace coarser fragments, cohesive, wet, compact. (SW) SPTs (2-4-6-7)		
650.0									
645.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Low Plasticity Clay (CL)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-29B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 36

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173594.6882 E: 2975292.8798
GROUND SURFACE ELEV.: 666.64
TOP OF CASING ELEV.: 669.45
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/3/2016 10:57:00 AM
END DATE/TIME: 10/3/2016 12:23:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	FILL- grey to black fine SAND with FLY ASH/BOILER SLAG, some clay, some gravel, trace silt		1	SS		1.3 / 2	0.67-2': SAND with FLY ASH/BOILER SLAG, some clay, some gravel, fine, angular, poorly-sorted; grey to black; trace silt, dry, loose. (FILL) SPTs (1-1-8-15)		Bentonite grout mix 0-22 ft-bgs
	grey to white CLAY, some gravel		2	SS		2 / 2	5-7': CLAY, some gravel, stiff, poorly-sorted; grey to white; cohesive, dry to moist, silt-like. (CL) SPTs (1-8-6-4)		
660.0									
	brown to grey, fine to medium SAND, trace coarser fragments, trace silt		3	SS		1.6 / 2	10.42-10.96': CLAY, silt-like, poorly-sorted; grey to white; trace gravel, cohesive, dry to moist, firm. (CL) 10.96-12': SAND, fine, well-graded; tan to brown; trace coarser fragments, cohesive, wet, compact. (SW) SPTs (2-4-6-7)		
655.0									
			4	SS		2 / 2	15-17': SAND, brown to grey, well-graded; fine to medium; trace silt, wet, loose. (SW) SPTs (2-2-2-4)		
650.0									
	grey GRAVEL, trace silt		5	SS		1.3 / 2	20.75-21.42': GRAVEL, well-rounded, poorly-sorted; grey; trace silt, wet, compact. (GP) 21.42-22': SAND, fine, poorly-graded; brown to grey; trace silt, wet, compact. (SP) SPTs (2-5-8-10)		
645.0	brown to grey fine SAND, trace silt								Bentonite chips 22-24 ft-bgs Filter Pack #4 Sand 24-36 ft-bgs

LITHOLOGY LEGEND

Fill (made ground)
USCS Well-graded Gravel (GW)
USCS Low Plasticity Clay (CL)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-29B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 36

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173594.6882 E: 2975292.8798
GROUND SURFACE ELEV.: 666.64
TOP OF CASING ELEV.: 669.45
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/3/2016 10:57:00 AM
END DATE/TIME: 10/3/2016 12:23:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to grey fine SAND, trace silt		6	SS		1.3 / 2	25.75-26.38': SAND, fine, poorly-graded; brown to grey; trace silt, wet, compact. (SP) 26.38-26.67': GRAVEL, some brown sand, well-rounded, well-graded; grey; trace silt, wet, compact. (GW) 26.67-27': SAND, fine, poorly-graded; brown to grey; trace silt, wet, compact. (SP) SPTs (3-4-8-12)		2" PVC Screen slot 0.010 26-36 ft-bgs
640.0	grey fine GRAVEL, some brown sand, trace silt								
	grey GRAVEL, trace silt		7	SS		1.4 / 2	30.58-31.08': GRAVEL, well-rounded, well-graded; grey; trace silt, wet, dense. (GW) 31.08-32': SAND, fine to medium, well-graded; dark brown to grey; trace silt, wet, dense. (SW) SPTs (7-16-17-19)		
635.0	dark brown, fine to medium SAND, trace silt								
	SHALE		8	SS		0.8 / 2	35-36': No Recovery. Auger refusal in SHALE; dark grey to black. SPTs (1-7-16-22)		
630.0									
625.0									
620.0									

LITHOLOGY LEGEND

Fill (made ground)
USCS Well-graded Gravel (GW)
USCS Low Plasticity Clay (CL)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-30

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 16
DEPTH TO BEDROCK: 30.92

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173602.0685 E: 2974396.0195
GROUND SURFACE ELEV.: 664.27
TOP OF CASING ELEV.: 666.92
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/30/2016 10:41:00 AM
END DATE/TIME: 9/30/2016 11:15:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- CLAY, SAND, FLY ASH/ BOILER SLAG, trace gravel, trace silt		1	SS		1.8 / 2	0.17-1.08': FLY ASH/ BOILER SLAG, medium, well-graded; dark brown to black; trace gravel, cohesive, dry, compact. (FILL) 1.08-2': CLAY, trace gravel, W<PL; grey; cohesive, stiff. (FILL) SPTs (3-5-10-15)		Bentonite grout mix 0-2 ft-bgs Bentonite chips 2-4 ft-bgs
660.0			2	SS		1.9 / 2	5-5.75': CLAY, trace gravel, trace fly ash, W<PL; grey; cohesive, stiff (FILL) 5.75-7': SAND, fine, poorly-graded; dark brown to black; trace fly ash, trace silt, moist, loose. (FILL) SPTs (1-1-3-4)		Filter Pack #4 Sand 4-16 ft-bgs 2" PVC Screen slot 0.010 6-16 ft-bgs
655.0									
	fine to medium brown SAND, trace silt		3	SS		1.5 / 2	10-10.75': SAND, fine, poorly-graded; dark brown to grey; trace boiler slag, trace silt, moist, loose. (FILL) 10.75-11.5': SAND, fine to medium, well-graded; brown; trace silt, wet, loose. (SW) SPTs (1-2-2-5)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

Fill (made ground)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-30B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32
DEPTH TO BEDROCK: 30.92

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173601.5341 E: 2974399.2253
GROUND SURFACE ELEV.: 664.27
TOP OF CASING ELEV.: 666.88
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/30/2016 8:32:00 AM
END DATE/TIME: 9/30/2016 9:22:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	FILL- CLAY, SAND, FLY ASH/ BOILER SLAG, trace gravel, trace silt		1	SS		1.8 / 2	0.17-1.08': FLY ASH/ BOILER SLAG, medium, well-graded; dark brown to black; trace gravel, cohesive, dry, compact. (FILL) 1.08-2': CLAY, trace gravel, W<PL; grey; cohesive, stiff. (FILL) SPTs (3-5-10-15)		Bentonite grout mix 0-18 ft-bgs
660.0			2	SS		1.9 / 2	5-5.75': CLAY, trace gravel, trace fly ash, W<PL; grey; cohesive, stiff (FILL) 5.75-7': SAND, fine, poorly-graded; dark brown to black; trace fly ash, trace silt, moist, loose. (FILL) SPTs (1-1-3-4)		
655.0	fine to medium brown SAND, trace silt		3	SS		1.5 / 2	10-10.75': SAND, fine, poorly-graded; dark brown to grey; trace boiler slag, trace silt, moist, loose. (FILL) 10.75-11.5': SAND, fine to medium, well-graded; brown; trace silt, wet, loose. (SW) SPTs (1-2-2-5)		
650.0			4	SS		1.5 / 2	15-15.58': SAND, fine to medium, well-graded; brown; trace silt, wet, loose. (SW) 15.58-16.5': SAND, medium, well-graded; brown; trace silt, wet, loose. (SW) SPTs (2-2-2-2)		Bentonite chips 18-20 ft-bgs
645.0	grey GRAVEL, trace silt		5	SS		0.8 / 2	21.25-21.67': GRAVEL, well-rounded, poorly-sorted; grey; trace silt, wet, compact. (GW) 21.67-22': SAND, some gravel, fine to medium, well-graded; dark brown to grey; trace silt, wet, compact. (SW) SPTs (3-4-6-8)		Filter Pack #4 Sand 20-32 ft-bgs
	light brown to grey fine to medium SAND, grey gravel lenses, trace silt								2" PVC Screen slot 0.010 22-32 ft-bgs
640.0									

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Well-graded Sand (SW)
USCS Well-graded Gravel (GW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-30B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32
DEPTH TO BEDROCK: 30.92

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173601.5341 E: 2974399.2253
GROUND SURFACE ELEV.: 664.27
TOP OF CASING ELEV.: 666.88
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/30/2016 8:32:00 AM
END DATE/TIME: 9/30/2016 9:22:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light brown to grey fine to medium SAND, grey gravel lenses, trace silt		6	SS		1.3 / 2	25.75-26': GRAVEL, well-rounded, well-graded; grey; trace silt, wet, compact. (GW) 26-27': SAND, trace gravel, fine to medium, well-graded; dark brown to grey; trace silt, wet, compact. (SW) SPTs (4-6-10-12)		
635.0			7	SS		1.3 / 2	30.67-30.92': SAND, trace gravel, fine to medium, well-graded; light brown to brown; trace silt, wet, compact. (SW) 30.92-31.08': GRAVEL, well-rounded, poorly-sorted; grey; trace silt, wet, compact. (GP) 31.08-32': SAND, trace gravel, fine to medium, well-graded; dark brown to grey; trace silt, wet, compact. (SW) 32': auger refusal in SHALE; dark grey to black. SPTs (7-9-15-20)		
	SHALE								
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

Fill (made ground)
Shale
USCS Well-graded Sand (SW)
USCS Well-graded Gravel (GW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-31

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 16
DEPTH TO BEDROCK: 30

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174043.9313 E: 2974076.4256
GROUND SURFACE ELEV.: 662.68
TOP OF CASING ELEV.: 665.4
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/5/2016 3:39:00 PM
END DATE/TIME: 10/5/2016 4:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light brown to brown fine SAND, trace organics, trace silt		1	SS		1.6 / 2	0-1': SAND, fine, poorly-graded; light brown to brown; trace organics, trace silt, dry, very loose. (SP) 1-1.58': SAND, fine, poorly-graded; dark brown to black; trace silt, dry, very loose. (SP) SPTs (1-1-1-1)		Bentonite grout mix 0-2 ft-bgs
	tan to black fine SAND, trace silt								Bentonite chips 2-4 ft-bgs
660.0			2	SS		2 / 2	5-5.67': SAND, fine, poorly-graded; dark brown to black/grey; trace silt, dry, very loose. (SP) 5.67-7': SAND, medium, poorly-graded; brown to tan; trace silt, moist, loose. (SP) SPTs (1-1-3-4)		Filter Pack #4 Sand 4-16 ft-bgs 2" PVC Screen slot 0.010 6-16 ft-bgs
655.0									
	brown to grey fine SAND, trace silt		3	SS		2 / 2	10-10.67': SAND, fine, poorly-graded; dark brown to black/grey; trace silt, wet, loose. (SP) 10.67-12': SAND, fine, poorly-graded; brown to grey; trace silt, wet, loose. (SP) SPTs (1-4-5-8)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

BOREHOLE LOG: GAMW-31B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 30
DEPTH TO BEDROCK: 30

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174041.6795 E: 2974075.8315
GROUND SURFACE ELEV.: 662.69
TOP OF CASING ELEV.: 665.41
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/5/2016 1:38:00 PM
END DATE/TIME: 10/5/2016 2:33:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light brown to brown fine SAND, trace organics, trace silt		1	SS		1.6 / 2	0-1': SAND, fine, poorly-graded; light brown to brown; trace organics, trace silt, dry, very loose. (SP) 1-1.58': SAND, fine, poorly-graded; dark brown to black; trace silt, dry, very loose. (SP) SPTs (1-1-1-1)		Bentonite grout mix 0-16 ft-bgs
	tan to black fine SAND, trace silt								
660.0			2	SS		2 / 2	5-5.67': SAND, fine, poorly-graded; dark brown to black/grey; trace silt, dry, very loose. (SP) 5.67-7': SAND, medium, poorly-graded; brown to tan; trace silt, moist, loose. (SP) SPTs (1-1-3-4)		
655.0			3	SS		2 / 2	10-10.67': SAND, fine, poorly-graded; dark brown to black/grey; trace silt, wet, loose. (SP) 10.67-12': SAND, fine, poorly-graded; brown to grey; trace silt, wet, loose. (SP) SPTs (1-4-5-8)		
	brown to grey fine SAND, trace silt								
650.0			4	SS		0.4 / 2	16.58-17': SAND, fine, poorly-graded; brown to grey; trace silt, wet, compact. (SP) SPTs (14-8-14-17)		Bentonite chips 16-18 ft-bgs
645.0									Filter Pack #4 Sand 18-30 ft-bgs
			5	SS		1.8 / 2	20.25-21.33': SAND, fine, well-graded; brown to grey; trace silt, wet, compact. (SW) 21.33-21.71': SAND, fine to medium, well-graded; grey; trace silt, wet, loose. (SW) 21.71-21.8': GRAVEL, well rounded, poorly-sorted; wet, loose. (GW) 21.8-22': SAND, fine to medium, well-graded; grey; trace silt, wet, loose. (SW) SPTs (1-4-5-8)		2" PVC Screen slot 0.010 20-30 ft-bgs
	grey SAND, fine gravel, trace silt								
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

BOREHOLE LOG: GAMW-31B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 30
DEPTH TO BEDROCK: 30

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174041.6795 E: 2974075.8315
GROUND SURFACE ELEV.: 662.69
TOP OF CASING ELEV.: 665.41
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 10/5/2016 1:38:00 PM
END DATE/TIME: 10/5/2016 2:33:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	grey SAND, fine gravel, trace silt		6	SS		1.1 / 2	25.9-26.46': SAND, fine to medium gravel, well-graded; grey; trace silt, wet, compact. (SW) 26.46-27': SAND, fine to medium, well-graded; grey; trace silt, wet, loose. 31': auger refusal in SHALE; dark grey to black. (SW) SPTs (8-13-15-18)		
635.0									
	SHALE								
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-32

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 18
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174364.5854 E: 2974353.1359
GROUND SURFACE ELEV.: 665.44
TOP OF CASING ELEV.: 668.08
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/27/2016 5:08:00 PM
END DATE/TIME: 9/27/2016 6:01:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	light brown to black fine SAND, trace organics, trace silt		1	SS		1.7 / 2	0-1': SAND, fine, poorly-graded; dark brown to black; trace organics, trace silt, dry, very loose. (SP) 1-2': SAND, fine, poorly-graded; light brown to brown; trace organics, trace silt, dry, very loose. (SP) SPTs (1-2-2-4)		Bentonite grout mix 0-4 ft-bgs
660.0	black fine to medium SAND, trace silt		2	SS		1.8 / 2	5.17-6.33': SAND, fine, poorly-graded; light brown to brown; trace organics, trace silt, moist, loose. (SP) 6.33-7': SAND, fine to medium, poorly-graded; grey to black; trace silt, wet, loose. (SP) SPTs (1-1-2-3)		Bentonite chips 4-6 ft-bgs Filter Pack #4 Sand 6-18 ft-bgs 2" PVC Screen slot 0.010 8-18 ft-bgs
655.0	fine to medium dark brown SAND, trace silt		3	SS		1.8 / 2	10-11.25': SAND, fine, poorly-graded; light brown to black; trace silt, moist, loose. (SP) 11.25-12': SAND, fine to medium, poorly-graded; dark brown; trace silt, moist, loose. (SP) SPTs (2-4-3-6)		
650.0	grey fine to medium SAND, trace gravel, trace silt CLAY		4	SS		1.5 / 2	15.5-16.33': SAND, fine, poorly-graded; dark brown; trace silt, wet, loose. (SP) 16.33-16.83': SAND, fine to medium, well-graded; grey; trace gravel, trace silt, wet, loose. (SW) 16.83-17': CLAY, W<PL; cohesive, wet, soft. (CL) SPTs (5-4-6-8)		
645.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | USCS Low Plasticity Clay (CL)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

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BOREHOLE LOG: GAMW-32B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174364.6987 E: 2974350.0919
GROUND SURFACE ELEV.: 665.53
TOP OF CASING ELEV.: 668.28
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/27/2016 2:47:00 PM
END DATE/TIME: 9/27/2016 3:47:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
665.0	light brown to black fine SAND, trace organics, trace silt		1	SS		1.7 / 2	0-1': SAND, fine, poorly-graded; dark brown to black; trace organics, trace silt, dry, very loose. (SP) 1-2': SAND, fine, poorly-graded; light brown to brown; trace organics, trace silt, dry, very loose. (SP) SPTs (1-2-2-4)		Bentonite grout mix 0-20 ft-bgs
660.0	black fine to medium SAND, trace silt		2	SS		1.8 / 2	5.17-6.33': SAND, fine, poorly-graded; light brown to brown; trace organics, trace silt, moist, loose. (SP) 6.33-7': SAND, fine to medium, poorly-graded; grey to black; trace silt, wet, loose. (SP) SPTs (1-1-2-3)		
655.0	fine to medium dark brown SAND, trace silt		3	SS		1.8 / 2	10-11.25': SAND, fine, poorly-graded; light brown to black; trace silt, moist, loose. (SP) 11.25-12': SAND, fine to medium, poorly-graded; dark brown; trace silt, moist, loose. (SP) SPTs (2-4-3-6)		
650.0	grey fine to medium SAND, trace gravel, trace silt CLAY		4	SS		1.5 / 2	15.5-16.33': SAND, fine, poorly-graded; dark brown; trace silt, wet, loose. (SP) 16.33-16.83': SAND, fine, well-graded; grey; trace gravel, trace silt, wet, loose. (SW) 16.83-17': CLAY, W<PL; cohesive, wet, soft. (CL) SPTs (5-4-6-8)		
645.0	dark brown fine to medium SAND, trace organics, trace gravel, trace silt		5	SS		0.7 / 2	20-20.67': SAND, fine, well-graded; dark brown to grey; trace organics, trace gravel, trace silt, wet, compact. (SW) SPTs (4-8-9-12)		Bentonite chips 20-22 ft-bgs Filter Pack #4 Sand 22-34 ft-bgs 2" PVC Screen slot 0.010 24-34 ft-bgs

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)
USCS Low Plasticity Clay (CL)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

BOREHOLE LOG: GAMW-32B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174364.6987 E: 2974350.0919
GROUND SURFACE ELEV.: 665.53
TOP OF CASING ELEV.: 668.28
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/27/2016 2:47:00 PM
END DATE/TIME: 9/27/2016 3:47:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
640.0	dark brown fine to medium SAND, trace organics, trace gravel, trace silt		6	SS		2 / 2	25-27': SAND, fine to medium, well-graded; dark brown to grey; trace organics, trace gravel, trace silt, wet, compact. (SW) SPTs (3-7-13-19)		
635.0	brown to grey fine to medium SAND, trace gravel, trace silt		7	SS		1.3 / 2	30-31': Not Sampled. Auger refusal in SHALE; dark grey to black. SPTs (6-14-15-14)		
	SHALE								
630.0									
625.0									
620.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)
USCS Low Plasticity Clay (CL)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

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BOREHOLE LOG: GAMW-33

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 16
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174015.7087 E: 2976811.1491
GROUND SURFACE ELEV.: 662.63
TOP OF CASING ELEV.: 665.29
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/27/2016 12:16:00 PM
END DATE/TIME: 9/27/2016 12:48:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown to black fine SAND with organics, trace silt		1	SS		1.3 / 2	0-2': SAND with organics, black soil, fine, poorly-graded; dark brown to black; trace silt, moist, very loose. (SP) SPTs (1-1-1-2)		Bentonite grout mix 0-2 ft-bgs
660.0									Bentonite chips 2-4 ft-bgs
			2	SS		2 / 2	5-6': SILTY SAND, fine, poorly-graded; dark brown to black; trace silt, wet, very loose (SM). 6-7': SAND, fine, poorly-graded; light brown to brown; trace silt, wet, very loose. (SP) COMPOSITE: (SP), F=31.4° SPTs (1-1-2-2)		Filter Pack #4 Sand 4-16 ft-bgs
	light brown to brown fine SAND, trace silt								2" PVC Screen slot 0.010 6-16 ft-bgs
655.0			3	SS		1.5 / 2	10.5-12': SAND, fine to medium, poorly-graded; light brown to brown; trace silt, wet, loose. (SP) SPTs (1-3-4-5)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-33B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 31
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174015.8544 E: 2976814.0104
GROUND SURFACE ELEV.: 662.43
TOP OF CASING ELEV.: 665.29
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/27/2016 9:20:00 AM
END DATE/TIME: 9/27/2016 10:23:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown to black fine SAND with organics, trace silt		1	SS		1.3 / 2	0-2': SAND with organics, black soil, fine, poorly-graded; dark brown to black; trace silt, moist, very loose. (SP) SPTs (1-1-1-2)		Bentonite grout mix 0-17 ft-bgs
660.0			2	SS		2 / 2	5-6': SILTY SAND, fine, poorly-graded; dark brown to black; trace silt, wet, very loose (SM). 6-7': SAND, fine, poorly-graded; light brown to brown; trace silt, wet, very loose. (SP) COMPOSITE: (SP), F=31.4° SPTs (1-1-2-2)		
	light brown to brown fine SAND, trace silt								
655.0			3	SS		1.5 / 2	10.5-12': SAND, fine to medium, poorly-graded; light brown to brown; trace silt, wet, loose. (SP) SPTs (1-3-4-5)		
650.0			4	SS		1 / 2	16-17': SAND, medium, poorly-graded; light brown to grey; trace gravel, trace silt, wet, very loose. (SP) SPTs (1-2-2-3)		
	light brown to grey medium to coarse SAND, some gravel, trace silt								Bentonite chips 17-19 ft-bgs
645.0									Filter Pack #4 Sand 19-31 ft-bgs
			5	SS		1 / 2	21-22': SAND, medium, well-graded; grey; trace gravel, trace silt, wet, compact. (SW) SPTs (6-4-8-10)		2" PVC Screen slot 0.010 21-31 ft-bgs
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-33B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 31
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174015.8544 E: 2976814.0104
GROUND SURFACE ELEV.: 662.43
TOP OF CASING ELEV.: 665.29
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/27/2016 9:20:00 AM
END DATE/TIME: 9/27/2016 10:23:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light brown to grey medium to coarse SAND, some gravel, trace silt		6	SS		1.1 / 2	25.92-26.75': SAND, medium to coarse, poorly-graded; grey; trace gravel, trace silt, wet, compact. (SP) 26.75-27': SAND, fine, poorly-graded; light brown to brown; trace silt, wet, compact. (SP) SPTs (2-11-15-18)		
635.0	light brown to brown, fine SAND, trace silt								
							30-31': Not Sampled. Auger refusal in SHALE; dark grey to black. SPTs (4-5-13-50/4)		
	SHALE		7	SS		2 / 2			
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-34

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 16
DEPTH TO BEDROCK: 29

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173123.8017 E: 2976637.5824
GROUND SURFACE ELEV.: 661.78
TOP OF CASING ELEV.: 664.82
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/28/2016 1:15:00 PM
END DATE/TIME: 9/28/2016 1:51:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	light brown to black fine SAND, trace organics, trace silt		1	SS		1.4 / 2	0.58-2': SAND, fine, poorly-graded; light brown to black; trace organics, trace silt, dry, very loose. (SP) SPTs (1-1-1-2)		Bentonite grout mix 0-2 ft-bgs Bentonite chips 2-4 ft-bgs Filter Pack #4 Sand 4-16 ft-bgs 2" PVC Screen slot 0.010 6-16 ft-bgs
655.0	brown fine SAND, trace silt		2	SS		2 / 2	5-5.88': SAND, fine, poorly-graded; light brown to black; trace silt, moist, very loose. (SP) 5.88-7': SAND, fine, poorly graded; light brown to brown; trace silt, moist, very loose. (SP) COMPOSITE: (SP), F=31.4° SPTs (1-1-3-4)		
650.0	brown to gray fine to medium SAND, trace silt		3	SS		0.9 / 2	11.08-12': SAND, fine to medium, poorly-graded; brown to grey; trace to some silt, moist, compact. (SP) SPTs (4-5-10-10)		
645.0									
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-34B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32
DEPTH TO BEDROCK: 29

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173126.747 E: 2976637.8425
GROUND SURFACE ELEV.: 661.65
TOP OF CASING ELEV.: 664.84
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/28/2016 11:21:00 AM
END DATE/TIME: 9/28/2016 12:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	light brown to black fine SAND, trace organics, trace silt		1	SS		1.4 / 2	0.58-2': SAND, fine, poorly-graded; light brown to black; trace organics, trace silt, dry, very loose. (SP) SPTs (1-1-1-2)		Bentonite grout mix 0-15 ft-bgs
655.0	brown fine SAND, trace silt		2	SS		2 / 2	5-5.88': SAND, fine, poorly-graded; light brown to black; trace silt, moist, very loose. (SP) 5.88-7': SAND, fine, poorly graded; light brown to brown; trace silt, moist, very loose. (SP) COMPOSITE: (SP), F=31.4° SPTs (1-1-3-4)		
650.0	brown to gray fine to medium SAND, trace silt		3	SS		0.9 / 2	11.08-12': SAND, fine to medium, poorly-graded; brown to grey; trace to some silt, moist, compact. (SP) SPTs (4-5-10-10)		
645.0	brown to gray GRAVELLY SAND, trace silt		4	SS		0.8 / 2	16.25-17': GRAVELLY SAND, fine to coarse, predominately medium, poorly-graded; brown to grey; trace silt, moist, compact. (SP) SPTs (1-2-2-7)		Bentonite chips 15-17 ft-bgs Filter Pack #4 Sand 17-29 ft-bgs 2" PVC Screen slot 0.010 19-29 ft-bgs
640.0			5	SS		1.5 / 2	20.5-22': GRAVELLY SAND, fine to coarse, predominately medium, poorly-graded; brown to grey; trace silt, moist, compact. (SP) SPTs (1-3-6-11)		

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-34B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32
DEPTH TO BEDROCK: 29

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173126.747 E: 2976637.8425
GROUND SURFACE ELEV.: 661.65
TOP OF CASING ELEV.: 664.84
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/28/2016 11:21:00 AM
END DATE/TIME: 9/28/2016 12:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
635.0	brown to gray GRAVELLY SAND, trace silt		6	SS		1.1 / 2	25.92-27': GRAVELLY SAND, fine to coarse, predominately medium, poorly-graded; brown to grey; trace silt, moist, compact. (SP) 29': auger refusal in SHALE; dark grey to black. SPTs (4-5-11-13)		
	SHALE								
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

USCS Well-graded Sand (SW)

Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-35B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 24
DEPTH TO BEDROCK: 24

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172046.6383 E: 2976576.9707
GROUND SURFACE ELEV.: 661.78
TOP OF CASING ELEV.: 664.62
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/28/2016 8:57:00 AM
END DATE/TIME: 9/28/2016 9:55:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown to black, fine SAND, trace organics, trace silt		1	SS		1.6 / 2	0.33-1.92': SAND, fine, poorly-graded; dark brown to black; trace organics, trace silt, moist, very loose. (SP) SPTs (1-1-1-2)		Bentonite grout mix 0-10 ft-bgs
660.0									
	light brown to brown fine to medium SAND, trace silt		2	SS		2 / 2	5-5.67': SAND, fine, poorly-graded; dark brown to black; trace organics, trace silt, moist, very loose. (SP) 5.67-7': SAND, fine, poorly-graded; light brown to brown; trace silt, wet, very loose. (SP) SPTs (1-1-2-4)		
655.0									
			3	SS		1.5 / 2	10-11.42': SAND, fine to medium, poorly-graded; light brown to grey; trace silt, wet, loose. (SP) 11.42-11.5': GRAVEL, well-rounded, poorly-sorted; light brown to grey; trace silt, wet, loose. (GP) SPTs (2-3-5-5)		Bentonite chips 10-12 ft-bgs
650.0	light brown to grey, fine to medium SAND, some gravel, trace silt								Filter Pack #4 Sand 12-24 ft-bgs
			4	SS		1.5 / 2	15.5-16.17': SAND, medium, poorly-graded; light brown to grey; trace silt, wet, compact. (SP) 16.17-17': SAND, medium, poorly-graded; grey; trace gravel, trace to some silt, wet, compact. (SP) SPTs (2-6-11-16)		2" PVC Screen slot 0.010 14-24 ft-bgs
645.0	grey medium SAND, trace gravel, trace silt								
			5	SS		1.5 / 2	20-20.83': SAND, fine to medium, predominately medium, poorly-graded; grey; trace coarse sand, trace silt, wet, compact. (SW) 20.83-21.5': SAND, medium, poorly-graded; light brown to grey; trace silt, wet, loose. (SW) 24': auger refusal in SHALE; dark grey to black. SPTs (3-4-9-16)		
640.0	light brown to grey medium SAND, trace silt								
	SHALE								

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

BOREHOLE LOG: GAMW-35B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 24
DEPTH TO BEDROCK: 24

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2172046.6383 E: 2976576.9707
GROUND SURFACE ELEV.: 661.78
TOP OF CASING ELEV.: 664.62
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/28/2016 8:57:00 AM
END DATE/TIME: 9/28/2016 9:55:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	SAMPLE INFORMATION: Type	SAMPLE INFORMATION: PID (ppm)	SAMPLE INFORMATION: Soil Rec./Att. Or Core Rec. %	SAMPLE INFORMATION: Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	SHALE								
635.0									
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-36

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 16
DEPTH TO BEDROCK: 34.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174145.142 E: 2977866.7207
GROUND SURFACE ELEV.: 662.24
TOP OF CASING ELEV.: 665
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/29/2016 10:54:00 AM
END DATE/TIME: 9/29/2016 11:21:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light brown to black fine SAND, trace organics, trace silt		1	SS		2 / 2	0-2': SAND, trace organics, fine, poorly-graded; light brown to black; trace silt, moist, very loose. (SP) SPTs (1-1-1-2)		Bentonite grout mix 0-2 ft-bgs
660.0									Bentonite chips 2-4 ft-bgs
			2	SS		1.9 / 2	5.08-6.08': SAND, medium, poorly-graded; light brown to black; trace organics, trace silt, moist, very loose. (SP) 6.08-7': SAND, fine, poorly-graded; light brown to brown; trace silt, wet, very loose. (SP) COMPOSITE: (SP), F=31.4° SPTs (2-1-1-1)		Filter Pack #4 Sand 4-16 ft-bgs
	light brown to brown, fine to medium SAND, trace silt								2" PVC Screen slot 0.010 6-16 ft-bgs
655.0									
			3	SS		1.9 / 2	10.08-12': SAND, fine to medium, poorly-graded; light brown to brown; trace to some silt, wet, loose. (SP) SPTs (3-5-5-6)		
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-36B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34.5
DEPTH TO BEDROCK: 34.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174142.5054 E: 2977866.949
GROUND SURFACE ELEV.: 662.35
TOP OF CASING ELEV.: 665.07
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/29/2016 9:14:00 AM
END DATE/TIME: 9/29/2016 10:18:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light brown to black fine SAND, trace organics, trace silt		1	SS		2 / 2	0-2': SAND, trace organics, fine, poorly-graded; light brown to black; trace silt, moist, very loose. (SP) SPTs (1-1-1-2)		Bentonite grout mix 0-20.5 ft-bgs
660.0			2	SS		1.9 / 2	5.08-6.08': SAND, fine, poorly-graded; light brown to black; trace organics, trace silt, moist, very loose. (SP) 6.08-7': SAND, fine, poorly-graded; light brown to brown; trace silt, wet, very loose. (SP) COMPOSITE: (SP), F=31.4° SPTs (2-1-1-1)		
	light brown to brown fine to medium SAND, trace silt								
655.0			3	SS		1.9 / 2	10.08-12': SAND, fine to medium, poorly-graded; light brown to brown; trace to some silt, wet, loose. (SP) SPTs (3-5-5-6)		
650.0			4	SS		1.5 / 2	15.5-17': SAND, fine to medium, well-graded; brown to grey; trace gravel, trace silt, wet, compact. (SW) SPTs (2-4-8-9)		
	brown to grey fine to medium SAND, trace gravel, trace silt								
645.0			5	SS		1.2 / 2	20.83-21.42': GRAVELLY SAND, well-rounded, fine to coarse, predominately medium to coarse, poorly-sorted; grey; trace silt, wet, compact. (SW) 21.42-22': SAND, some gravel, fine to medium, well-graded; brown to grey; trace silt, wet, compact. (SW) SPTs (2-4-9-11)		Bentonite chips 20.5-22.5 ft-bgs
	grey GRAVELLY SAND, trace silt								
	brown to grey fine to medium SAND, trace gravel, trace silt								
640.0									Filter Pack #4 Sand 22.5-34.5 ft-bgs
									2" PVC Screen slot

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)
USCS Well-graded Gravel (GW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-36B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34.5
DEPTH TO BEDROCK: 34.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174142.5054 E: 2977866.949
GROUND SURFACE ELEV.: 662.35
TOP OF CASING ELEV.: 665.07
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/29/2016 9:14:00 AM
END DATE/TIME: 9/29/2016 10:18:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to grey fine to medium SAND, trace gravel, trace silt		6	SS		1.1 / 2	25.92-27': SAND, some gravel, medium to coarse, well-graded; brown to grey; trace silt, wet, loose. (SW) SPTs (4-3-4-11)		0.010 24.5-34.5 ft-bgs
635.0									
	light brown to brown fine to medium SAND, trace silt		7	SS		1.4 / 2	30.58-31.25': SAND, fine, poorly-graded; light brown to brown; trace silt, wet, compact. (SP) 31.25-31.46': GRAVEL, well-rounded, poorly-sorted; grey; trace silt, wet, compact. (SP) 31.46-32': SAND, fine, poorly-graded; light brown to brown; trace to some medium to coarse sand and fine gravel, trace silt, wet, compact. (SP) 34.5': auger refusal in SHALE; dark grey to black. SPTs (1-3-16-24)		
	grey GRAVEL, trace silt								
630.0	light brown to brown fine SAND, trace gravel, trace silt								
	SHALE								
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)
Shale
USCS Well-graded Sand (SW)
USCS Well-graded Gravel (GW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-37B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 25
DEPTH TO BEDROCK: 25

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173307.5408 E: 2977852.5437
GROUND SURFACE ELEV.: 662.68
TOP OF CASING ELEV.: 665.32
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/28/2016 3:59:00 PM
END DATE/TIME: 9/28/2016 4:44:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light brown to black fine SAND, trace organics, trace silt		1	SS		1.8 / 2	0-1.75': SAND, fine, poorly-graded; light brown to black; trace organics, trace silt, dry, very loose. (SP) SPTs (1-1-1-1)		Bentonite grout mix 0-11 ft-bgs
660.0			2	SS		1.9 / 2	5-6.08': SILTY SAND, fine, poorly-graded; light brown to black; trace organics, trace silt, moist, very loose. (SM) 6.08-7': SAND, fine, poorly-graded; light brown to brown; trace silt, wet, very loose. (SP) COMPOSITE: (SP), F=31.4° SPTs (1-1-1-1)		
	light brown to brown fine SAND, trace silt								
655.0			3	SS		2 / 2	10-12': SAND, fine, poorly-graded; tan to brown; trace silt, wet, loose. (SP) SPTs (1-2-5-7)		Bentonite chips 11-13 ft-bgs
650.0									Filter Pack #4 Sand 13-25 ft-bgs
	brown to gray fine to medium SAND, trace gravel, trace silt		4	SS		1.3 / 2	15.67-17': SAND, fine to medium, well-graded; brown to grey; trace gravel, trace silt, wet, compact. (SW) SPTs (2-7-11-15)		2" PVC Screen slot 0.010 15-25 ft-bgs
645.0			5	SS		1.7 / 2	20.33-20.83': SAND, fine to medium, well-graded; brown to grey; trace gravel, trace silt, wet, compact. (SW) 25': auger refusal in SHALE; dark grey to black. SPTs (2-7-12-11)		
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

BOREHOLE LOG: GAMW-37B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 25
DEPTH TO BEDROCK: 25

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173307.5408 E: 2977852.5437
GROUND SURFACE ELEV.: 662.68
TOP OF CASING ELEV.: 665.32
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 9/28/2016 3:59:00 PM
END DATE/TIME: 9/28/2016 4:44:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
635.0	SHALE								
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: HV
CHECKED BY: JMR
DATE: 3/22/17

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-38

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 15
DEPTH TO BEDROCK: 29.5

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173106.902 E: 2974209.725
GROUND SURFACE ELEV.: 660.93
TOP OF CASING ELEV.: 663.27
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 4/3/2018 2:25:00 PM
END DATE/TIME: 4/4/2018 8:55:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	dark brown fine SAND, some organics, some silt		1	SS		1 / 2	0-1': SAND, fine, poorly-graded; dark brown; some organics, some silt, moist, very loose. (SP) SPTs (1-2-1-2)		Bentonite Chips 0-3 ft-bgs
	light brown fine to medium SAND, trace gravel		2	SS		1.25 / 2	2-2.25': SAND, fine, poorly-graded, dark brown; some organics, some silt, moist, loose. (SP) 2.25-3.25': SAND, fine, poorly-graded, light brown; trace rounded gravel <1 inch, rounded gravel >1 inch at 3.25', wet, loose. (SP) SPTs (2-3-4-5)		#5 Sand Filter Pack 3-15 ft-bgs
			3	SS		1.58 / 2	4-5.58': SAND, fine to medium, well-graded, light brown; trace rounded gravel <1 cm, 1/2 inch thick red staining at 5', wet, loose. (SW) SPTs (3-3-3-4)		2" PVC Screen slot 0.010 5-15 ft-bgs
655.0	light brown SILT, trace fine sand gray fine to medium SAND, trace gravel, trace silt		4	SS		0.83 / 2	6-6.33': SILT, light brown; trace fine sand, wet, very loose. (ML) 6.33-6.83': SAND, fine to medium, poorly-graded, gray; trace rounded gravel <1/2 inch, trace rounded gravel >1/2 inch, trace silt, wet, very loose. (SP). SPTs (1-1-2-3)		
	light brown fine to medium SAND, trace silt light brown fine SILT and SAND gray fine to coarse SAND, trace rounded gravel, trace silt		5	SS		2 / 2	8-8.5': SAND, fine to medium, well-graded, light brown; trace silt, wet loose. (SW) 8.5-9': SILT and SAND, fine, poorly-graded, light brown; wet, loose. (ML) 9-10': SAND, fine to coarse, well-graded, gray; trace rounded gravel <1 cm, trace silt, wet, lo		
650.0			6	SS		1.83 / 2			
			7	SS		2 / 2	10-11.83': SAND, fine to coarse, well-graded, gray; trace rounded gravel <1 cm, trace silt, wet, loose. (SW) SPTs (3-5-7-7)		
	gray fine to coarse SAND and rounded GRAVEL, trace silt		8	SS		0.75 / 2	12-14': SAND, fine to coarse, well-graded, gray; trace rounded gravel <1 cm, trace silt, with brown sand and silt lenses 1/2 inch thick at 12.67' and 13', wet, loose. (SW) SPTs (3-5-7-12)		
645.0							14-14.75': SAND and GRAVEL, fine to coarse sand, rounded gravel <1 cm, well-graded, gray: trace silt, wet, loose. (SW) SPTs (2-3-3-5)		
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)
USCS Well-graded Gravelly Sand (SWG)
USCS Silt (ML)
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Craig Neilson
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-38B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 29.5
DEPTH TO BEDROCK: 29.33

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173104.461 E: 2974206.659
GROUND SURFACE ELEV.: 660.81
TOP OF CASING ELEV.: 663.29
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 4/3/2018 11:30:00 AM
END DATE/TIME: 4/3/2018 1:00:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	dark brown fine SAND, some organics, some silt		1	SS		1 / 2	0-1': SAND, fine, poorly-graded; dark brown; some organics, some silt, moist, very loose. (SP) SPTs (1-2-1-2)		CETCO grout 0-15.5 ft-bgs
	light brown fine to medium SAND, trace gravel		2	SS		1.25 / 2	2-2.25': SAND, fine, poorly-graded, dark brown; some organics, some silt, moist, loose. (SP) 2.25-3.25': SAND, fine, poorly-graded, light brown; trace rounded gravel <1 inch, rounded gravel >1 inch at 3.25', wet, loose. (SP) SPTs (2-3-4-5)		
			3	SS		1.58 / 2	4-5.58': SAND, fine to medium, well-graded, light brown; trace rounded gravel <1 cm, 1/2 inch thick red staining at 5', wet, loose. (SW) SPTs (3-3-3-4)		
655.0	light brown SILT, trace fine sand gray fine to medium SAND, trace gravel, trace silt		4	SS		0.83 / 2	6-6.33': SILT, light brown; trace fine sand, wet, very loose. (ML) 6.33-6.83': SAND, fine to medium, poorly-graded, gray; trace rounded gravel <1/2 inch, trace rounded gravel >1/2 inch, trace silt, wet, very loose. (SP). SPTs (1-1-2-3)		
	light brown fine to medium SAND, trace silt light brown fine SILT and SAND gray fine to coarse SAND, trace rounded gravel, trace silt		5	SS		2 / 2	8-8.5': SAND, fine to medium, well-graded, light brown; trace silt, wet loose. (SW) 8.5-9': SILT and SAND, fine, poorly-graded, light brown; wet, loose. (ML) 9-10': SAND, fine to coarse, well-graded, gray; trace rounded gravel <1 cm, trace silt, wet, loose. (SW) SPTs (1-2-4-5)		
650.0			6	SS		1.83 / 2			
			7	SS		2 / 2			
	gray fine to coarse SAND and rounded GRAVEL, trace silt		8	SS		0.75 / 2	10-11.83': SAND, fine to coarse, well-graded, gray; trace rounded gravel <1 cm, trace silt, wet, loose. (SW) SPTs (3-5-7-7)		
645.0	gray medium to coarse SAND, trace fine sand, trace rounded gravel		9	SS		1.083 / 2	12-14': SAND, fine to coarse, well-graded, gray; trace rounded gravel <1 cm, trace silt, with brown sand and silt lenses 1/2 inch thick at 12.67' and 13', wet, loose. (SW) SPTs (3-5-7-12)		Bentonite Chips 15.5-18 ft-bgs
			10	SS		1 / 2	14-14.75': SAND and GRAVEL, fine to coarse sand, rounded gravel <1 cm, well-graded, gray: trace silt, wet, loose. (SW) SPTs (2-3-3-5)		#5 Sand Filter Pack 18-29.5 ft-bgs
640.0	gray to brown fine to medium SAND, trace rounded gravel, trace silt		11	SS		1 / 2	16-17.083': SAND, medium to coarse, well-graded, gray: some fine sand, trace rounded <1 cm gravel, wet, compact. (SW) SPTs (5-4-7-9)		2" PVC Screen slot 0.010 19.5-29.5 ft-bgs
			12	SS		0.83 / 2	18-19': SAND, medium to coarse, well-graded, gray: some fine sand, trace rounded <1 cm gravel, wet, compact. (SW) SPTs (3-4-8-11)		
			13	SS		1.25 / 2	20-21': SAND, fine to medium, well-graded, gray to brown: trace rounded <1 cm gravel, trace silt, wet, compact. (SW) SPTs (3-4-8-10)		

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)
USCS Well-graded Gravelly Sand (SWG)
USCS Silt (ML)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Craig Neilson
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-38B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 29.5
DEPTH TO BEDROCK: 29.33

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173104.461 E: 2974206.659
GROUND SURFACE ELEV.: 660.81
TOP OF CASING ELEV.: 663.29
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 4/3/2018 11:30:00 AM
END DATE/TIME: 4/3/2018 1:00:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
635.0	gray to brown fine to medium SAND, trace rounded gravel, trace silt		13	SS		1.25 / 2	22-22.83': SAND, fine to medium, well-graded, gray to brown: trace rounded <1 cm gravel, trace silt, wet, compact. (SW) SPTs (5-6-9-14)		
			14	SS		0.83 / 2	24-25.25': SAND, fine to medium, well-graded, gray to brown: trace rounded <1 cm gravel, trace silt, wet, loose. (SW) SPTs (1-2-7-14)		
			15	SS		1.42 / 1.5	26-26.83': SAND, fine to medium, well-graded, gray to brown: trace rounded gravel, trace silt, wet, compact. (SW) SPTs (5-11-16-21)		
	brown to gray SHALE						28-29.33': SAND, fine to medium, well-graded, gray to brown: trace rounded gravel, trace silt, wet, compact. (SW) 29.33-29.42': SHALE, brown to gray, wet, cohesive SPTs (7-11-50/6)		
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)
USCS Well-graded Gravelly Sand (SWG)
USCS Silt (ML)
Shale
USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Craig Neilson
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-39

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 15
DEPTH TO BEDROCK: 29

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173099.95 E: 2974491.988
GROUND SURFACE ELEV.: 661.04
TOP OF CASING ELEV.: 663.51
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 4/4/2018 12:30:00 PM
END DATE/TIME: 4/4/2018 1:15:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	dark brown SILT and fine SAND, trace organics		1	SS		1.83 / 2	2-3.33': SILT and SAND, fine, well-graded, dark brown, trace organics, very loose, moist. (ML) 3.33-3.83': SAND, fine to medium, well-graded, light brown, trace rounded <1 cm gravel, very loose, wet. (SW) SPTs (1-1-1-1)		Bentonite Chips 0-3 ft-bgs
	light brown fine to medium SAND, trace rounded gravel								#5 Sand Filter Pack 3-15 ft-bgs
	light brown SILT and SAND		2	SS		1.83 / 2	5-5.83': SILT and SAND, fine, poorly-graded, brown, wet, loose. (ML) 5.83-6.83': SAND, fine, poorly-graded, light brown, some silt, wet, loose. (SP) SPTs (2-3-4-5)		2" PVC Screen slot 0.010 5-15 ft-bgs
655.0	light brown fine SAND, some silt								
	light brown fine SILT and SAND								
	gray fine to coarse SAND, little rounded gravel, trace silt								
	dark brown SILT and fine SAND								
650.0	gray fine to coarse SAND, some rounded gravel		3	SS		1.58 / 2	10-10.25': SILT and SAND, fine, poorly-graded, dark brown, wet, very loose. (ML) 10.25-11.58': SAND, medium to coarse, well-graded, gray, some rounded <1/2 inch gravel, trace rounded <1 cm gravel, wet, very loose. (SW) SPTs (1-2-2-2)		
645.0									
640.0									

LITHOLOGY LEGEND

USCS Silt (ML)

USCS Well-graded Sand (SW)

USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Craig Neilson
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-39B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 29.92
DEPTH TO BEDROCK: 29

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173103.206 E: 2974490.702
GROUND SURFACE ELEV.: 660.96
TOP OF CASING ELEV.: 663.47
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 4/4/2018 9:30:00 AM
END DATE/TIME: 4/4/2018 11:20:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	dark brown SILT and fine SAND, trace organics		1	SS		1.83 / 2	2-3.33': SILT and SAND, fine, well-graded, dark brown, trace organics, very loose, moist. (ML) 3.33-3.83': SAND, fine to medium, well-graded, light brown, trace rounded <1 cm gravel, very loose, wet. (SW) SPTs (1-1-1-1)		CETCO Grout 0-15 ft-bgs
	light brown fine to medium SAND, trace rounded gravel								
	light brown SILT and SAND		2	SS		1.83 / 2	5-5.83': SILT and SAND, fine, poorly-graded, brown, wet, loose. (ML) 5.83-6.83': SAND, fine, poorly-graded, light brown, some silt, wet, loose. (SP) SPTs (2-3-4-5)		
655.0	light brown fine SAND, some silt								
	light brown fine SILT and SAND		3	SS		1.58 / 2	10-10.25': SILT and SAND, fine, poorly-graded, dark brown, wet, very loose. (ML) 10.25-11.58': SAND, medium to coarse, well-graded, gray, some rounded <1/2 inch gravel, trace rounded <1 cm gravel, wet, very loose. (SW) SPTs (1-2-2-2)		
	gray fine to coarse SAND, little rounded gravel, trace silt								
	dark brown SILT and fine SAND								
650.0	gray fine to coarse SAND, some rounded gravel								
			4	SS		0.67 / 2	15-15.67': SAND, medium to coarse, well-graded, gray, some rounded <1 cm gravel, wet, loose. (SW) SPTs (3-4-5-7)		Bentonite Chips 15-17 ft-bgs
645.0									#5 Sand Filter Pack 17-29.75 ft-bgs
			5	SS		1 / 2	20-21': SAND, fine to coarse, well-graded, gray, some rounded <1 cm gravel, wet, compact. (SW) SPTs (3-5-6-9)		2" PVC Screen slot 0.010 19.75-29.75 ft-bgs
640.0									

LITHOLOGY LEGEND

USCS Silt (ML)
Shale
USCS Well-graded Sand (SW)
USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Craig Neilson
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-39B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 29.92
DEPTH TO BEDROCK: 29

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173103.206 E: 2974490.702
GROUND SURFACE ELEV.: 660.96
TOP OF CASING ELEV.: 663.47
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 4/4/2018 9:30:00 AM
END DATE/TIME: 4/4/2018 11:20:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
635.0	gray fine to coarse SAND, some rounded gravel		6	SS		1 / 2	20-21': SAND, fine to coarse, well-graded, gray, some rounded <1 cm gravel, wet, compact. (SW) SPTs (4-8-10-14)		
	gray SHALE		7	SS		0.92 / 0.92	29-29.92': SHALE, gray, clayey. SPTs (11-50/5)		
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Silt (ML)
Shale
USCS Well-graded Sand (SW)
USCS Poorly-graded Sand (SP)

DRILLING COMPANY: Earth Exploration
DRILLER: Craig Neilson
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

BOREHOLE LOG: GAMW-40

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 17
DEPTH TO BEDROCK: 30.25

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173336.206 E: 2974705.878
GROUND SURFACE ELEV.: 664.11
TOP OF CASING ELEV.: 666.54
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 4/5/2018 8:05:00 AM
END DATE/TIME: 4/5/2018 8:55:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown fine SAND and SILT, some organics		1	SS		1.5 / 2	0-1.5': SAND and SILT, fine, poorly-graded, dark brown, some organics, moist, very loose. (SP) SPTs (1-1-1-2)		Bentonite Chips 0-5 ft-bgs
660.0			2	SS		2 / 2	5-5.5': SILT, dark brown, some fine sand, trace organics, trace rounded <1 cm gravel, moist, loose. (ML) 5.5-6.08': SAND and SILT, fine, poorly-graded, brown, moist, loose. (SP) 6.08-7': SAND, fine to medium, well-graded, light brown, trace rounded <1 c		#5 Sand Filter Pack 5-17 ft-bgs
	light brown fine to medium SAND, trace rounded gravel								2" PVC Screen slot 0.010 7-17 ft-bgs
655.0			3	SS		1.5 / 2	10-10.83': SAND, fine to coarse, well-graded, brown to gray, trace rounded <1 cm gravel, wet, loose. (SW) 10.83-11.08': SAND and SILT, fine, poorly-graded, dark brown. (SP) 11.08-11.5': SAND, fine to coarse, well-graded, brown to gray, trace rounded <1		
	brown to gray fine to coarse SAND, trace rounded gravel								
650.0			4	SS		0.42 / 2	15-15.42': SAND, fine to coarse, well-graded, brown to gray, trace rounded <1 cm gravel, wet, very loose. (SW) SPTs (1-1-2-3)		
645.0									
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Craig Neilson
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

BOREHOLE LOG: GAMW-40B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 31.5
DEPTH TO BEDROCK: 30.25

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173336.053 E: 2974709.344
GROUND SURFACE ELEV.: 664.05
TOP OF CASING ELEV.: 666.38
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 4/4/2018 3:50:00 PM
END DATE/TIME: 4/4/2018 4:50:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	dark brown fine SAND and SILT, some organics		1	SS		1.5 / 2	0-1.5': SAND and SILT, fine, poorly-graded, dark brown, some organics, moist, very loose. (SP) SPTs (1-1-1-2)		Cetgo Grout 0-17.5 ft bgs
660.0			2	SS		2 / 2	5-5.5': SILT, dark brown, some fine sand, trace organics, trace rounded <1 cm gravel, moist, loose. (ML) 5.5-6.08': SAND and SILT, fine, poorly-graded, brown, moist, loose. (SP) 6.08-7': SAND, fine to medium, well-graded, light brown, trace rounded <1 cm gravel, wet, loose. (SW) SPTs (2-5-4-5)		
	light brown fine to medium SAND, trace rounded gravel								
655.0			3	SS		1.5 / 2	10-10.83': SAND, fine to coarse, well-graded, brown to gray, trace rounded <1 cm gravel, wet, loose. (SW) 10.83-11.08': SAND and SILT, fine, poorly-graded, dark brown. (SP) 11.08-11.5': SAND, fine to coarse, well-graded, brown to gray, trace rounded <1 cm gravel, wet, loose. (SW) SPTs (1-2-3-5)		
	brown to gray fine to coarse SAND, trace rounded gravel								
650.0			4	SS		0.42 / 2	15-15.42': SAND, fine to coarse, well-graded, brown to gray, trace rounded <1 cm gravel, wet, very loose. (SW) SPTs (1-1-2-3)		
									Bentonite Chips 17.5-19.5 ft bgs
645.0									#5 Sand Filter Pack 19.5-31.5 ft bgs
	light gray fine to coarse SAND, some rounded gravel		5	SS		1.17 / 2	20-21.17': SAND, fine to medium, well-graded, light brown, trace rounded <1 cm gravel, some silt, wet, compact. (SW) SPTs (5-9-18-21)		2" PVC Screen slot 0.010 21.5-31.5 ft-bgs
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Craig Neilson
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-40B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 31.5
DEPTH TO BEDROCK: 30.25

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173336.053 E: 2974709.344
GROUND SURFACE ELEV.: 664.05
TOP OF CASING ELEV.: 666.38
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 4/4/2018 3:50:00 PM
END DATE/TIME: 4/4/2018 4:50:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light gray fine to coarse SAND, some rounded gravel		6	SS		1.08 / 2	25-26.08': SAND, fine to coarse, well-graded, gray, some rounded <1 cm gravel, wet, compact. (SW) SPTs (5-9-14-15)		
635.0	gray clayey SHALE		7	SS		1 / 2	30-30.25': SAND, fine to coarse, well-graded, gray, some rounded <1 cm gravel, wet, compact. (SW) 30.25-31': SHALE, gray, clayey SPTs (5-10-15-16)		
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Craig Neilson
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-41

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 15
DEPTH TO BEDROCK: 27

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173334.044 E: 2975014.682
GROUND SURFACE ELEV.: 660.09
TOP OF CASING ELEV.: 662.41
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/17/2018 2:10:00 PM
END DATE/TIME: 5/17/2018 2:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	fine dark brown SAND, some silt		1			2 / 2	0-0.33': SAND, fine, poorly-graded, dark brown, some silt, some sandstone gravel, moist, compact. (SP) 0.33-1.75': SAND, fine, poorly-graded, dark brown, some silt, moist, compact. (SP) 1.75-2': SAND, fine to medium, well-graded, light brown, moist comp		Bentonite Chips 0-3 ft-bgs
	fine to medium light brown SAND								#5 Sand Filter Pack 3-15 ft-bgs
655.0			2			1.17 / 2	5-6.17': SAND, fine to medium, well-graded, light brown, wet, loose. (SW) SPTs (3-4-4-5)		2" PVC Screen slot 0.010 5-15 ft-bgs
650.0	fine to coarse light gray SAND		3			2 / 2	10-12': SAND, fine to coarse, well-graded, light gray, wet, compact. (SW) SPTs (3-5-7-9)		
645.0									
640.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-41B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 27.83
DEPTH TO BEDROCK: 27

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173337.097 E: 2975019.417
GROUND SURFACE ELEV.: 660.08
TOP OF CASING ELEV.: 662.15
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/17/2018 11:55:00 AM
END DATE/TIME: 5/17/2018 12:45:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	fine dark brown SAND, some silt		1			2 / 2	0-0.33': SAND, fine, poorly-graded, dark brown, some silt, some sandstone gravel, moist, compact. (SP) 0.33-1.75': SAND, fine, poorly-graded, dark brown, some silt, moist, compact. (SP) 1.75-2': SAND, fine to medium, well-graded, light brown, moist compact. (SW) SPTs (4-6-6-8)		Cetgo Grout 0-13 ft bgs
	fine to medium light brown SAND								
655.0			2			1.17 / 2	5-6.17': SAND, fine to medium, well-graded, light brown, wet, loose. (SW) SPTs (3-4-4-5)		
650.0	fine to coarse light gray SAND		3			2 / 2	10-12': SAND, fine to coarse, well-graded, light gray, wet, compact. (SW) SPTs (3-5-7-9)		Bentonite Chips 13-15 ft bgs
645.0			4			0.58 / 2	15-15.58': SAND, fine to coarse, well-graded, light gray, wet, loose. (SW) SPTs (3-3-4-5)		#5 Sand Filter Pack 15-27 ft bgs 2" PVC Screen slot 0.010 17-27 ft-bgs
640.0	fine to coarse light gray SAND, trace to some rounded gravel		5			1.33 / 2	20-21.33': SAND, fine to coarse, well-graded, light gray, trace rounded <1 inch gravel, wet, compact. (SW) SPTs (5-8-12-15)		

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-41B

PROJECT: NIPSCO Schahfer
PROJECT NO.: 164-8171
HOLE DEPTH: 27.83
DEPTH TO BEDROCK: 27

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2173337.097 E: 2975019.417
GROUND SURFACE ELEV.: 660.08
TOP OF CASING ELEV.: 662.15
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: Hollow-stem auger
CORING METHOD:
DRILL RIG: CME 55
START DATE/TIME: 5/17/2018 11:55:00 AM
END DATE/TIME: 5/17/2018 12:45:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
635.0	fine to coarse light gray SAND, trace to some rounded gravel		6			1.42 / 2	25-26.42': SAND, fine to coarse, well-graded, light gray, some rounded <1.5 inch gravel, wet, compact. (SW) SPTs (5-8-12-13)		
	light gray clayey SHALE		7			0.83 / 1.17	27-27.83': SHALE, clayey, light gray SPTs (5-15-50/2)		
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Poorly-graded Sand (SP) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Earth Exploration
DRILLER: Jeff Silcox
DRILL RIG: CME 55

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/13/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS.GPJ GOLDER NH 2011.GDT 1/16/19

BOREHOLE LOG: GAMW-48

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 30

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2178605.716 E: 2975279.248
GROUND SURFACE ELEV.: 660.81
TOP OF CASING ELEV.: 663.36
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 8/1/2018 3:20:00 PM
END DATE/TIME: 8/1/2018 3:40:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	dark brown fine SILTY SAND, some organics			RS			0-0.3': SILTY SAND, fine, poorly-graded, dark brown, some organics, moist. (SM)		Bentonite Chips 0-4 ft bgs
	light brown to brown fine to coarse SAND			RS			0.3-2.7': SAND, fine to medium, well-graded, light brown to brown, some coarse sand, wet. (SW)		
				RS			2.7-7': SAND, fine to medium, well-graded, light brown to brown, some coarse sand, wet. (SW)		#5 Sand Filter Pack 4-15 ft bgs 2" PVC Screen slot 0.010 5-15 ft bgs
655.0				RS			7-9.1': SAND, fine to medium, well-graded, light brown to brown, some coarse sand, wet. (SW)		
	light gray fine to coarse SAND, trace rounded gravel			RS			9.1-11.2': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		
650.0				RS			12-15.25': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		
645.0									
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-48B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 30

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2178606.458 E: 2975283.237
GROUND SURFACE ELEV.: 660.44
TOP OF CASING ELEV.: 663.31
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 8/1/2018 1:20:00 PM
END DATE/TIME: 8/1/2018 2:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
660.0	dark brown fine SILTY SAND, some organics			RS			0-0.3': SILTY SAND, fine, poorly-graded, dark brown, some organics, moist. (SM)		Bentonite Grout 0-16 ft bgs
	light brown to brown fine to coarse SAND			RS			0.3-2.7': SAND, fine to medium, well-graded, light brown to brown, some coarse sand, wet. (SW)		
				RS			2.7-7': SAND, fine to medium, well-graded, light brown to brown, some coarse sand, wet. (SW)		
655.0				RS			7-9.1': SAND, fine to medium, well-graded, light brown to brown, some coarse sand, wet. (SW)		
	light gray fine to coarse SAND, trace rounded gravel			RS			9.1-11.2': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		
650.0				RS			12-15.25': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		
645.0				RS			16-20.8': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		Bentonite Chips 16-18 ft bgs #5 Sand Filter Pack 18-30 ft bgs 2" PVC Screen slot 0.010 20-30 ft bgs
640.0				RS			21-25.5': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		

LITHOLOGY LEGEND

USCS Silty Sand (SM) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-48B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 36
DEPTH TO BEDROCK: 30

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2178606.458 E: 2975283.237
GROUND SURFACE ELEV.: 660.44
TOP OF CASING ELEV.: 663.31
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 8/1/2018 1:20:00 PM
END DATE/TIME: 8/1/2018 2:10:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
635.0	light gray fine to coarse SAND, trace rounded gravel			RS					
				RS			26-28.2': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		
				RS			29-30': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		
630.0	gray clayey SHALE			RS		6.5 / 6	30-36': CLAYEY SHALE, gray, very hard, with rounded gravel up to 3 in. at 30', wet.		#5 Sand 30-36 ft bgs
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM) | USCS Well-graded Sand (SW) | Shale

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-49

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 33

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2176111.214 E: 2976600.944
GROUND SURFACE ELEV.: 662.00
TOP OF CASING ELEV.: 664.62
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/31/2018 4:10:00 PM
END DATE/TIME: 7/31/2018 4:20:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to dark brown fine SILTY SAND, some organics			RS			0-1': SILTY SAND, fine, poorly-graded, brown, some organics, dry. (SM)		Bentonite Chips 0-4 ft bgs
				RS			1-2.4': SILTY SAND, fine, poorly-graded, brown, moist. (SM)		
660.0				RS			2.4-3.3': SILTY SAND, poorly-graded, dark brown, cohesive, moist. (SM)		
	light gray fine to medium SAND			RS			3.3-4.2': SAND, fine to medium, well-graded, light gray, wet. (SW)		#5 Sand Filter Pack 4-15 ft bgs 2" PVC Screen slot 0.010 5-15 ft bgs
655.0									
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-49B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34
DEPTH TO BEDROCK: 33

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2176115.757 E: 2976600.61
GROUND SURFACE ELEV.: 662.12
TOP OF CASING ELEV.: 664.50
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/31/2018 2:35:00 PM
END DATE/TIME: 7/31/2018 3:05:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to dark brown fine SILTY SAND, some organics			RS			0-1': SILTY SAND, fine, poorly-graded, brown, some organics, dry. (SM)		Bentonite Grout 0-19 ft bgs
				RS			1-2.4': SILTY SAND, fine, poorly-graded, brown, moist. (SM)		
660.0				RS			2.4-3.3': SILTY SAND, poorly-graded, dark brown, cohesive, moist. (SM)		
	light gray fine to medium SAND			RS			3.3-4.2': SAND, fine to medium, well-graded, light gray, wet. (SW)		
655.0									
650.0									
	light gray fine to coarse SAND, trace to some gravel			RS			16-16.7': SAND, fine to coarse, well-graded, light gray, trace rounded gravel <1 inch, wet. (SW)		
645.0							16.7-16.8': SILTY SAND, dark brown. (SM)		Bentonite Chips 19-21 ft bgs
							20-23.2': SAND, fine to coarse, well-graded, light gray, some rounded gravel <1 inch, wet. (SW)		
640.0				RS					#5 Sand Filter Pack 21-33 ft bgs
	light gray coarse SAND and rounded GRAVEL, some medium sand			RS			23.2-24.2': SAND and rounded GRAVEL <1 inch, coarse sand, poorly-graded, light gray, some medium sand, wet. (SP)		2" PVC Screen slot 0.010 23-33 ft bgs

LITHOLOGY LEGEND

USCS Silty Sand (SM)
USCS Poorly-graded Gravelly Sand (SPG)
USCS Well-graded Sand (SW)
USCS Well-graded Gravel (GW)
USCS Well-graded Gravelly Sand (SWG)
Shale

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-49B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 34
DEPTH TO BEDROCK: 33

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2176115.757 E: 2976600.61
GROUND SURFACE ELEV.: 662.12
TOP OF CASING ELEV.: 664.50
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 7/31/2018 2:35:00 PM
END DATE/TIME: 7/31/2018 3:05:00 PM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light gray fine to coarse SAND, trace to some gravel			RS			25-29.3': SAND, fine to coarse, well-graded, light gray, some rounded gravel <1 inch, wet. (SW)		
635.0				RS			30-32': SAND, fine to coarse, well-graded, light gray, some rounded gravel <1 inch, wet. (SW)		
630.0	light gray GRAVEL, some fine to coarse sand			RS			32-32.5': GRAVEL, rounded <4 inch, well-graded, light gray, some fine to coarse sand, wet. (GW)		
	gray SHALE			RS		0.4 / 1	33-34': SHALE, gray, wet, little weathering.		#5 Sand 33-34 ft bgs
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)
USCS Poorly-graded Gravelly Sand (SPG)
USCS Well-graded Sand (SW)
USCS Well-graded Gravel (GW)
USCS Well-graded Gravelly Sand (SWG)
Shale

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

BOREHOLE LOG: GAMW-50

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 15
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174957.138 E: 2977953.352
GROUND SURFACE ELEV.: 662.52
TOP OF CASING ELEV.: 665.15
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 8/1/2018 11:15:00 AM
END DATE/TIME: 8/1/2018 11:25:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to dark brown fine SILTY SAND, some organics			RS			0-1.25': SILTY SAND, fine, poorly-graded, brown, some organics, dry. (SM)		Bentonite Chips 0-4 ft bgs
				RS			1.25-2.75': SILTY SAND, fine, poorly-graded, dark brown, cohesive, moist. (SM)		
660.0	light gray fine to coarse SAND			RS			2.75-4.2': SAND, fine to coarse, well-graded, light gray, wet. (SW)		#5 Sand Filter Pack 4-15 ft bgs
	light gray fine to coarse SAND, some rounded gravel			RS			5-8': SAND, fine to coarse, well-graded, light gray, some rounded gravel up to 3 inches, wet. (SW)		2" PVC Screen slot 0.010 5-15 ft bgs
655.0									
650.0									
645.0									
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)

USCS Well-graded Sand (SW)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-50B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174961.01 E: 2977953.312
GROUND SURFACE ELEV.: 662.28
TOP OF CASING ELEV.: 664.88
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 8/1/2018 9:35:00 AM
END DATE/TIME: 8/1/2018 10:05:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	brown to dark brown fine SILTY SAND, some organics			RS			0-1.25': SILTY SAND, fine, poorly-graded, brown, some organics, dry. (SM)		Bentonite Grout 0-17 ft bgs
660.0				RS			1.25-2.75': SILTY SAND, fine, poorly-graded, dark brown, cohesive, moist. (SM)		
	light gray fine to coarse SAND			RS			2.75-4.2': SAND, fine to coarse, well-graded, light gray, wet. (SW)		
	light gray fine to coarse SAND, some rounded gravel			RS			5-8': SAND, fine to coarse, well-graded, light gray, some rounded gravel up to 3 inches, wet. (SW)		
655.0									
650.0									
				RS			15-19': SAND, fine to coarse, well-graded, light gray, some rounded gravel up to 3 inches, wet. (SW)		Bentonite Chips 17-19 ft bgs
645.0									#5 Sand Filter Pack 19-31 ft bgs
				RS			20-24.4': SAND, fine to coarse, well-graded, light gray, some rounded gravel up to 3 inches, wet. (SW)		2" PVC Screen slot 0.010 21-31 ft bgs
640.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)
Shale
USCS Well-graded Sand (SW)
USCS Well-graded Gravelly Sand (SWG)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

BOREHOLE LOG: GAMW-50B

PROJECT: NIPSCO LLC Schahfer
PROJECT NO.: 19127906
HOLE DEPTH: 32
DEPTH TO BEDROCK: 31

BOREHOLE LOCATION: Wheatfield, IN
COORDINATES: N: 2174961.01 E: 2977953.312
GROUND SURFACE ELEV.: 662.28
TOP OF CASING ELEV.: 664.88
DATUM: Indiana West Zone NAD 83

DRILLING METHOD: ROTOSONIC
CORING METHOD:
DRILL RIG: SDC500-28EA
START DATE/TIME: 8/1/2018 9:35:00 AM
END DATE/TIME: 8/1/2018 10:05:00 AM

Depth Elev.	LITHOLOGY DESCRIPTION	Graphical Log	SAMPLE INFORMATION: Sample No. Or Run No.	Type	PID (ppm)	Soil Rec./Att. Or Core Rec. %	Soil Sample Description Or Discontinuity Data (Depth, Dip, Angle From Core Axis, Type, and Surface Description)	Well Graphic	Well Construction Information
	light gray fine to coarse SAND, some rounded gravel								
635.0									
	light gray fine to coarse SAND and rounded GRAVEL			RS			30-30.75': SAND and rounded GRAVEL <1 inch, medium to coarse sand, well-graded, light gray, some fine sand, wet. (SW)		
	gray SHALE			RS		1.2 / 1	31-32': SHALE, gray, wet, little weathering.		#5 Sand 31-32 ft bgs
630.0									
625.0									
620.0									
615.0									

LITHOLOGY LEGEND

USCS Silty Sand (SM)
Shale
USCS Well-graded Sand (SW)
USCS Well-graded Gravelly Sand (SWG)

DRILLING COMPANY: Layne
DRILLER: K. Fehrman
DRILL RIG: SDC500-28EA

LOGGED BY: DFS
CHECKED BY: KMC
DATE: 11/14/18

Golder Associates

NIPSCO RMSGS 1648171 - NIPSCO CCR RMSGS - WITH NON-CCR WELLS - COPY.GPJ GOLDER NH 2011.GDT 11/25/20

LF I Landfill
Analytical Data 40
CFR Part §257.103(f)
(2)(v)(C)(3)

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Location		GAMW20																			
Sample Date		2016-07-12		2016-09-08	2016-11-08	2016-12-07	2017-01-10	2017-02-28	2017-03-28	2017-04-27		2017-06-26	2017-08-22	2017-10-04	2018-03-01	2018-09-05	2019-02-26		2019-10-09	2020-03-17
Sample Type		FD	N	N	N	N	N	N	N	FD	N	N	N	N	N	N	FD	N	N	N
Chemical Name	Unit																			
CCR Appendix III																				
Boron	mg/L	1.7	1.7	0.28	0.92	0.97	0.52	0.27	0.63	0.84	0.88	1.4	1.5 O	2.1	3.2	2.5	2.9		3.8	3.7
Calcium	mg/L	130	120	71	97	100	91	76	96	100	110	110	130 O	94	120	140	140		200	230
Chloride	mg/L	7.8	7.6	12	12	11	12	12	14	14	15	14	17 O	19	17	14	15		13	9.3
Fluoride	mg/L	0.18 J	0.18 J	0.27 J	0.36 J	0.36 J	0.31 J	0.24 J	0.24 J	0.17 J	0.19 J	0.23 J	0.18 JO	0.2 J	0.37 J	0.33 J	0.21		0.24	0.17
pH	SU		7.04	7.31	6.96	7.18	7.05	7.14	6.79		7.1	7.1	6.68	6.47	7.15	6.99		7.1	7.49	7.23
Sulfate	mg/L	300 J+	300 J+	44	190	180	94	69	140	170	170	220	310 O	270	420	380	470		670	669
Total Dissolved Solids	mg/L	760	740	290	570	600	420	370	480	550	560	630	750 O	780	970	910	1100		1200	1210
CCR Appendix IV																				
Antimony	mg/L	0.002 U	0.00058 J	0.002 U	0.002 U	0.002 U	0.002 U	0.0022	0.00036 J	0.002 U	0.002 U	0.002 U	0.0012 JO	0.002 U						
Arsenic	mg/L	0.017	0.018	0.016	0.01	0.011	0.01	0.0064	0.0076	0.0059	0.0062	0.0089	0.41 O	0.011						
Barium	mg/L	0.084	0.081	0.03 J-	0.041	0.036	0.03	0.022	0.032	0.036	0.037	0.04	0.25 O	0.068						
Beryllium	mg/L	0.0002 J	0.0012 O	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00036 J	0.001 U	0.00061 JO	0.001 U						
Cadmium	mg/L	0.001 U	0.00015 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00043 JO	0.001 U						
Chromium	mg/L	0.002 U	0.0015 J	0.002 U	0.002 U	0.00085 J	0.00053 J	0.0013 J	0.00043 J	0.002 U	0.002 U	0.0013 J	0.036 O	0.002 U						
Cobalt	mg/L	0.00056 J	0.00077 J	0.00034 J	0.00087 J	0.0018	0.0012	0.00097 J	0.00091 J	0.0012	0.0014	0.0019	0.0019 O	0.0007 J						
Fluoride	mg/L	0.18 J	0.18 J	0.27 J	0.36 J	0.36 J	0.31 J	0.24 J	0.24 J	0.17 J	0.19 J	0.23 J	0.18 JO	0.2 J	0.37 J	0.33 J	0.21		0.24	0.17
Lead	mg/L	0.00026 J	0.00041 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00027 J	0.001 U	0.0005 J	0.001 U	0.00099 JO	0.001 U						
Lithium	mg/L	0.004 J	0.0041 J	0.008 U	0.008 U	0.0011 J	0.0012 J	0.0014 J	0.008 U	0.0036 J	0.0037 J	0.04 U	0.0047 J+O	0.0043 J						
Mercury	mg/L	0.00017 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJO	0.0002 U						
Molybdenum	mg/L	0.12	0.12	0.13	0.1	0.25 U	0.074	0.1	0.073 J+	0.06	0.067	0.075	0.19 O	0.19						
Radium, Total	pCi/L	1.01	0.995	0.753	0.797 J+	0.575	0.376	0.416 U	0.358 U	0.3 U	0.259 U	0.8	2.75 O							
Selenium	mg/L	0.00029 J	0.0012 J	0.005 U	0.0038 J	0.01	0.0069	0.0047 J	0.005	0.002 J	0.0024 J	0.0019 J	0.1 O	0.0011 J						
Thallium	mg/L	0.001 U	0.00016 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00021 JO	0.001 U						
Field Parameters																				
DO	mg/L		0.31	0.25	0.32	0.23	0.19	0.17	0.24		0.22	0.17	0.04	0.45	2.3	0.31		0.59	0.1	0.09
ORP	millivolts		-99.7	-98.4	-57.3	50.6	-43.4	-76.2	-100.9		-97.9	-65	-56.1	-42.6	-91.3	-105.7		-34.6	47.1	-72.7
pH	SU		7.04	7.31	6.96	7.18	7.05	7.14	6.79		7.1	7.1	6.68	6.47	7.15	6.99		7.1	7.49	7.23
SC	uS/cm		914	496	892	884	647	574	702		768	988	1084	1119	1289	1210		1096	1314	1578
TEMP	deg C		16.48	20.97	19.24	12.1	14.22	12.52	11.89		11.94	14.93	17.52	17.69	10	17.2		9.57	17.4	10.2
TURB	NTU		4.9	3.14	4.91	4.69	4.78	4.64	3.14		4.83	4.88	4.87	4.12	9.94	3.18		3.69	7.48	6.39

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW21													
Sample Date		2016-07-12	2016-09-07	2016-11-08	2016-12-07		2017-01-10	2017-03-01	2017-03-28	2017-04-27	2017-06-26	2017-08-22	2017-10-04		2018-02-28
Sample Type		N	N	N	FD	N	N	N	N	N	N	N	FD	N	N
Chemical Name	Unit														
CCR Appendix III															
Boron	mg/L	1.2	1	0.86	1	1	1	0.95	1	0.86	1	0.88	1.1	1.1	1.2
Calcium	mg/L	53	48	49	50	45	51	54	56	61	49	66	48	48	91
Chloride	mg/L	2.9	2.7	2.4	2.3	2.3	2.4	2.6	2.8	4	2.5	3.6	2.1	2.1	3.5 J
Fluoride	mg/L	0.15 J	0.2 J	0.19 J	0.19 J	0.19 J	0.17 J	0.17 J	0.19 J	0.15 J	0.19 J	0.15 J	0.22 J	0.22 J	5 U
pH	SU	7.21	7.73	7.07		7.4	7.05	7.2	6.71	6.8	7.13	6.41		6.51	7.36
Sulfate	mg/L	93 J+	65	62	54	59	51	56	48	56	51	54	45	46	160
Total Dissolved Solids	mg/L	310	250	270	270	280	230	270	270	330	240	330	270	260	420
CCR Appendix IV															
Antimony	mg/L	0.00024 J	0.002 U	0.002 U	0.01 U	0.002 U	0.002 U	0.002 U	0.0014 J	0.002 U	0.002 U	0.002 U			
Arsenic	mg/L	0.0057	0.0074	0.0072	0.0065 J	0.0074	0.0072	0.0078	0.0085	0.0071	0.0075	0.011			
Barium	mg/L	0.048	0.044 J-	0.044	0.038	0.041	0.04	0.048	0.051	0.057	0.041	0.068			
Beryllium	mg/L	0.00071 J	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			
Cadmium	mg/L	7.1E-05 J	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			
Chromium	mg/L	0.0007 J	0.00068 J	0.002 U	0.012	0.00076 J	0.00079 J	0.002 U	0.001 J	0.00098 J	0.002 U	0.002 U			
Cobalt	mg/L	0.0011	0.0012	0.0017	0.005 U	0.001 U	0.00085 J	0.0024	0.003	0.0048	0.0029	0.005			
Fluoride	mg/L	0.15 J	0.2 J	0.19 J	0.19 J	0.19 J	0.17 J	0.17 J	0.19 J	0.15 J	0.19 J	0.15 J	0.22 J	0.22 J	5 U
Lead	mg/L	0.00032 J	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.00043 J	0.001 U	0.001 U	0.00045 J			
Lithium	mg/L	0.001 J	0.0013 J	0.008 U	0.00083 J	0.0009 J	0.00072 J	0.0005 J	0.008 U	0.008 U	0.04 U	0.008 U			
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ			
Molybdenum	mg/L	0.01 U	0.0063 J	0.0065 J	0.05 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0052 J	0.006 J	0.0054 J			
Radium, Total	pCi/L	0.412 U	0.4 U	0.513 J+	0.55	0.739	0.522 U	0.428	0.677 U	0.505	0.462	0.324 U			
Selenium	mg/L	0.00059 J	0.0007 J	0.005 U	0.025 U	0.005 U	0.00084 J	0.005 U	0.0012 J	0.005 U	0.005 U	0.00092 J			
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U			
Field Parameters															
DO	mg/L	0.2	0.25	0.31		0.29	0.21	0.35	0.19	0.83	0.81	0.48		0.08	1.9
ORP	millivolts	-73	729	-65.6		-79.3	-67.2	-77.6	-52.9	-28.2	-45.1	2.4		-19	-120
pH	SU	7.21	7.73	7.07		7.4	7.05	7.2	6.71	6.8	7.13	6.41		6.51	7.36
SC	uS/cm	356	408	436		406	388	463	435	479	452	516		413	684
TEMP	deg C	13.14	17.04	15.25		13.12	11.22	8.98	8.9	9.28	13.23	15.76		16.08	9.2
TURB	NTU	1.53	1.18	1.2		1.56	2.39	3.03	4.76	3.2	0.86	1.07		0.77	3.84

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW21B													
Sample Date		2016-07-12	2016-09-07	2016-11-08		2016-12-07	2017-01-10		2017-03-01	2017-03-28	2017-04-27	2017-06-26	2017-08-23	2017-10-04	2018-02-28
Sample Type		N	N	FD	N	N	FD	N	N	N	N	N	N	N	N
Chemical Name	Unit														
CCR Appendix III															
Boron	mg/L	3.2	3.6	5.2	5.3	5.4	5.1	5.1	4.1	3.5	2.9	3.4	3.8	4	3.7
Calcium	mg/L	120	120	130	130	130	150	150	140	140	130	150	140	150	140
Chloride	mg/L	28	36	34	35	33	33	33	29	35	30	37	41	40	26
Fluoride	mg/L	0.21 J	0.22 J	10 U	10 U	10 U	0.18 J	0.18 J	0.2 J	0.17 J	0.19 J	0.14 J	5 U	0.17 J	0.19 J
pH	SU	7.29	7.32		7.07	7.2		6.99	7.5	6.89	7.3	7.24	6.51	6.54	7.29
Sulfate	mg/L	610 J+	590	630	650	590	560	580	530	550	480	590	660	650 J-	570
Total Dissolved Solids	mg/L	1000	1100	1100	1200	1100	1100	1000	1000	1100	970	1100	1200	1300	1100
CCR Appendix IV															
Antimony	mg/L	0.00022 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		
Arsenic	mg/L	0.0026 J	0.0021 J	0.0018 J	0.0018 J	0.0019 J	0.0018 J	0.0017 J	0.005 U	0.0017 J	0.0019 J	0.0023 J	0.0019 J		
Barium	mg/L	0.079	0.083 J-	0.085	0.086	0.084	0.082	0.083	0.067	0.073	0.067	0.073	0.069		
Beryllium	mg/L	0.00051 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Cadmium	mg/L	0.00013 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Chromium	mg/L	0.002 U	0.00037 J	0.002 U	0.002 U	0.002 U	0.00034 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		
Cobalt	mg/L	0.00036 J	0.001 U	0.001 U	0.001 U	0.001 U	0.00013 J	0.001 U	0.001 U	0.00022 J	0.001 U	0.00022 J	0.001 U		
Fluoride	mg/L	0.21 J	0.22 J	10 U	10 U	10 U	0.18 J	0.18 J	0.2 J	0.17 J	0.19 J	0.14 J	5 U	0.17 J	0.19 J
Lead	mg/L	0.00082 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00029 J	0.001 U	0.001 U	0.001 U		
Lithium	mg/L	0.0027 J	0.0029 J	0.0018 J	0.0019 J	0.0048 J	0.004 J	0.004 J	0.0028 J	0.008 U	0.0022 J	0.04 U	0.0033 J+		
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		
Molybdenum	mg/L	0.7	0.84	1.2	1.3	1.1	1.1	1.1	0.75	0.59	0.53	0.62	0.6		
Radium, Total	pCi/L	0.947	1.34	2.07 J+	1.84 J+	1.52	2.6 J	1.72 J	0.884	0.824	0.797	0.842	1.3		
Selenium	mg/L	0.00067 J	0.00066 J	0.005 U	0.005 U	0.005 U	0.00062 J	0.00049 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Field Parameters															
DO	mg/L	1.89	0.43		0.27	0.23		0.43	0.24	0.29	0.26	0.23	0.45	0.17	2
ORP	millivolts	-80.4	-77.9		-82.7	-87.4		-88.2	-109.2	-95.4	-98.3	-86.5	77.3	-5.8	-122
pH	SU	7.29	7.32		7.07	7.2		6.99	7.5	6.89	7.3	7.24	6.51	6.54	7.29
SC	uS/cm	1099	1449		1496	1521		1479	1418	1280	1164	1588	1536	1634	1387
TEMP	deg C	11.89	14.25		13.01	12.25		12.11	11.07	11.08	10.81	11.95	12.76	13.49	11.5
TURB	NTU	4.21	3.05		1.07	1.16		1.24	3.96	2.9	4.53	3.97	3.21	1.59	4.33

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

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NTU = Nephelometric Turbidity Units

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"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW22											
Sample Date		2016-07-12	2016-09-07	2016-11-08	2016-12-07	2017-01-10	2017-03-01	2017-03-28	2017-04-28	2017-06-27	2017-08-23	2017-10-04	2018-02-28
Sample Type		N	N	N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit												
CCR Appendix III													
Boron	mg/L	0.95	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.6	1.6	1.7	2
Calcium	mg/L	98	99	97	120	140	110	130	120	120	130	110	120
Chloride	mg/L	2.7	2.9	3.9 J	4.1 J	4.2 J	3.6	4.1 J	4.2	4.2	4.6 J	4.8	4.7 J
Fluoride	mg/L	0.2 J	0.21 J	0.2 J	0.2 J	0.2 J	0.16 J	5 U	0.16 J	0.2 J	0.14 J	0.2 J	0.19 J
pH	SU	7.19	7.56	6.9	7.02	6.68	7.15	6.5	6.69	7.01	6.62	6.53	7.07
Sulfate	mg/L	100 J+	130	140	180	200	160	220	180	170	190	160	270
Total Dissolved Solids	mg/L	390	430	490	580	600	530	590	580	550	610	570	630
CCR Appendix IV													
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		
Arsenic	mg/L	0.0045 J	0.0041 J	0.0062	0.0032 J	0.0028 J	0.005 U	0.0018 J	0.0018 J	0.0019 J	0.0035 J		
Barium	mg/L	0.072	0.059 J-	0.079	0.081	0.078	0.063	0.08	0.076	0.065	0.099		
Beryllium	mg/L	0.0003 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		
Cobalt	mg/L	0.00059 J	0.0014	0.0011	0.0019	0.0025	0.0025	0.0025	0.0024	0.0018	0.0024		
Fluoride	mg/L	0.2 J	0.21 J	0.2 J	0.2 J	0.2 J	0.16 J	5 U	0.16 J	0.2 J	0.14 J	0.2 J	0.19 J
Lead	mg/L	0.00026 J	0.001 U	0.00017 J	0.001 U	0.001 U	0.001 U	0.00027 J	0.001 U	0.001 U	0.001 U		
Lithium	mg/L	0.0013 J	0.0013 J	0.008 U	0.00081 J	0.0012 J	0.00073 J	0.008 U	0.008 U	0.04 U	0.0019 J+		
Mercury	mg/L	0.0001 J	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		
Molybdenum	mg/L	0.01 U	0.0055 J	0.014	0.01 U	0.015	0.012	0.011 J+	0.0059 J	0.0089 J	0.007 J		
Radium, Total	pCi/L	0.533 U	0.43 U	0.686 J+	0.503	0.447 U	0.5	0.515	0.281 U	0.443	0.443		
Selenium	mg/L	0.00034 J	0.0006 J	0.005 U	0.005 U	0.00066 J	0.005 U	0.00064 J	0.005 U	0.005 U	0.005 U		
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Field Parameters													
DO	mg/L	0.39	0.2	0.25	0.49	0.31	0.29	0.72	0.41	0.12	0.2	0.21	7.5
ORP	millivolts	-79.7	741.8	-31.2	-50	7.5	-79.5	15.4	-16.9	-17.1	44.9	-5.5	-58
pH	SU	7.19	7.56	6.9	7.02	6.68	7.15	6.5	6.69	7.01	6.62	6.53	7.07
SC	uS/cm	502	700	738	867	858	831	785	860	797	865	836	829
TEMP	deg C	14.12	17.49	15.63	13.12	10.72	8.47	8.39	9.5	13.24	16.32	16.97	8.5
TURB	NTU	4.66	2.31	2.12	2.89	3.09	4.21	3.14	4.4	4.87	3.34	3.69	4.89

Note:

mg/L = milligrams per liter

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deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

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"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

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"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW22B												
Sample Date		2016-07-13	2016-09-07	2016-11-08	2016-12-07	2017-01-10	2017-03-01		2017-03-28	2017-04-28	2017-06-27	2017-08-23	2017-10-04	2018-03-01
Sample Type		N	N	N	N	N	FD	N	N	N	N	N	N	N
Chemical Name	Unit													
CCR Appendix III														
Boron	mg/L	17	16	17	18	17	17	18	17	17	17	18	18	17
Calcium	mg/L	390	350	400	390	410	400	400	350	360	330	380	350	330
Chloride	mg/L	470	690	840	790	760	690	670	740	770	760	790	750	650
Fluoride	mg/L	0.35 J	100 U	200 U	200 U	50 U	50 U	50 U	50 U	100 U	100 U	50 U	50 U	50 U
pH	SU	7.53	7.42	7.31	7.21	7.18		7.66	7.02	7.15	7.37	7.21	6.91	7.53
Sulfate	mg/L	7100 J+	7400	9000	8400	7700	7500	6800	7000	6900	7300	7500	8500 J-	6700
Total Dissolved Solids	mg/L	9600	12000	14000	14000	13000	13000	12000	12000	12000	11000	13000	13000	11000
CCR Appendix IV														
Antimony	mg/L	0.002 U	0.002 U	0.01 U	0.01 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.01 U	0.002 U		
Arsenic	mg/L	0.0026 J	0.0021 J	0.0027 J	0.0029 J	0.0025 J	0.005 U	0.005 U	0.002 J	0.002 J	0.025 U	0.0019 J		
Barium	mg/L	0.075	0.07 J-	0.077	0.08	0.081	0.075	0.078	0.072	0.067	0.064	0.068		
Beryllium	mg/L	0.00011 J	0.001 U	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.005 U	0.001 U		
Cadmium	mg/L	0.00035 J	0.001 U	0.005 U	0.005 U	0.001 U	0.00044 J	0.00045 J	0.001 U	0.00046 J	0.005 U	0.00049 J		
Chromium	mg/L	0.0012 J	0.0012 J	0.01 U	0.0015 J	0.0012 J	0.002 U	0.002 U	0.0012 J	0.001 J	0.01 U	0.0011 J		
Cobalt	mg/L	0.001 U	0.00018 J	0.005 U	0.005 U	0.00026 J	0.001 U	0.001 U	0.00014 J	0.001 U	0.005 U	0.0002 J		
Fluoride	mg/L	0.35 J	100 U	200 U	200 U	50 U	50 U	50 U	50 U	100 U	100 U	50 U	50 U	50 U
Lead	mg/L	0.0016	0.001 U	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.00059 J	0.001 U	0.0028 J	0.001 U		
Lithium	mg/L	0.26	0.25	0.28	0.29	0.3	0.28	0.27	0.29	0.3	0.31	0.32 J+		
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ	0.0002 UJ		
Molybdenum	mg/L	3.9	3.1	2.5	2.8	3.2	0.3 J	3.1 J	2.9	3	2.1	2.7		
Radium, Total	pCi/L	5.87	6.59	10.5 J+	8.18	9.05	9.06	7.69	6.25	5.53	7.21	7.74		
Selenium	mg/L	0.0017 J	0.0021 J	0.025 U	0.025 U	0.0028 J	0.005 U	0.005 U	0.0026 J	0.002 J	0.025 U	0.0016 J		
Thallium	mg/L	0.001 U	0.001 U	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.005 U	0.00021 J		
Field Parameters														
DO	mg/L	1.07	0.34	0.21	0.15	0.13		0.15	0.1	0.11	0.11	0.03	0.16	2.1
ORP	millivolts	-97.2	-88.1	-101.4	-84.7	-103.4		-157.7	-108.2	-126.1	-98	20.1	-6.5	-101.3
pH	SU	7.53	7.42	7.31	7.21	7.18		7.66	7.02	7.15	7.37	7.21	6.91	7.53
SC	uS/cm	8594	13730	1512	1577	1510		1536	10170	13680	1478	1397	1496	12570
TEMP	deg C	12.23	13.41	13.09	12.28	12.14		11.35	11.18	11.2	12.38	12.87	13.48	11.1
TURB	NTU	4.29	3.67	3.76	1.57	2.67		3.44	2.99	4.54	2.97	2.39	1.13	4.65

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

	Location	GAMW23											
	Sample Date	2016-07-13	2016-09-07	2016-11-08	2016-12-08	2017-01-10	2017-03-01	2017-03-29	2017-04-28	2017-06-27	2017-08-23	2017-10-03	2018-02-28
	Sample Type	N	N	N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit												
CCR Appendix III													
Boron	mg/L	21	19	24	24	25	26	26	25	23	24	26	25
Calcium	mg/L	460	430	420	380	490	490	470	500	470	440	450	550
Chloride	mg/L	11	20	18 J	22	18 J	17	20	15 J	56	17	17	12
Fluoride	mg/L	0.43 J	0.7 J	0.6 J	10 UO	0.8 J	0.89 J	0.76 J	0.78 J	50 U	0.8 J	1.1 J	1.4 J
pH	SU	8.54	8.5	8.38	8.53	8.22	8.97	8.31	8.72	8.46	8.37	8.12	8.76
Sulfate	mg/L	1700 J+	1700	1600	1200	1600	1500	1700	1700	1600	1700	1600	1800
Total Dissolved Solids	mg/L	2300	2500	2300	2500	2400	2600	2600	2800	2600	2600	2600	2800
CCR Appendix IV													
Antimony	mg/L	0.00089 J	0.00072 J	0.00066 J	0.002 U	0.0021	0.006 J+	0.0033	0.0065	0.0022	0.0013 J		
Arsenic	mg/L	0.012	0.019	0.025	0.024 J	0.047	0.12	0.1	0.11	0.11	0.044		
Barium	mg/L	0.043	0.033 J-	0.03	0.035	0.032	0.029	0.031	0.029	0.027	0.029		
Beryllium	mg/L	0.00039 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		
Cobalt	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Fluoride	mg/L	0.43 J	0.7 J	0.6 J	10 UO	0.8 J	0.89 J	0.76 J	0.78 J	50 U	0.8 J	1.1 J	1.4 J
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00046 J		
Lithium	mg/L	0.043	0.026	0.027	0.026	0.027	0.027	0.029	0.032	0.026 J	0.026 J+		
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		
Molybdenum	mg/L	0.02	0.0088 J	0.015	0.01 U	0.05	0.037	0.067	0.013	0.007 J	0.005 J		
Radium, Total	pCi/L	1.33	1.26	1.06 J+	1.48	1.69	0.544	0.411	0.603	0.637	0.9		
Selenium	mg/L	0.0016 J	0.0018 J	0.0023 J	0.0032 J	0.0017 J	0.005 U	0.0018 J	0.0023 J	0.0015 J	0.0011 J		
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Field Parameters													
DO	mg/L	0.14	0.2	0.12	0.1	0.11	0.2	0.11	0.15	0.09	0.02	0.04	3.4
ORP	millivolts	-306	-303	-308.5	-344.8	-330.6	-349.2	-341.9	-346.7	-313.6	-272.8	-260	-293.1
pH	SU	8.54	8.5	8.38	8.53	8.22	8.97	8.31	8.72	8.46	8.37	8.12	8.76
SC	uS/cm	2075	2624	2800	2829	2657	2956	2580	2677	2811	2711	2736	2793
TEMP	deg C	12.93	15.15	14.78	13.11	13.1	11.53	11.21	11.05	12.45	14.31	14.81	11.2
TURB	NTU	2.11	0.77	0.28	0.56	0.71	0.25	0.74	0.82	1.77	1.12	0.7	0.92

Note:

mg/L = milligrams per liter

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"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW23B											
Sample Date		2016-07-13	2016-09-07	2016-11-08	2016-12-08	2017-01-11	2017-03-01	2017-03-29	2017-04-28	2017-06-27	2017-08-23	2017-10-03	2018-02-28
Sample Type		N	N	N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit												
CCR Appendix III													
Boron	mg/L	15	11	13	14	13	13	13	13	14	14	14	14
Calcium	mg/L	270	250	240	270	250	270	240	250	230	240	240	260
Chloride	mg/L	570	630	680	630	630	570	690	580	610	640	590	550
Fluoride	mg/L	0.53 J	100 U	200 U	200 U	1.3 J	50 U	50 U	100 U	100 U	50 U	1.4 J	50 U
pH	SU	8.65	8.32	8.21	8.12	7.69	8.55	7.95	8.48	8.27	8.32	7.89	8.47
Sulfate	mg/L	7900 J+	6800	7400	6200	6500	5800	6300	6200	6100	6200	6000	6500
Total Dissolved Solids	mg/L	10000	11000	11000	11000	10000	11000	11000	11000	9600	11000	11000	11000
CCR Appendix IV													
Antimony	mg/L	0.002 U	0.002 U	0.01 U	0.01 U	0.002 U	0.002 U	0.002 U	0.002 U	0.01 U	0.002 U		
Arsenic	mg/L	0.0031 J	0.002 J	0.025 U	0.002 J	0.0018 J	0.005 U	0.0022 J	0.0022 J	0.025 U	0.0019 J		
Barium	mg/L	0.047	0.046 J-	0.048	0.051	0.047	0.045	0.045	0.046	0.041	0.038		
Beryllium	mg/L	0.00042 J	0.001 U	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.005 U	0.001 U		
Cadmium	mg/L	0.001 U	0.001 U	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.005 U	0.001 U		
Chromium	mg/L	0.0022	0.0027	0.0025 J	0.01 U	0.0022	0.0026	0.0025	0.0023	0.01 U	0.0024		
Cobalt	mg/L	0.001 U	0.00034 J	0.005 U	0.005 U	0.00016 J	0.001 U	0.00028 J	0.001 U	0.005 U	0.001 U		
Fluoride	mg/L	0.53 J	100 U	200 U	200 U	1.3 J	50 U	50 U	100 U	100 U	50 U	1.4 J	50 U
Lead	mg/L	0.0011	0.001 U	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.005 U	0.00063 J		
Lithium	mg/L	0.092	0.086	0.068	0.072	0.062	0.078	0.065	0.074	0.35	0.06 J+		
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		
Molybdenum	mg/L	0.037	0.036	0.043 J	0.077	0.044	0.05	0.055	0.046	0.043 J	0.05		
Radium, Total	pCi/L	3.9	4.22	5.05 J+	4.49	5.18	4.13	4.05	3.19	3.46	4.38		
Selenium	mg/L	0.0031 J	0.0014 J	0.025 U	0.025 U	0.0021 J	0.005 U	0.002 J	0.0015 J	0.025 U	0.0013 J		
Thallium	mg/L	0.001 U	0.001 U	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.005 U	0.001 U		
Field Parameters													
DO	mg/L	0.25	0.14	0.19	0.12	0.54	0.35	0.33	0.25	0.14	0.16	0.07	1
ORP	millivolts	-262.8	-180	-203.8	-249.3	-145.2	-240.3	-223.6	-231.8	-178.6	-186.7	-213.7	-307.1
pH	SU	8.65	8.32	8.21	8.12	7.69	8.55	7.95	8.48	8.27	8.32	7.89	8.47
SC	uS/cm	9658	12860	1362	1359	1306	1360	10400	10830	1253	1226	1229	11980
TEMP	deg C	12.89	14.21	13.08	12.61	12.55	12.49	12.54	12.24	12.79	13.47	13.75	12.6
TURB	NTU	4.37	2.49	2.72	0.97	0.79	0.79	0.61	1.75	1.51	1.2	0.66	1.36

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

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"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW24																
Sample Date		2016-11-11	2016-12-07	2017-01-09	2017-02-28	2017-03-27	2017-04-25		2017-06-27		2017-08-24	2017-10-03		2018-02-26	2018-09-04	2019-02-27	2019-10-07	2020-03-16
Sample Type		N	N	N	N	N	FD	N	FD	N	N	FD	N	N	N	N	N	N
Chemical Name	Unit																	
CCR Appendix III																		
Boron	mg/L	0.081 J	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.11 J	0.15 J	0.13	0.093 J	0.055 J	0.057 J	0.1 U
Calcium	mg/L	66	61	80	51	72	76	76	51	67	69	82	82	72	83	83	76	84.2
Chloride	mg/L	16	14	32	3.6	11	19	20	24	24	16	30	30	15	25	19	15	36.5
Fluoride	mg/L	5 U	0.11 J	0.11 J	0.13 J	0.1 J	0.1 J	0.094 J	0.15 J	0.15 J	0.11 J	0.18 J	0.18 J	0.063 J	0.17 J	0.12	0.12	0.088
pH	SU	7.47	7.29	7.17	7.31	7.01		7.49		7.31	6.5		6.11	7.47	6.79	7.37	7.34	7.73
Sulfate	mg/L	58	43	51	44	46	63	60	58	58	67	75	73	69	77	80	69	72.8
Total Dissolved Solids	mg/L	270	320	340	210	340	310	310	330	330	330	390	430	360	380	370	320	328
CCR Appendix IV																		
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U							
Arsenic	mg/L	0.0023 J	0.0023 J	0.0019 J	0.00035 J	0.0017 J	0.0017 J	0.0017 J	0.0014 J	0.0019 J	0.0019 J							
Barium	mg/L	0.048	0.049	0.055	0.02	0.039	0.041	0.043	0.028	0.037	0.036							
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Chromium	mg/L	0.00026 J	0.00027 J	0.002 U	0.00052 J	0.00034 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U							
Cobalt	mg/L	0.00028 J	0.001 U	0.00041 J	0.001 U	0.00032 J	0.00032 J	0.00039 J	0.001 U	0.00019 J	0.001 U							
Fluoride	mg/L	5 U	0.11 J	0.11 J	0.13 J	0.1 J	0.1 J	0.094 J	0.15 J	0.15 J	0.11 J	0.18 J	0.18 J	0.063 J	0.17 J	0.12	0.12	0.088
Lead	mg/L	0.00029 J	0.001 U	0.001 U	0.001 U	0.00039 J	0.0006 J	0.0008 J	0.001 U	0.001 U	0.001 U							
Lithium	mg/L	0.008 U	0.0029 J	0.0029 J	0.0015 J	0.008 U	0.004 J	0.004 J	0.04 U	0.04 U	0.0028 J+							
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ							
Molybdenum	mg/L	0.0018 J	0.01 U	0.01 U	0.0031 J	0.0018 J	0.0024 J	0.002 J	0.003 J	0.0013 J	0.01 U							
Radium, Total	pCi/L	0.882	0.727	0.997	0.629	0.38 U	0.308	0.361 U	0.538	0.478	0.354 U							
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U							
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Field Parameters																		
DO	mg/L	0.55	0.44	0.35	0.22	0.13		0.26		0.14	0.26		0.12	0.4	0.56	0.2	0.38	0.07
ORP	millivolts	-102.1	-9.9	-63	-68.3	-74.3		-101.1		-97.1	64.4		61.3	-73.4	20.9	-12.9	67.7	-39.4
pH	SU	7.47	7.29	7.17	7.31	7.01		7.49		7.31	6.5		6.11	7.47	6.79	7.37	7.34	7.73
SC	uS/cm	415	516	574	536	475		504		516	514		553	537	611	384	407	555
TEMP	deg C	14.53	12.14	9.52	8.72	8.95		12.63		13.34	15.75		16.16	8.56	16.5	7.56	16.2	7.6
TURB	NTU	2.56	4.35	4.67	4.38	4.77		4.4		4.61	2.82		2.92	6.71	2.54	4.66	4.12	4.8

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

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"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW24B															
Sample Date		2016-11-11	2016-12-07	2017-01-09	2017-02-28		2017-03-27	2017-04-25	2017-06-27	2017-08-24		2017-10-03	2018-02-27	2018-09-04	2019-02-27	2019-10-07	2020-03-16
Sample Type		N	N	N	FD	N	N	N	N	FD	N	N	N	N	N	N	N
Chemical Name	Unit																
CCR Appendix III																	
Boron	mg/L	0.083 J	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.11 J	0.11	0.072 J	0.056 J	0.059 J	0.1 U
Calcium	mg/L	55	51	58	50 J	73 J	52	51	51	56	57	54	48	55	55	52	47.4
Chloride	mg/L	6.5	6.2	5.2	3.7 J	18 J	4.3	3.3	3.8	9.9	11	8.4	4.1	6.2	5.3	5.1	3.7
Fluoride	mg/L	0.14 J	0.13 J	0.14 J	0.13 J	0.11 J	0.14 J	0.12 J	0.15 J	0.14 J	0.12 J	0.16 J	0.13 J	0.15 J	0.11	0.13	0.13
pH	SU	7.12	7.42	7.24		7.55	7.39	7.83	7.61		6.97	6.5	7.5	7.5	7.62	7.81	8.03
Sulfate	mg/L	55	46	47	51	56	51	52	51	57	61	45	34	49	46	44	38.7
Total Dissolved Solids	mg/L	210	250	230 J+	230 J	320 J	250	210	230	280	290	260	220	250	250	230	204
CCR Appendix IV																	
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U						
Arsenic	mg/L	0.0005 J	0.00041 J	0.005 U	0.005 U	0.0016 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U						
Barium	mg/L	0.026	0.024	0.022	0.02 J	0.045 J	0.02	0.019	0.019	0.02	0.022						
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U						
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U						
Chromium	mg/L	0.0011 J	0.00027 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U						
Cobalt	mg/L	0.00031 J	0.001 U	0.00019 J	0.001 U	0.00023 J	0.001 U	0.001 U	0.001 U	0.001 U	0.00023 J						
Fluoride	mg/L	0.14 J	0.13 J	0.14 J	0.13 J	0.11 J	0.14 J	0.12 J	0.15 J	0.14 J	0.12 J	0.16 J	0.13 J	0.15 J	0.11	0.13	0.13
Lead	mg/L	0.00069 J	0.001 U	0.001 U	0.001 U	0.001 U	0.00028 J	0.001 U	0.001 U	0.001 U	0.001 U						
Lithium	mg/L	0.008 U	0.0016 J	0.0019 J	0.0015 J	0.0026 J	0.008 U	0.0022 J	0.04 U	0.0018 J+	0.0019 J+						
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ	0.0002 UJ						
Molybdenum	mg/L	0.0029 J	0.01 U	0.01 U	0.0088 J	0.0021 J	0.0017 J	0.0016 J	0.0019 J	0.0045 J	0.0016 J						
Radium, Total	pCi/L	0.699	0.96	0.63	0.454 U	0.372	0.357 U	0.323	0.296 U	0.521	0.35 U						
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U						
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U						
Field Parameters																	
DO	mg/L	2.23	0.56	0.79		0.49	2.1	0.28	1.31		0.64	0.52	1.6	0.82	0.38	0.14	0.61
ORP	millivolts	-92.4	-123.4	-87.1		-119.4	-113.2	-129.3	-110.7		-42.2	-20.4	-130.8	-119.7	-25.8	-91.9	-109.6
pH	SU	7.12	7.42	7.24		7.55	7.39	7.83	7.61		6.97	6.5	7.5	7.5	7.62	7.81	8.03
SC	uS/cm	304	404	372		320	336	347	371		359	394	332	406	282	253	317.9
TEMP	deg C	12.8	12.46	11.55		11.11	10.71	14.23	11.86		12.94	13.51	11.2	13.6	10.1	13.3	10.1
TURB	NTU	4.76	4.41	3.66		4.8	4.97	4.97	3.82		3.24	4.3	4.89	4.91	4.97	3.69	10.1

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

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"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW25																	
Sample Date		2016-11-10	2016-12-08	2017-01-11	2017-03-01	2017-03-29	2017-04-26	2017-06-28	2017-08-24	2017-10-03	2018-03-01	2018-09-04		2019-02-28		2019-10-08	2020-03-17	
Sample Type		N	N	N	N	N	N	N	N	N	N	FD	N	FD	N	N	FD	N
Chemical Name	Unit																	
CCR Appendix III																		
Boron	mg/L	0.3	0.24	0.21	0.16 J	0.21	0.22	0.2	0.25	0.19 J	0.17	0.27	0.26	0.16	0.16	0.23	0.15	0.15
Calcium	mg/L	76	65	81	61	90	79	77	82	81	61	76	77	69	70	68	73.9	74.9
Chloride	mg/L	3.1 J	2.2	2.9	1.8	1.5	1.5 J	1.9	1.5 J	1.8 J	1.4	1 J	1 J	2.4	2.3	2.4	6.7	6.7
Fluoride	mg/L	2.3 J	1.9 J	1.8 J-	1.9	1.9	1.6 J	1.7	1.9 J	1.6 J	1.6	1.7 J	1.7 J	1.1	1.1	1.5	1.1	1.1
pH	SU	6.72	7.26	6.82	7.6	7.16	6.82	6.89	6.61	6.83	7.44		7.45		6.84	7.26		7.61
Sulfate	mg/L	94	67	70	89	85	64	67	110	82	53	74	75	63	64	65	51.7	51.1
Total Dissolved Solids	mg/L	400	360	330	350	330	350	360	400	350	270	350	350	320 J+	330 J+	350 J+	261	271
CCR Appendix IV																		
Antimony	mg/L	0.00073 J	0.002 U	0.002 U	0.002 U	0.002 U	0.00077 J	0.002 U	0.002 U									
Arsenic	mg/L	0.002 J	0.0025 J	0.0019 J	0.005 U	0.005 U	0.002 J	0.0018 J	0.002 J									
Barium	mg/L	0.036	0.033	0.031	0.024	0.073	0.03	0.03	0.034									
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U									
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U									
Chromium	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.00029 J	0.002 U	0.002 U	0.002 U									
Cobalt	mg/L	0.0039 O	0.002	0.0019	0.0012	0.00015 J	0.0014	0.0011	0.00085 J									
Fluoride	mg/L	2.3 J	1.9 J	1.8 J-	1.9	1.9	1.6 J	1.7	1.9 J	1.6 J	1.6	1.7 J	1.7 J	1.1	1.1	1.5	1.1	1.1
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U									
Lithium	mg/L	0.00046 J	0.0042 J	0.0031 J	0.0044 J	0.008 U	0.0026 J	0.04 U	0.0027 J+									
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ									
Molybdenum	mg/L	0.0097 J	0.01 U	0.01 U	0.01 U	0.01 U	0.0054 J	0.0057 J	0.0049 J									
Radium, Total	pCi/L	0.393 U	0.794	0.813 J+	0.602	0.37 U	0.251 U	0.308	0.386 U									
Selenium	mg/L	0.001 J	0.0014 J	0.0022 J	0.005 U	0.005 U	0.0038 J	0.0026 J	0.0026 J									
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U									
Field Parameters																		
DO	mg/L	0.53	0.96	1.28	7.85	5.78	1.92	0.23	1.17	0.08	68.8		0.95		5.6	3.13		5.47
ORP	millivolts	-12.2	172.1	24.7	27	-20.6	214.1	33.4	56.9	-4.7	-6.6		61.5		-11.4	89.1		141.6
pH	SU	6.72	7.26	6.82	7.6	7.16	6.82	6.89	6.61	6.83	7.44		7.45		6.84	7.26		7.61
SC	uS/cm	527	544	561	568	485	519	541	575	542	406		501		306	421		485.5
TEMP	deg C	16.23	8.04	10.24	7.82	8.68	10.74	13.26	16.39	15.73	7.4		16.52		5.82	16.9		7.7
TURB	NTU	0.76	4.44	2.87	1.17	1.4	1.31	1.8	0.94	0.71	3.06		0.49		2.12	2.9		2.16

Note:

mg/L = milligrams per liter

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deg C = degrees Celsius

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pCi/L = picocuries per liter

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"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW25B														
Sample Date		2016-11-10		2016-12-08	2017-01-11	2017-03-02	2017-03-29	2017-04-26	2017-06-28	2017-08-24	2017-10-03	2018-03-02	2018-09-04	2019-02-28	2019-10-08	2020-03-17
Sample Type		FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit															
CCR Appendix III																
Boron	mg/L	0.29	0.29	0.36	0.27	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.17 J	0.19	0.18	0.14	0.14	0.13
Calcium	mg/L	110	99	100	100	94	62	86	83	75	77	84	100	83	73	88.5
Chloride	mg/L	4.9 J	5	4.9 J	5.6	6.5	7.8	7.4	7.1	6.9	6.8	6.2	7.9	7.1	5.7	7.8
Fluoride	mg/L	0.16 J	0.16 J	0.14 J	0.15 J	0.19 J	0.19 J	0.14 J	0.22 J	0.15 J	0.23 J	0.17 J	0.32 J	0.19	0.23 J+	0.22
pH	SU		6.66	7.06	6.72	7.33	6.79	7.16	7.01	6.65	6.46	6.86	7.57	7.06	6.99	7.49
Sulfate	mg/L	76	74	62	62	62	59	56	61	71	62	79	75	66	84	82.9
Total Dissolved Solids	mg/L	410	440	450	390	390	360	380	400	370	350	370	450	360 J+	340 J+	363
CCR Appendix IV																
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U						
Arsenic	mg/L	0.0014 J	0.0011 J	0.00053 J	0.00041 J	0.005 U	0.0019 J	0.005 U	0.005 U	0.005 U						
Barium	mg/L	0.076	0.075	0.088	0.084	0.071	0.023	0.069	0.064	0.058						
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U						
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U						
Chromium	mg/L	0.00053 J	0.002 U	0.002 U	0.00038 J	0.00031 J	0.00036 J	0.002 U	0.002 U	0.002 U						
Cobalt	mg/L	0.00044 J	0.00031 J	0.001 U	0.001 U	0.001 U	0.0011	0.00022 J	0.001 U	0.001 U						
Fluoride	mg/L	0.16 J	0.16 J	0.14 J	0.15 J	0.19 J	0.19 J	0.14 J	0.22 J	0.15 J	0.23 J	0.17 J	0.32 J	0.19	0.23 J+	0.22
Lead	mg/L	0.00063 J	0.00045 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U						
Lithium	mg/L	0.008 U	0.00068 J	0.0027 J	0.0022 J	0.0019 J	0.008 U	0.0029 J	0.04 U	0.0018 J+						
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ						
Molybdenum	mg/L	0.001 J	0.0014 J	0.01 U	0.01 U	0.00096 J	0.01 U	0.01 U	0.01 U	0.01 U						
Radium, Total	pCi/L	1.23	0.66	0.744	0.826 J+	0.826	0.382 U	0.299	0.464	1.12						
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0024 J	0.005 U	0.005 U	0.005 U						
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U						
Field Parameters																
DO	mg/L		0.74	0.98	1.99	3.9	2.28	0.33	0.36	0.06	1.07	12.5	0.12	0.23	0.46	0.04
ORP	millivolts		-77.5	-95.6	-52.7	-60.2	-92.8	-107.1	-109.2	-10.5	-17.1	-72.3	-106.7	-29.5	77.6	-121.2
pH	SU		6.66	7.06	6.72	7.33	6.79	7.16	7.01	6.65	6.46	6.86	7.57	7.06	6.99	7.49
SC	uS/cm		560	677	650	654	559	547	577	517	533	535	639	407	377	577
TEMP	deg C		13.61	7.79	12.3	11.09	11.04	12	11.61	12.65	12.81	10.7	13.97	9.35	13.1	10.2
TURB	NTU		3.45	2.21	1.13	3.4	3.89	3.04	1.77	0.85	0.78	2.9	0.91	2.47	1.69	3.56

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

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"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW26															
Sample Date		2016-11-10	2016-12-08	2017-01-11	2017-03-02	2017-03-28	2017-04-26	2017-06-27		2017-08-23	2017-10-04	2018-03-01	2018-09-05		2019-02-28	2019-10-08	2020-03-18
Sample Type		N	N	N	N	N	N	FD	N	N	N	N	FD	N	N	N	N
Chemical Name	Unit																
CCR Appendix III																	
Boron	mg/L	0.22	0.25	0.25	0.3	0.32	0.29	0.25	0.26	0.22	0.26	0.28	0.3	0.31	0.26	0.23	0.27
Calcium	mg/L	100	93	110	100	100	99	86	71	94	92	89	100	110	87	65	96.1
Chloride	mg/L	5.6	6.2	6.6	5	6.5	3.3	3.8	3.8	2.9	2.6	2	2.6	2.7	1.3	2.2	2
Fluoride	mg/L	2.5	2.5 J	2.3	2.3	2.3	2	2.3	2.3	3	3.1	2.1	2.6	2.5	2.3	3.2	2.5
pH	SU	8.84	7.57	7.16	7.56	6.93	7.14		7.74	7.09	6.85	9.5 O		7.56	7.14	7.54	7.47
Sulfate	mg/L	68	68	71	78	94	76	110	110	130	110	120	110	110	81	85	69.1
Total Dissolved Solids	mg/L	290	430	420	470	500	470	470	460	480	470	1700	550	510	420 J+	350 J+	397
CCR Appendix IV																	
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U							
Arsenic	mg/L	0.0017 J	0.0017 J	0.0012 J	0.001 J	0.00099 J	0.0011 J	0.0012 J	0.00095 J	0.0013 J							
Barium	mg/L	0.045	0.038	0.039	0.031	0.034	0.037	0.037	0.03	0.031							
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Chromium	mg/L	0.002 U	0.002 U	0.00044 J	0.0005 J	0.0005 J	0.002 U	0.002 U	0.002 U	0.002 U							
Cobalt	mg/L	0.0006 J	0.001	0.0012	0.0011	0.0013	0.00092 J	0.00053 J	0.00046 J	0.00098 J							
Fluoride	mg/L	2.5	2.5 J	2.3	2.3	2.3	2	2.3	2.3	3	3.1	2.1	2.6	2.5	2.3	3.2	2.5
Lead	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.00022 J	0.001 U	0.001 U	0.001 U	0.001 U							
Lithium	mg/L	0.017	0.0095	0.0091	0.0047 J	0.008 U	0.0086	0.014 J	0.015 J	0.0017 J+							
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ							
Molybdenum	mg/L	0.0078 J	0.01 U	0.01 U	0.0048 J	0.01 U	0.0053 J	0.0059 J	0.0044 J	0.0055 J							
Radium, Total	pCi/L	0.874	1.03	1.53 J+	0.488 U	0.681	0.364	0.792	0.897	1.4							
Selenium	mg/L	0.00049 J	0.0005 J	0.005 U	0.005 U	0.00058 J	0.005 U	0.00096 J	0.005 U	0.005 U							
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Field Parameters																	
DO	mg/L	0.25	0.73	0.69	0.54	0.22	0.64		0.3	0.23	0.16	15.8		0.16	1.02	0.65	1.01
ORP	millivolts	-114.5	-67.8	-74.3	-26.1	-37.6	23.7		-92.4	-19.8	17.5	-39.1		54.3	-17.5	58.6	72.1
pH	SU	8.84	7.57	7.16	7.56	6.93	7.14		7.74	7.09	6.85	9.5		7.56	7.14	7.54	7.47
SC	uS/cm	443	630	693	772	677	649		660	667	670	506		705	422	409	632
TEMP	deg C	16.48	7.68	10.41	8.65	8.83	11.15		15.05	17.62	17.26	7.54		18.69	7.64	17.5	7.5
TURB	NTU	43.7	3.19	2.1	0.8	1.49	1.35		2.33	1.44	0.7	4.69		1.26	1.89	1.6	2.44

Note:

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Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW26B														
Sample Date		2016-11-10	2016-12-08	2017-01-11	2017-03-02	2017-03-28	2017-04-26	2017-06-27	2017-08-23	2017-10-04	2018-03-02	2018-09-05	2019-02-28	2019-10-08	2020-03-18	
Sample Type		N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N
Chemical Name	Unit															
CCR Appendix III																
Boron	mg/L	0.19 J	0.19 J	0.2 U	0.21	0.27	0.23	0.45	0.36	0.4	0.86	0.97	0.36	0.36	0.26	0.25
Calcium	mg/L	81	68	85	90	100	90	150	120	130	94	210	75	120	88.6	87.3
Chloride	mg/L	8.6	7.5	8.8	12	19	12	42	28	31	16	100	17	33	13.1	13.1
Fluoride	mg/L	0.23 J	0.18 J	0.2 J	0.22 J	0.21 J	0.18 J	0.3 J	0.17 J	0.36 J	0.22 J	10 U	0.18	0.21 J+	0.22	0.22
pH	SU	7.28	7.53	7.04	7.71	7.06	7.57	7.47	7.17	6.63	7.36	7.95	7.3	7.38		7.81
Sulfate	mg/L	63	58	65	150	230	120	510	390	400	150	1500	200	410	130	129
Total Dissolved Solids	mg/L	380	370	340	480	650	460	1100	870	990	520	1900	590 J+	42 J+	436	456
CCR Appendix IV																
Antimony	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U							
Arsenic	mg/L	0.00097 J	0.00081 J	0.00048 J	0.00054 J	0.00042 J	0.005 U	0.005 U	0.005 U							
Barium	mg/L	0.061	0.058	0.063	0.064	0.067	0.064	0.067	0.06							
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Chromium	mg/L	0.00051 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U							
Cobalt	mg/L	0.00033 J	0.00025 J	0.00021 J	0.001 U	0.00016 J	0.001 U	0.001 U	0.001 U							
Fluoride	mg/L	0.23 J	0.18 J	0.2 J	0.22 J	0.21 J	0.18 J	0.3 J	0.17 J	0.36 J	0.22 J	10 U	0.18	0.21 J+	0.22	0.22
Lead	mg/L	0.0008 J	0.001 U	0.001 U	0.001 U	0.00019 J	0.001 U	0.001 U	0.001 U							
Lithium	mg/L	0.008 U	0.0022 J	0.0026 J	0.0043 J	0.008 U	0.0039 J	0.04 U	0.0038 J+							
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ							
Molybdenum	mg/L	0.0012 J	0.01 U	0.01 U	0.002 J	0.01 U	0.0014 J	0.002 J	0.01 U							
Radium, Total	pCi/L	0.536	0.99	0.598 J+	0.532 U	0.459	0.264 U	0.866	1.25							
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U							
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Field Parameters																
DO	mg/L	0.36	0.59	1.97	1.7	1.08	1.34	0.27	0.14	0.25	10.2	2.27	1.9	2.04		1.95
ORP	millivolts	-85.9	-121.4	-50.6	-57.9	-74.5	-83.1	-96.9	20.6	31.3	-63.2	-51.5	-15.6	26		-42.4
pH	SU	7.28	7.53	7.04	7.71	7.06	7.57	7.47	7.17	6.63	7.36	7.95	7.3	7.38		7.81
SC	uS/cm	480	534	573	750	838	614	1479	1128	1317	739	2262	644	840		715
TEMP	deg C	13.28	7.87	11.97	11.3	11.17	12	12.42	12.87	13.02	11.4	14.45	9.99	13.4		10.2
TURB	NTU	4.06	1.3	1.5	4.38	3.31	3.65	1.62	0.91	0.67	4.52	4.49	4.86	4.35		4.8

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW27															
Sample Date		2016-11-09	2016-12-07		2017-01-10	2017-02-28	2017-03-28	2017-04-26	2017-06-27	2017-08-23	2017-10-03	2018-03-01		2018-09-05	2019-02-26	2019-10-09	2020-03-18
Sample Type		N	FD	N	N	N	N	N	N	N	N	FD	N	N	N	N	N
Chemical Name	Unit																
CCR Appendix III																	
Boron	mg/L	6.5	4.9	4.8	5	5.1	5.6	4.9	2	4.9	4.9	4.9	4.7	2.3	5.7	4.5	4.4
Calcium	mg/L	190	220	190	230	240	260	220	73	220	200	350	350	170	260	170	288
Chloride	mg/L	24	23	23	28	45	53	48	15	30	31	17	16	11	29	17	16.2
Fluoride	mg/L	0.42 J	0.36 J	0.33 J	0.45 J	5.4 O	0.46 J	0.3 J	0.57 J	0.36 J	0.57 J	0.39 J	0.35 J	0.47 J	0.32	0.45	0.54
pH	SU	7.2		7.25	7.22	7.24	6.89	7.54	7.05	7.11	6.91		7.21	6.94	7.15	7.51	7.49
Sulfate	mg/L	740	640	640	790	840	940	880	90	780	750	1000	990	370	730	450	803
Total Dissolved Solids	mg/L	1400	1300	1300	1400	1600	1600	1600	450	1400	1300	1700	1700	930	1400	920	1330
CCR Appendix IV																	
Antimony	mg/L	0.002 U	0.01 U	0.002 U	0.00032 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U							
Arsenic	mg/L	0.018	0.017 J	0.016 J	0.017	0.014	0.018	0.015	0.034	0.021							
Barium	mg/L	0.15	0.17	0.17	0.17	0.17	0.19	0.15	0.12	0.28							
Beryllium	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Cadmium	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.00023 J	0.001 U	0.001 U							
Chromium	mg/L	0.002 U	0.012	0.00062 J	0.00067 J	0.00035 J	0.001 J	0.002 U	0.002 U	0.002 U							
Cobalt	mg/L	0.00013 J	0.005 U	0.001 U	0.00036 J	0.00019 J	0.00034 J	0.001 U	0.001	0.00026 J							
Fluoride	mg/L	0.42 J	0.36 J	0.33 J	0.45 J	5.4 O	0.46 J	0.3 J	0.57 J	0.36 J	0.57 J	0.39 J	0.35 J	0.47 J	0.32	0.45	0.54
Lead	mg/L	0.001 U	0.005 U	0.001 U	0.0014	0.001 U	0.0021	0.00051 J	0.0014	0.001 U							
Lithium	mg/L	0.0019 J	0.0044 J	0.0073 J	0.0052 J	0.0052 J	0.008 U	0.0074 J	0.04 U	0.003 J+							
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ							
Molybdenum	mg/L	1	1	0.94	0.87	1.4	1.3	1.8	0.32	1.2							
Radium, Total	pCi/L	2.54	2.6	2.18	2.1	2.64	1.91	1.8	1.11	2.12							
Selenium	mg/L	0.005 U	0.025 U	0.005 U	0.00077 J	0.00051 J	0.0008 J	0.005 U	0.005 U	0.005 U							
Thallium	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Field Parameters																	
DO	mg/L	0.63		0.16	0.18	0.14	0.09	0.14	0.1	0.4	0.09		0.4	0.78	0.57	0.42	0.04
ORP	millivolts	-78.5		-105	-69.3	-85.8	-91.1	-88.6	-98.3	-49	-75.6		-94.2	-59.6	-55.1	39.3	-103.5
pH	SU	7.2		7.25	7.22	7.24	6.89	7.54	7.05	7.11	6.91		7.21	6.94	7.15	7.51	7.49
SC	uS/cm	1390		1665	1755	1947	1733	1736	701	1721	1691		1808	1035	1164	951	1619
TEMP	deg C	16.19		9.91	11.76	10.58	9.93	11.2	16.31	16.57	16.7		10	19.3	9.7	17.5	9.5
TURB	NTU	3.34		4.72	4.14	3.56	4.33	3.42	3.87	2.03	1.21		4.43	1.26	1.8	1.08	5.96

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW27B													
Sample Date		2016-11-09	2016-12-07	2017-01-09	2017-02-28	2017-03-28	2017-04-26	2017-06-27	2017-08-23	2017-10-03	2018-03-01	2018-09-05	2019-02-27	2019-10-09	2020-03-19
Sample Type		N	N	N	N	N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit														
CCR Appendix III															
Boron	mg/L	11	11	11	11	11	9.8	12	12	12	11	11	11	11	11.5
Calcium	mg/L	410	450	450	430	390	490	270	370	350	420	330	90	230	415
Chloride	mg/L	460	450	450	420	450	480	440	460	420	410	460	440	390	488
Fluoride	mg/L	200 U	50 U	50 U	50 U	50 U	100 U	100 U	50 U	50 U	50 U	100 U	0.13 J	0.17 J	0.05 U
pH	SU	7.25	7.3	7.19	7.27	6.93	7.4	7.23	7.26	7.01	7.32	7.84	7.52	7.65	7.49
Sulfate	mg/L	7900	6800	7000	6800	7100	7400	6400	6700	6300	7700	6800	7000	6000	7540
Total Dissolved Solids	mg/L	12000	12000	11000	12000	11000	13000	10000	12000	11000	11000	13000	13000	8500	11000
CCR Appendix IV															
Antimony	mg/L	0.003 J	0.01 U	0.002 U	0.002 U	0.002 U	0.002 U	0.01 U	0.002 U						
Arsenic	mg/L	0.0032 J	0.0024 J	0.002 J	0.0018 J	0.0014 J	0.0016 J	0.025 U	0.0011 J						
Barium	mg/L	0.05	0.045	0.046	0.044	0.044	0.04	0.03	0.038						
Beryllium	mg/L	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.005 U	0.001 U						
Cadmium	mg/L	0.005 U	0.005 U	0.001 U	0.0005 J	0.001 U	0.00038 J	0.005 U	0.00038 J						
Chromium	mg/L	0.01 U	0.01 U	0.002 U	0.00086 J	0.00086 J	0.002 U	0.01 U	0.002 U						
Cobalt	mg/L	0.0009 J	0.005 U	0.00014 J	0.001 U	0.00013 J	0.001 U	0.005 U	0.001 U						
Fluoride	mg/L	200 U	50 U	50 U	50 U	50 U	100 U	100 U	50 U	50 U	50 U	100 U	0.13 J	0.17 J	0.05 U
Lead	mg/L	0.0015 J	0.005 U	0.001 U	0.001 U	0.00027 J	0.001 U	0.005 U	0.001 U						
Lithium	mg/L	0.019 J	0.029 J	0.027	0.025	0.028	0.04	0.2 U	0.029 J+						
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ						
Molybdenum	mg/L	2.9	3	3.4 J+	3.5	3.3	2.9	2.3	3.4						
Radium, Total	pCi/L	4.06	4.54	3.28	3.09	3.35	2.45	2.87	3.68						
Selenium	mg/L	0.0031 J	0.025 U	0.002 J	0.002 J	0.0019 J	0.002 J	0.025 U	0.0013 J						
Thallium	mg/L	0.005 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.005 U	0.001 U						
Field Parameters															
DO	mg/L	0.58	0.31	0.37	0.28	0.22	0.53	0.24	0.04	0.26	6.7	0.23	0.47	0.29	0.44
ORP	millivolts	-97.4	-108.6	-56.7	-94	-95	-81.5	-81.3	-46.7	-65	-99.3	-101.5	-124.8	70.2	-92.8
pH	SU	7.25	7.3	7.19	7.27	6.93	7.4	7.23	7.26	7.01	7.32	7.84	7.52	7.65	7.49
SC	uS/cm	10690	13880	1311	1306	9969	9849	1286	1232	1225	12310	11625	10019	8988	12796
TEMP	deg C	13.74	9.24	12.58	12.41	11.95	12.33	13.3	13.73	13.98	11.7	16.3	12.3	14.9	11.6
TURB	NTU	4.18	3.3	0.98	0.59	0.8	1.69	1.57	1.28	0.94	1.24	1.31	2.19	4	2.59

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW28										
Sample Date		2016-11-10	2016-12-07	2017-01-09		2017-02-28	2017-03-27	2017-04-27	2017-06-27	2017-08-23	2017-10-03	2018-02-27
Sample Type		N	N	FD	N	N	N	N	N	N	N	N
Chemical Name	Unit											
CCR Appendix III												
Boron	mg/L	3.7	3.6	2.9	3	2.7	2.8	3.3	3.4	3.6	3.3	7.1
Calcium	mg/L	210	210	200	210	200	220	210	240	230	220	270
Chloride	mg/L	14	16	17 J	180 J	17	21	25	28	32	32	65
Fluoride	mg/L	0.36 J	0.32 J	0.36 J	3.3 JO	0.4 J	0.33 J	0.24 J	20 U	0.25 J	0.37 J	10 U
pH	SU	6.73	7.19		7.09	7.21	7.14	7.11	7.38	7.31	6.79	7.24
Sulfate	mg/L	650	540	570 J	370 J	570	700	580	690	710	690	1100
Total Dissolved Solids	mg/L	1100	1100	1100	1100	1100	1200	1100	1200	1300	1200	2000
CCR Appendix IV												
Antimony	mg/L	0.002 U	0.01 U	0.00048 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		
Arsenic	mg/L	0.003 J	0.0028 J	0.0036 J	0.0034 J	0.0037 J	0.0033 J	0.0034 J	0.0044 J	0.0039 J		
Barium	mg/L	0.19	0.18	0.19	0.2	0.17	0.19	0.17	0.18	0.2		
Beryllium	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Cadmium	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Chromium	mg/L	0.002 U	0.01 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U		
Cobalt	mg/L	0.00016 J	0.005 U	0.00068 J	0.00062 J	0.00068 J	0.00039 J	0.001 U	0.001 U	0.001 U		
Fluoride	mg/L	0.36 J	0.32 J	0.36 J	3.3 JO	0.4 J	0.33 J	0.24 J	20 U	0.25 J	0.37 J	10 U
Lead	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.00016 J	0.001 U	0.001 U	0.001 U		
Lithium	mg/L	0.0041 J	0.0078 J	0.0069 J	0.0074 J	0.009	0.009	0.01	0.04 U	0.0084 J+		
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ		
Molybdenum	mg/L	0.17	0.17	0.087 J+	0.13 J+	0.13	0.19	0.29	0.23	0.23		
Radium, Total	pCi/L	2.52	2.23	3.14	2.43	1.93	2.07	1.5	1.58	2.59		
Selenium	mg/L	0.005 U	0.025 U	0.00081 J	0.00048 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		
Thallium	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U		
Field Parameters												
DO	mg/L	0.45	0.14		0.25	0.12	0.1	0.26	0.16	0.33	0.17	0
ORP	millivolts	-81.2	-80.9		-36.3	-80.7	-90.6	-93	-94.7	-79.1	8.2	-93.9
pH	SU	6.73	7.19		7.09	7.21	7.14	7.11	7.38	7.31	6.79	7.24
SC	uS/cm	1172	1476		1444	1444	1116	1238	1493	1558	1519	2387
TEMP	deg C	16.12	9.01		10.44	9.96	9.58	9.8	13.91	16.32	17.1	9.5
TURB	NTU	4.85	4.32		4.97	4.78	4.52	3.41	3.94	1.32	0.91	10

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

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"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW28B													GAMW38			
Sample Date		2016-11-10	2016-12-08	2017-01-09	2017-03-01	2017-03-27		2017-04-27	2017-06-27	2017-08-23		2017-10-03	2018-02-28		2018-09-04	2019-02-27	2019-10-10	2020-03-19
Sample Type		N	N	N	N	FD	N	N	N	FD	N	N	FD	N	N	N	N	N
Chemical Name	Unit																	
CCR Appendix III																		
Boron	mg/L	3.6	4.3	4.3	4	4.2	4.1	4.5	4.8	5.9	5.8	7.2	4.2	4.3	0.76	0.82	1.1	0.98
Calcium	mg/L	250	280	280	240	230	230	230	260	300	280	300	260	260	82	79	100	72
Chloride	mg/L	120	130	130	130	150	160	100	190	160	170	160	77	79	5.6	6.1	6.2	4.5
Fluoride	mg/L	20 U	1 U	20 U	10 U	20 U	20 U	20 U	50 U	20 U	20 U	20 U	10 U	10 U	0.27 J	0.15	0.23	0.2
pH	SU	6.8	7.13	7.1	7.43		7.08	7.26	7.17		7.07	6.62		7.13	7.19	7.33	7.18	7.5
Sulfate	mg/L	1800	1900	1900	1900	2200	2200	1600	2200	2700	2700	2500	1400	1500	160	200	350	195
Total Dissolved Solids	mg/L	2900	3700	3900	3200	3800	3800	2700	3700	4600	4600	5700	600 J	2500 J	500	540	790	471
CCR Appendix IV																		
Antimony	mg/L	0.002 U	0.01 U	0.0016 J	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U							
Arsenic	mg/L	0.00091 J	0.025 U	0.0013 J	0.005 U	0.00065 J	0.00061 J	0.00097 J	0.025 U	0.005 U	0.005 U							
Barium	mg/L	0.061	0.074	0.08	0.081	0.082	0.082	0.074	0.061	0.08	0.076							
Beryllium	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Cadmium	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Chromium	mg/L	0.002 U	0.01 U	0.002 U	0.002 U	0.00028 J	0.00032 J	0.002 U	0.01 U	0.002 U	0.002 U							
Cobalt	mg/L	0.001 U	0.005 U	0.00034 J	0.001 U	0.001 U	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U							
Fluoride	mg/L	20 U	1 U	20 U	10 U	20 U	20 U	20 U	50 U	20 U	20 U	20 U	10 U	10 U	0.27 J	0.15	0.23	0.2
Lead	mg/L	0.001 U	0.005 U	0.001 U	0.001 U	0.001 U	0.00018 J	0.001 U	0.001 U	0.001 U	0.001 U							
Lithium	mg/L	0.0071 J	0.011 J	0.01	0.0094	0.01	0.011	0.01	0.011 J	0.013 J+	0.011 J+							
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ	0.0002 UJ							
Molybdenum	mg/L	0.4	0.51	0.5 J+	0.55	0.57	0.56	0.38	0.41	0.74	0.7							
Radium, Total	pCi/L	2.25	3.67	3.62	2.28	2.55	2.73	1.26	1.84	2.74	3.02							
Selenium	mg/L	0.005 U	0.025 U	0.0021 J	0.005 U	0.0009 J	0.00065 J	0.005 U	0.025 U	0.005 U	0.005 U							
Thallium	mg/L	0.001 U	0.005 U	0.00042 J	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U							
Field Parameters																		
DO	mg/L	0.33	0.33	0.31	0.27		0.15	0.2	0.1		0.5	0.28		12.2	0.22	1.15	0.33	0.05
ORP	millivolts	-100	-49.9	-96	-117.7		-104.4	-96.8	-86.3		-42.2	-15.7		-88.6	123.3	-105.1	-73.1	-107.2
pH	SU	6.8	7.13	7.1	7.43		7.08	7.26	7.17		7.07	6.62		7.13	7.19	7.33	7.18	7.5
SC	uS/cm	2847	4258	4601	4337		3203	2900	4663		4926	5011		2657	662	551	769	747
TEMP	deg C	13.96	12.32	12.39	11.87		11.55	11.21	12.79		13.35	14.14		11.8	17.04	8.08	16	8.1
TURB	NTU	0.8	0.83	0.59	0.6		2.17	1.26	0.93		0.78	1		4.89	2.43	2.67	1.71	3.85

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW38B					GAMW39				GAMW39B				GAMW40				
Sample Date		2018-09-04	2019-02-27	2019-10-10		2020-03-19	2018-09-04	2019-02-27	2019-12-05	2020-03-23	2018-09-05	2019-02-28	2019-12-05	2020-03-23	2018-09-05	2019-02-28	2019-10-10		2020-03-23
Sample Type		N	N	FD	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	N
Chemical Name	Unit																		
CCR Appendix III																			
Boron	mg/L	9.4	7.3	6.4	6.5	5.4	2	1.2	1.3	0.93	17	16	15	11.1	3.1	3.2	3	2.9	3.1
Calcium	mg/L	280	240	230	230	239	270	170	180	165	380	360	400	429	270	250	280	270	269
Chloride	mg/L	54	40	33	33	29.2	21	13	11	7.2	110	76	62	51.8	14	14	15	15	10.7
Fluoride	mg/L	10 U	0.088	0.11	0.13	0.083	10 U	0.25	0.22	0.25	20 U	0.075	0.078 J	0.078	10 U	0.089	0.13	0.13	0.2
pH	SU	6.89	7.06		6.93	7	6.64	6.86	6.18	6.86	6.95	6.91	5.32	6.89	6.57	6.7		6.52	6.71
Sulfate	mg/L	1200	910	780	760	683	310	250	240	187	1900	1500	1500	1160	380	370	330	330	376
Total Dissolved Solids	mg/L	2300	1800	1600	1700	1340	1300	880	890	723	3600	2700	2300	2350	1400	1400	1600 J	3000 J	1330
CCR Appendix IV																			
Antimony	mg/L																		
Arsenic	mg/L																		
Barium	mg/L																		
Beryllium	mg/L																		
Cadmium	mg/L																		
Chromium	mg/L																		
Cobalt	mg/L																		
Fluoride	mg/L	10 U	0.088	0.11	0.13	0.083	10 U	0.25	0.22	0.25	20 U	0.075	0.078 J	0.078	10 U	0.089	0.13	0.13	0.2
Lead	mg/L																		
Lithium	mg/L																		
Mercury	mg/L																		
Molybdenum	mg/L																		
Radium, Total	pCi/L																		
Selenium	mg/L																		
Thallium	mg/L																		
Field Parameters																			
DO	mg/L	0.73	0.13		0.17	0.25	0.58	0.5	0.08	0.04	0.45	0.1	0.6	0.03	0.55	0.11		0.3	0.06
ORP	millivolts	-57	-81.3		-61.5	-78.3	-41.3	-40	29.7	-30.1	-178.5	-67.5	26.1	-53.1	-86.2	-36.1		-8.9	21
pH	SU	6.89	7.06		6.93	7	6.64	6.86	6.18	6.86	6.95	6.91	5.32	6.89	6.57	6.7		6.52	6.71
SC	uS/cm	2398	1632		1317	1801	1583	870	864	1128	3740	2525	2223	2868	1863	1389		1503	1909
TEMP	deg C	14.65	10.4		13.8	10.3	17.54	9.12	13.1	8.4	14.8	11.53	13.3	10.9	17.95	9.6		17.6	8.5
TURB	NTU	2.69	3.47		4.16	4.41	1.21	4.57	4.1	4.69	1.91	2.69	3.95	4.62	1.49	1.88		1.49	3.81

Note:

mg/L = milligrams per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celsius

NTU = Nephelometric Turbidity Units

SU = Standard Units

pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Table 1: Analytical Data
CCR Unit Schahfer Landfill Phase V and VI
NIPSCO LLC Rollin M. Schahfer Generating Sta
Wheatfield, Indiana

Location		GAMW40B				GAMW41			GAMW41B		
Sample Date		2018-09-05	2019-02-28	2019-10-10	2020-03-23	2019-02-28	2019-10-10	2020-03-24	2019-03-01	2019-10-10	2020-03-24
Sample Type		N	N	N	N	N	N	N	N	N	N
Chemical Name	Unit										
CCR Appendix III											
Boron	mg/L	30	32	31	34.2	17	11	32.7	33	27	0.1 U
Calcium	mg/L	240	210	220	236	350	260	259	310	98	1 U
Chloride	mg/L	880	770	790	774	480	360	171	890	760	782
Fluoride	mg/L	100 U	0.82	0.96	0.91	0.39	0.45	0.33	0.8	0.93	0.53
pH	SU	7.86	7.91	7.68	8.18	6.91	6.94	7.3	7.73	7.81	8.25
Sulfate	mg/L	6700	6500	6400	6430	4800	3300	2500	7800	7000	7020
Total Dissolved Solids	mg/L	15000	8900	11000	10600	7100	6100	4290	12000	4000	11300
CCR Appendix IV											
Antimony	mg/L										
Arsenic	mg/L										
Barium	mg/L										
Beryllium	mg/L										
Cadmium	mg/L										
Chromium	mg/L										
Cobalt	mg/L										
Fluoride	mg/L	100 U	0.82	0.96	0.91	0.39	0.45	0.33	0.8	0.93	0.53
Lead	mg/L										
Lithium	mg/L										
Mercury	mg/L										
Molybdenum	mg/L										
Radium, Total	pCi/L										
Selenium	mg/L										
Thallium	mg/L										
Field Parameters											
DO	mg/L	0.33	0.46	0.2	0.22	0.04	0.19	0.05	0.02	0.18	0.06
ORP	millivolts	-166.5	-154.1	-137.3	-134.1	-50.2	-57.1	-51.4	-181.4	-139.4	-145.3
pH	SU	7.86	7.91	7.68	8.18	6.91	6.94	7.3	7.73	7.81	8.25
SC	uS/cm	12982	9971	9761	13504	6783	6018	4931	11912	11044	13916
TEMP	deg C	15.5	12.3	15.7	8.8	10.47	19.1	7.6	15.24	17.3	9.7
TURB	NTU	3.27	0.8	1.92	2.3	1.98	2.05	4.88	3.93	2.51	4.62

Note:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units
pCi/L = picocuries per liter

"U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.

"J" = Indicates the result was estimated below the RL but above the MDL by the analytical laboratory; the estimated value is provided.

"J+" = Indicates the result was estimated below the RL but above the MDL and maybe biased high; the estimated value is provided.

"J-" = Indicates the result was estimated below the RL but above the MDL and maybe biased low; the estimated value is provided.

"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Prepared by: DFSC
Checked by : KMC
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LF J 2019 Annual Groundwater Monitoring and Corrective Action Report- Landfill Phase V and Phase VI

January 2020

2019 Annual Groundwater Monitoring and Corrective Action Report - Landfill Phase V and Phase VI

NIPSCO LLC R. M. Schahfer Generating Station

Prepared Pursuant to 40 CFR §257.90(e) and Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

Submitted to:

Northern Indiana Public Service Company LLC
R.M. Schahfer Generating Station
Wheatfield, Indiana

Submitted by:

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January 31, 2020

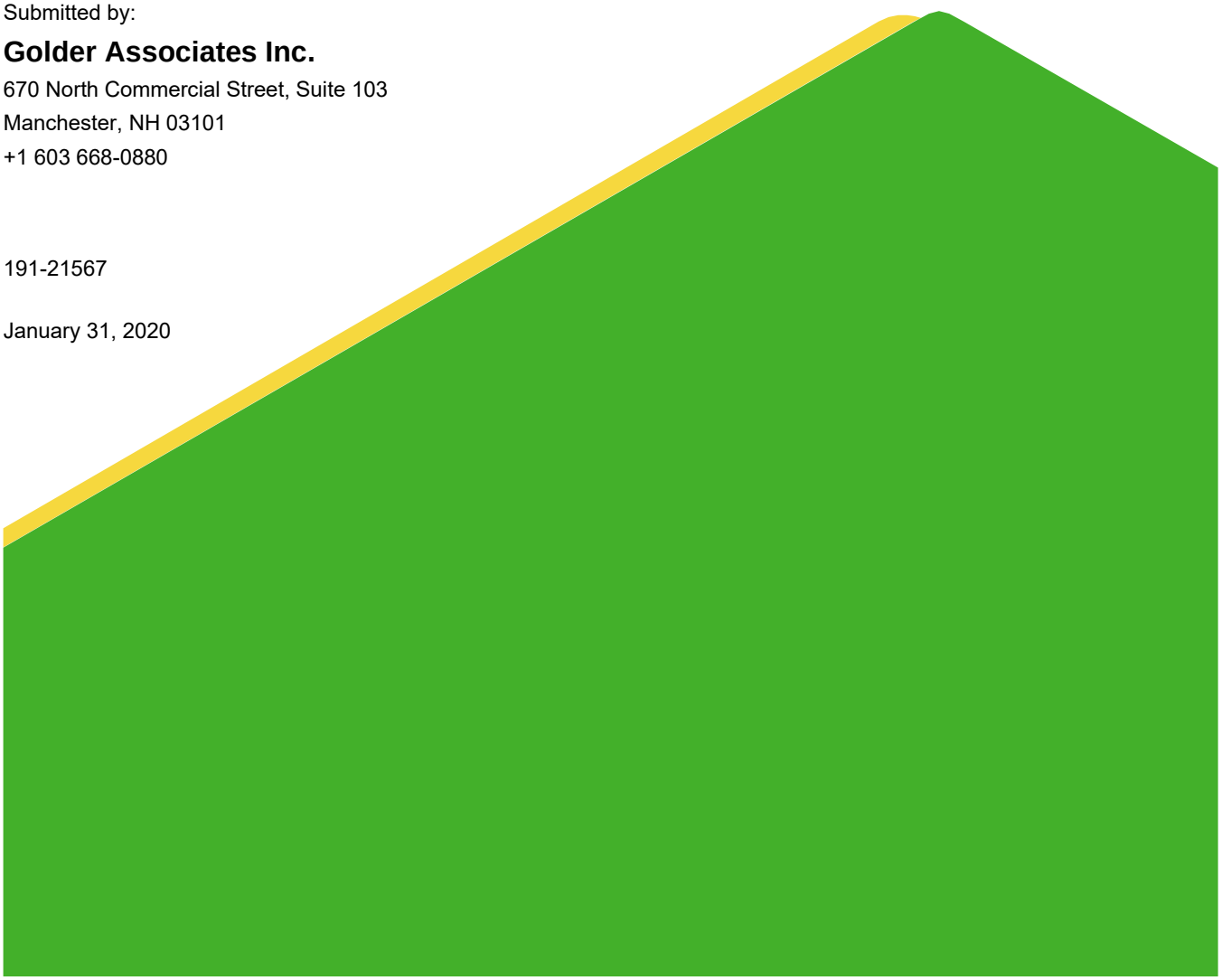


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1.0 INTRODUCTION

On behalf of Northern Indiana Public Service Company LLC (NIPSCO LLC), Golder Associates Inc. (Golder) prepared this 2019 Annual Groundwater Monitoring and Corrective Action Report (2019 Annual Report) for the Rollin M. Schahfer Generating Station (RMSGS, Schahfer) Landfill Phases V and VI (together, the CCR Unit) located at 2723 E 1500 N Road in Wheatfield, Jasper County, Indiana (Latitude 41° 12' 36" N and Longitude 87° 01' 48" W, see Figure 1). Phase V is an approximately 18-acre cell that stopped receiving CCR on April 1, 2017. Phase VI is an approximately 15-acre cell located due north of Phase V, which began receiving CCR on August 1, 2016. Closed, non-regulated (under the CCR Rule) Schahfer Landfill Phases I through IV are primarily located east of the CCR Rule-regulated landfill cells as shown in Figure 2. Golder prepared the 2019 Annual Report in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, “Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule” (CCR Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

To comply with the CCR Rule, NIPSCO LLC and Golder decided to monitor Phases V and VI as one CCR Unit due to the design, construction, and proximity of historical non-regulated landfill cells (i.e., Phases II and III) and because there is no practical means of monitoring groundwater between the two CCR landfill cells (i.e., Phases V and VI). In 2018, NIPSCO LLC began construction of a new landfill cell Phase VII, located adjacent to and immediately north of Phase VI, which will open in 2020. Consequently, the monitoring wells installed immediately downgradient of Phase VI were replaced with monitoring wells installed immediately downgradient of Phase VII. Routine monitoring activities performed during the reporting period include inspection of wells for integrity and security, measurement of groundwater levels prior to sample collection to assess groundwater flow direction, and collection of samples for laboratory analysis.

In conformance with the applicable requirements of 40 CFR §257.90(e)(1) through (5) and corresponding State of Indiana requirements, the 2019 Annual Report:

- Documents the status of the groundwater monitoring and corrective action program
- Provides figures showing the CCR Unit and monitoring well locations
- Summarizes key CCR Rule groundwater activities completed during calendar year 2019
- Includes CCR Rule groundwater monitoring data obtained in calendar year 2019
- Describes any problems encountered during monitoring activities
- Discusses actions taken to resolve the problems, if applicable
- Projects key activities for the upcoming year

2.0 GROUNDWATER MONITORING AND CORRECTIVE MEASURES PROGRAM STATUS

Starting in 2016 following the installation of a groundwater monitoring system and throughout calendar years 2017 and 2018, Golder collected background groundwater samples and performed Detection Monitoring at the CCR Unit pursuant to the requirements of 40 CFR §257.94. In 2019, Golder performed the fourth and fifth Detection Monitoring sampling events. Based upon groundwater monitoring results collected pursuant to the CCR Rule to date, corrective measures program requirements have neither been triggered nor implemented at the CCR Unit.

2.1 Key Actions Completed - 2019

NIPSCO LLC completed the following key actions relative to CCR Rule groundwater monitoring at the RMSGS Landfill Phases V and VI during calendar year 2019:

- Preparation of the of 2018 Groundwater Monitoring and Corrective Action Annual Report in January 2019 (2018 Annual Report, 40 CFR §257.90(e))
- Recertification of the RMSGS Landfill Phases V and VI Alternative Source Demonstration (ASD) in March 2019 (40 CFR §257.94(e))
- Performance of the fourth Detection Monitoring event in March 2019 (40 CFR §257.94)
- Evaluation of the results of the fourth Detection Monitoring event in June 2019 (40 CFR §257.95(d))
- Recertification of the RMSGS Landfill Phases V and VI ASD in September 2019 (40 CFR §257.94(e))
- Performance of the fifth Detection Monitoring event in September 2019 (40 CFR §257.94)

2.2 Monitoring System Modifications

No modifications were made to the groundwater monitoring network in 2019. An overview of the groundwater monitoring network is provided below.

Background Monitoring Wells	Downgradient Monitoring Wells	Decommissioned Monitoring Wells
GAMW-20, GAMW-24, GAMW-24B, GAMW-25, GAMW-25B	GAMW-26, GAMW-26B, GAMW-27, GAMW-27B, GAMW-38, GAMW-38B, GAMW-39, GAMW-39B, GAMW-40, GAMW-40B, GAMW-41, GAMW-41B	GAMW-21, GAMW-21B, GAMW-22, GAMW-22B, GAMW-23, GAMW-23B, GAMW-28, GAMW-28B

Table 1 provides a summary of the well rationale/purpose and date of installation. Golder installed, developed, and surveyed the wells in accordance with the CCR Groundwater Monitoring Program Implementation Manual prepared by Golder in October 2017.

2.3 Background Monitoring (2016 to 2017)

Per the requirements of 40 CFR §257.94, Golder collected eight independent background groundwater samples from each background and downgradient well between July 2016 and August 2017. Golder used the results of the background monitoring phase to develop appropriate, statistically valid background values for each constituent/monitoring well. Golder submitted the samples to a contract laboratory, in accordance with chain of custody and quality assurance/quality control procedures, for analysis of 40 CFR Part 257 Appendix III and Appendix IV constituents. In addition, Golder personnel measured field water quality parameters including specific conductance, temperature, dissolved oxygen, turbidity, oxidation-reduction potential, and pH. The background data set is included in the 2017 Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2018 (2017 Annual Report).

2.4 Detection Monitoring

Golder performed the first Detection Monitoring event in October 2017, followed by a statistical evaluation and data analysis in January 2018. Golder collected groundwater samples from Landfill Phases V and VI background and downgradient monitoring wells for analysis of Appendix III constituents per 40 CFR §257.94 and included the

results in the 2017 Annual Report. Following receipt and validation of laboratory results, Golder evaluated the results of the first Detection Monitoring sampling event to compare the concentration of 40 CFR Part 257 Appendix III constituents relative to facility background concentrations. Using Sanitas™ software, Golder pooled the background data to calculate prediction limits and compared the October 2017 results to the calculated prediction limits to identify statistically significant increases (SSIs).

Golder determined that SSIs existed for Phases V and VI in January 2018. Golder identified a potential alternative source that could explain the SSIs and prepared an ASD. A qualified Indiana-licensed professional engineer certified the ASD in April 2018. The ASD supports the findings that the SSIs determined in January 2018 do not result from a release from the CCR Unit. The key supporting lines of evidence described in the ASD indicate that the closed, non-regulated phases of the landfill (i.e., Phases I and II) are the source of the SSIs. Therefore, no further action (i.e., Assessment Monitoring) is warranted, and Phases V and VI will remain in Detection Monitoring. The ASD is presented in Appendix A of the 2018 Annual Groundwater Monitoring and Corrective Action Report, dated January 31, 2019 (2018 Annual Report).

Golder performed the second Detection Monitoring event in February 2018, followed by a statistical evaluation and data analysis in May 2018 that determined that SSIs existed for Phases V and VI. Consistent with the previous evaluation, Golder identified a potential alternative source that explained the SSIs. A qualified Indiana-licensed professional engineer recertified the ASD in August 2018 (Appendix B of the 2018 Annual Report). Golder performed the third Detection Monitoring event in September 2018 followed by a statistical evaluation and data analysis in December 2018 that determined that SSIs existing for Phases V and VI. Consistent with previous evaluations, Golder identified a potential alternative source that explained the SSIs. A qualified Indiana-licensed professional engineer recertified the ASD in March 2019 (Appendix A). The results from the second and third Detection Monitoring events are included in the 2018 Annual Report.

Golder performed the fourth Detection Monitoring event in February/March 2019 followed by a statistical evaluation and data analysis in June 2019. The SSIs identified are summarized in the table below by downgradient monitoring well and constituent. Consistent with previous evaluations, Golder identified a potential alternative source that explained the SSIs. A qualified Indiana-licensed professional engineer recertified the ASD in September 2019 (Appendix B).

	Boron	Calcium	Chloride	Fluoride	Sulfate	pH[1]	Total Dissolved Solids
GAMW-26							
GAMW-26B							
GAMW-27	X	X			X		X
GAMW-27B	X		X		X		X
GAMW-38							
GAMW-38B	X	X	X		X		X
GAMW-39		X					
GAMW-39B	X	X	X		X		X

	Boron	Calcium	Chloride	Fluoride	Sulfate	pH[1]	Total Dissolved Solids
GAMW-40	X	X					X
GAMW-40B	X	X	X		X	X	X
GAMW-41	X	X	X		X		X
GAMW-41B	X	X	X		X		X

"X" represents an SSI
1 = pH value is based on field water quality meter reading

Golder performed the fifth Detection Monitoring event in October 2019 and will perform the statistical evaluation and data analysis in February 2020.

2.5 Statistical Evaluation

Subsequent to each monitoring event, Golder assessed the analytical data for outliers, anomalies, and trends that may be an indication of a sampling or analytical error. Outliers and anomalies are generally defined as inconsistently large or small values that can occur as a result of sampling, laboratory, transportation, or transcription errors, or even by chance alone. Significant trends may indicate natural geochemical variability, a source of systematic error, influence of an upgradient/off-site source, or an actual occurrence of CCR Unit influence upon groundwater quality. Appropriate statistical methods are used to remove outliers from the database and manage trends with detrending routines, prior to the calculation of statistical limits. To assess the data for outliers, anomalies, and trends, Golder assessed the data using time vs. concentration graphs, and statistical routines included in the Sanitas™ statistical analysis software package. Golder has not identified any additional outliers since the 2018 Annual Report. Golder will continue to monitor trends and, if the CCR Unit enters Assessment Monitoring, detrending routines will be performed before using these data to calculate GWPS.

2.6 Problems Encountered and Follow-Up Corrective Actions

During the October 2019 monitoring event, groundwater samples were not collected from GAMW-39/39B due to administrative oversight. Samples were collected from these wells on December 5, 2019 to meet the semi-annual sampling requirement for 2019.

In the fourth Detection Monitoring event (October 2019), groundwater was sampled from GAMW-20 at a turbidity level of approximately 7.5 nephelometric turbidity units (NTUs). According to the CCR Groundwater Monitoring Program Implementation Manual (Golder 2017), groundwater samples are to be collected once a well has achieved a turbidity level below 5 NTUs. Due to time constraints in the field, wells were purged for a minimum of two hours and sampled when turbidity appeared to stabilize (e.g., no downward or upward trend over three consecutive readings five minutes apart). Evaluation of the analytical results from this well suggests that the slightly elevated turbidity levels had no significant effect on the representativeness of the samples of groundwater quality. Moving forward, wells will be purged for two hours or five well volumes, whichever is shorter. Professional judgement will then be used to determine when the purge water is representative of groundwater for sampling. In the event that an acceptable turbidity level cannot be achieved within a reasonable timeframe (e.g. three hours), Golder will redevelop the affected monitoring wells prior to the next sampling event.

3.0 KEY ACTIVITIES PROJECTED FOR 2020

During calendar year 2020, NIPSCO LLC anticipates conducting the following key CCR Rule groundwater monitoring activities for the RMSGS Landfill Phases V and VI:

- Prepare and submit the appropriate notifications according to the CCR Rule;
- Continue semi-annual Detection Monitoring groundwater sampling per CCR Rule requirements; and
- Inspect and maintain monitoring system including wells, pumps, and equipment.

4.0 REFERENCES

Golder Associates, “2017 Annual Groundwater Monitoring and Corrective Action Report- Landfill Phase V and Phase VI NIPSCO R. M. Schahfer Generating Station”, January 31, 2018.

Golder Associates, “2018 Annual Groundwater Monitoring and Corrective Action Report- Landfill Phase V and Phase VI NIPSCO R. M. Schahfer Generating Station”, January 31, 2019.

Golder Associates, “Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration”, August 28, 2018.

Golder Associates, “Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration”, April 13, 2018.

Tables

Table 1: Monitoring Well Network
CCR Unit Schahfer Landfill Phases V and VI
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

CCR Unit	Well Purpose	Monitoring Well ID	Installation Date	Decommission Date (If Applicable)	Basis For Action
LANDFILL Phase V and Phase VI	Background Monitoring Well	GAMW-20	5/27/2016	-	Installed for Groundwater Quality Monitoring[1]
		GAMW-24	9/26/2016	-	
		GAMW-24B	9/26/2016	-	
		GAMW-25	10/4/2016	-	
		GAMW-25B	10/5/2016	-	
	Downgradient Monitoring Well	GAMW-21	5/31/2016	4/5/2018	Abandoned due to Landfill Construction Activities[2]
		GAMW-21B	5/31/2016	4/5/2018	
		GAMW-22	5/31/2016	4/5/2018	
		GAMW-22B	6/2/2016	4/5/2018	
		GAMW-23	6/2/2016	4/6/2018	
		GAMW-23B	6/2/2016	4/6/2018	
		GAMW-28	9/29/2016	4/6/2018	
		GAMW-28B	9/29/2016	4/6/2018	
		GAMW-26	10/4/2016	-	Installed for Groundwater Quality Monitoring[1]
		GAMW-26B	10/4/2016	-	
		GAMW-27	10/3/2016	-	
		GAMW-27B	10/4/2016	-	
		GAMW-38	4/4/2018	-	Installed to Replace Abandoned Well[3]
		GAMW-38B	4/3/2018	-	
		GAMW-39	4/4/2018	-	
		GAMW-39B	4/4/2018	-	
		GAMW-40	4/5/2018	-	
		GAMW-40B	4/4/2018	-	
		GAMW-41	5/17/2018	-	
		GAMW-41B	5/17/2018	-	

Notes:

1) Per the CCR Rule requirements, Golder collected eight rounds of background data prior to October 17, 2017.

2) Monitoring well was abandoned due to the construction of landfill phase VII.

3) Monitoring well was installed to replace an abandoned monitoring well. Well was first sampled in September 2018.

Prepared by: AMH
Checked by: KMC
Reviewed by: MAH

Table 2: Summary of Sampling Events
CCR Unit Schahfer Landfill Phases V and VI
NIPSCO LLC Rollin M. Schahfer Generating Station
Wheatfield, Indiana

Well Purpose	Monitoring Well ID	Sample Event #14	Sample Event #15	Total Number of Samples
Purpose of Sample		Detection Monitoring	Detection Monitoring	
Sample Parameters		Appendix III	Appendix III	
Background Monitoring Well	GAMW-20	2/26/2019	10/9/2019	2
	GAMW-24	2/27/2019	10/7/2019	2
	GAMW-24B	2/27/2019	10/7/2019	2
	GAMW-25	2/28/2019	10/8/2019	2
	GAMW-25B	2/28/2019	10/8/2019	2
	GAMW-26	2/28/2019	10/8/2019	2
	GAMW-26B	2/28/2019	10/8/2019	2
	GAMW-27	2/26/2019	10/9/2019	2
	GAMW-27B	2/27/2019	10/9/2019	2
	GAMW-38	2/27/2019	10/10/2019	2
	GAMW-38B	2/27/2019	10/10/2019	2
	GAMW-39	2/27/2019	12/5/2019(2)	2
	GAMW-39B	2/28/2019	12/5/2019(2)	2
	GAMW-40	2/28/2019	10/10/2019	2
	GAMW-40B	2/28/2019	10/10/2019	2
	GAMW-41	2/28/2019	10/10/2019	2
	GAMW-41B	3/1/2019	10/10/2019	2
Total Number of Samples		17	17	34

Notes:

Sample counts do not include QA/QC samples.

(1) Sample events #1-#13 were completed prior to 2019. The purpose, sample parameters, and sample dates are included in the 2017 Annual Report and the 2018 Annual Report.

(2) Sample was not collected during the October 2019 sample event due to administrative oversight. Samples were collected from these wells on December 5, 2019 to meet the semi-annual sampling requirement for 2019.

Prepared by: DFS
Checked by: AMH
Reviewed by: MAH

Table 3: Analytical Data
CCR Unit R. M. Schahfer Landfill
NIPSCO LLC R. M. Schahfer Schahfer Generating Station
Wheatfield, Indiana

Analyte	Unit	GAMW-20			GAMW-24		GAMW-24B		GAMW-25			GAMW-25B		GAMW-26		GAMW-26B		GAMW-27		GAMW-27B	
		2019-02-26	2019-02-26	2019-10-09	2019-02-27	2019-10-07	2019-02-27	2019-10-07	2019-02-28	2019-02-28	2019-10-08	2019-02-28	2019-10-08	2019-02-28	2019-10-08	2019-02-28	2019-10-08	2019-02-26	2019-10-09	2019-02-27	2019-10-09
		FD	N	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	N	N	N	N
CCR Appendix III																					
Boron	mg/L	2.9	2.8	3.8	0.055 J	0.057 J	0.056 J	0.059 J	0.16	0.16	0.23	0.14	0.14	0.26	0.23	0.36	0.36	5.7	4.5	11	11
Calcium	mg/L	140	140	200	83	76	55	52	69	70	68	83	73	87	65	75	120	260	170	90	230
Chloride	mg/L	15	14	13	19	15	5.3	5.1	2.4	2.3	2.4	7.1	5.7	1.3	2.2	17	33	29	17	440	390
Fluoride	mg/L	0.21	0.2	0.24	0.12	0.12	0.11	0.13	1.1	1.1	1.5	0.19	0.23 J+	2.3	3.2	0.18	0.21 J+	0.32	0.45	0.13 J	0.17 J
pH	SU		3.69	7.48	7.37	7.34	7.62	7.81		6.84	7.26	7.06	6.99	7.14	7.54	7.3	7.38	7.15	7.51	7.52	7.65
Sulfate	mg/L	470	470	670	80	69	46	44	63	64	65	66	84	81	85	200	410	730	450	7000	6000
Total Dissolved Solids	mg/L	1100	1100	1200	370	320	250	230	320 J+	330 J+	350 J+	360 J+	340 J+	420 J+	350 J+	590 J+	42 J+	1400	920	13000	8500
Sample Parameters																					
Dissolved Oxygen	mg/L		0.59	0.10	0.2	0.38	0.38	0.14		5.6	3.13	0.23	0.46	1.02	0.65	1.9	2.04	0.57	0.42	0.47	0.29
Oxidation-Reduction Potential	millivolts		-34.6	47.1	-12.9	67.7	-25.8	-91.9		-11.4	89.1	-29.5	77.6	-17.5	58.6	-15.6	26	-55.1	39.3	-124.8	70.2
pH	SU		7.1	7.49	7.37	7.34	7.62	7.81		6.84	7.26	7.06	6.99	7.14	7.54	7.3	7.38	7.15	7.51	7.52	7.65
Specific Conductivity	uS/cm		1096	1314	384	407	282	253		306	421	407	377	422	409	644	840	1164	951	10019	8988
Temperature	deg c		9.57	17.4	7.56	16.2	10.1	13.3		5.82	16.9	9.35	13.1	7.64	17.5	9.99	13.4	9.7	17.5	12.3	14.9
Turbidity	ntu		3.69	7.48	4.66	4.12	4.97	3.69		2.12	2.9	2.47	1.69	1.89	1.6	4.86	4.35	1.8	1.08	2.19	4

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated may be biased high.

Table 3: Analytical Data
CCR Unit R. M. Schahfer Landfill
NIPSCO LLC R. M. Schahfer Schahfer Genera
Wheatfield, Indiana

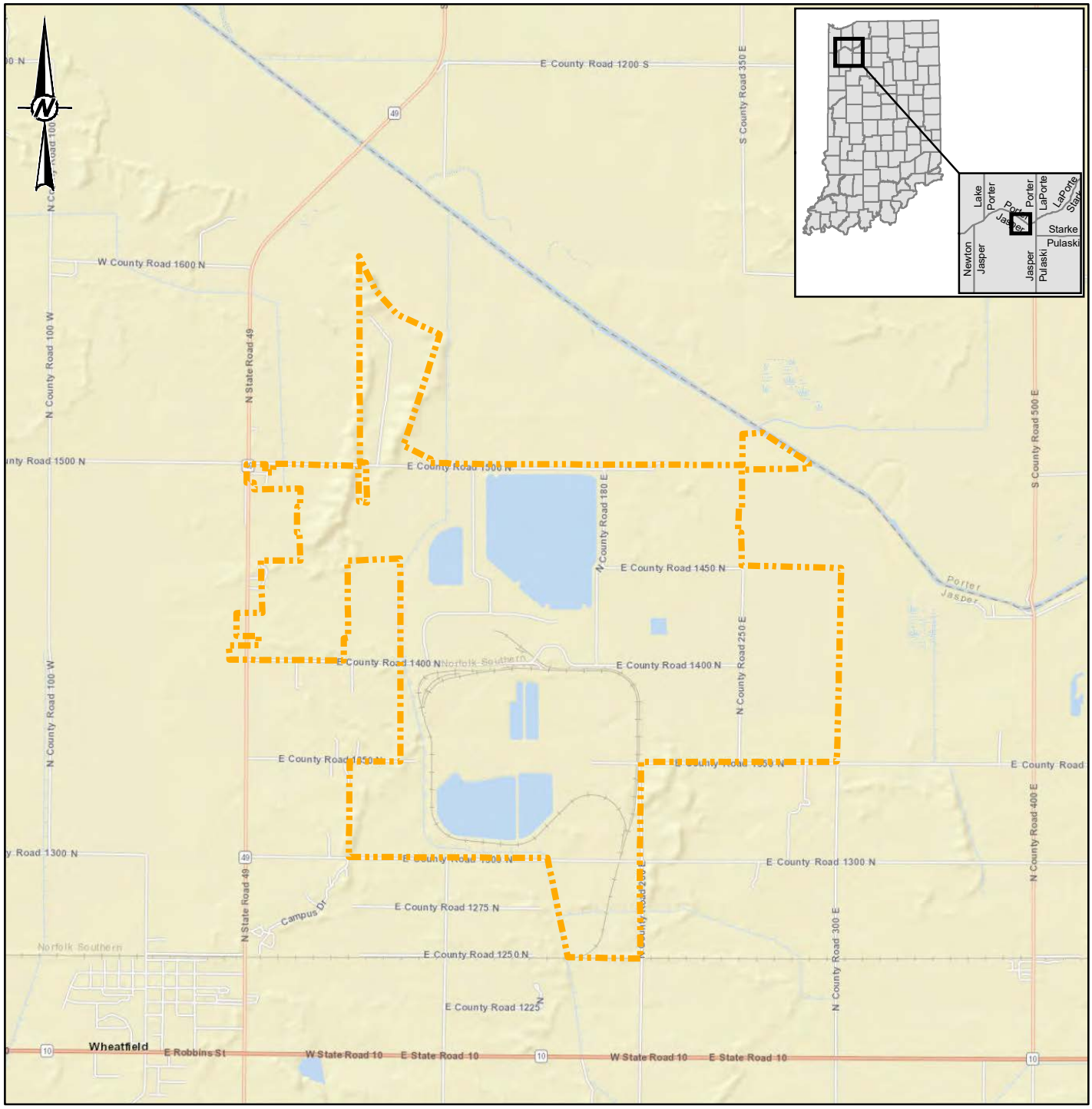
Analyte	Unit	GAMW-38		GAMW-38B			GAMW-39		GAMW-39B		GAMW-40			GAMW-40B		GAMW41		GAMW41B	
		2019-02-27	2019-10-10	2019-02-27	2019-10-10	2019-10-10	2019-02-27	2019-12-05	2019-02-28	2019-12-05	2019-02-28	2019-10-10	2019-10-10	2019-02-28	2019-10-10	2019-02-28	2019-10-10	2019-03-01	2019-10-10
		N	N	N	FD	N	N	N	N	N	N	FD	N	N	N	N	N	N	N
CCR Appendix III																			
Boron	mg/L	0.82	1.1	7.3	6.4	6.5	1.2	1.3	16	15	3.2	3	2.9	32	31	17	11	33	27
Calcium	mg/L	79	100	240	230	230	170	180	360	400	250	280	270	210	220	350	260	310	98
Chloride	mg/L	6.1	6.2	40	33	33	13	11	76	62	14	15	15	770	790	480	360	890	760
Fluoride	mg/L	0.15	0.23	0.088	0.11	0.13	0.25	0.22	0.075	0.078 J	0.089	0.13	0.13	0.82	0.96	0.39	0.45	0.8	0.93
pH	SU	7.33	7.18	7.06		6.93	6.86	6.18	6.91	5.32	6.7		6.52	7.91	7.68	6.91	6.94	7.73	7.81
Sulfate	mg/L	200	350	910	780	760	250	240	1500	1500	370	330	330	6500	6400	4800	3300	7800	7000
Total Dissolved Solids	mg/L	540	790	1800	1600	1700	880	890	2700	2300	1400	1600 J	3000 J	8900	11000	7100	6100	12000	4000
Sample Parameters																			
Dissolved Oxygen	mg/L	1.15	0.33	0.13		0.17	0.5	0.08	0.1	0.6	0.11		0.3	0.46	0.2	0.04	0.19	0.02	0.18
Oxidation-Reduction Potential	millivolts	-105.1	-73.1	-81.3		-61.5	-40	29.7	-67.5	26.1	-36.1		-8.9	-154.1	-137.3	-50.2	-57.1	-181.4	-139.4
pH	SU	7.33	7.18	7.06		6.93	6.86	6.18	6.91	5.32	6.7		6.52	7.91	7.68	6.91	6.94	7.73	7.81
Specific Conductivity	uS/cm	551	769	1632		1317	870	864	2525	2223	1389		1503	9971	9761	6783	6018	11912	11044
Temperature	deg c	8.08	16	10.4		13.8	9.12	13.1	11.53	13.3	9.6		17.6	12.3	15.7	10.47	19.1	15.24	17.3
Turbidity	ntu	2.67	1.71	3.47		4.16	4.57	4.1	2.69	3.95	1.88		1.49	0.8	1.92	1.98	2.05	3.93	2.51

Notes:
mg/L = milligrams per liter
uS/cm = micro Siemens per centimeter
deg C = degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units

"U" = Indicates the result was not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provided.
"J" = Indicates the result is estimated.
"J+" = Indicates the result is estimated may be biased high.

Prepared by: AMH
Checked by: DFS
Reviewed by: MAH

Figures



LEGEND

Approximate Property Line

0 0.75 1.5

1 " = 0.75 miles Miles

REFERENCE(S)

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

SITE LOCATION MAP

CONSULTANT

GOLDER

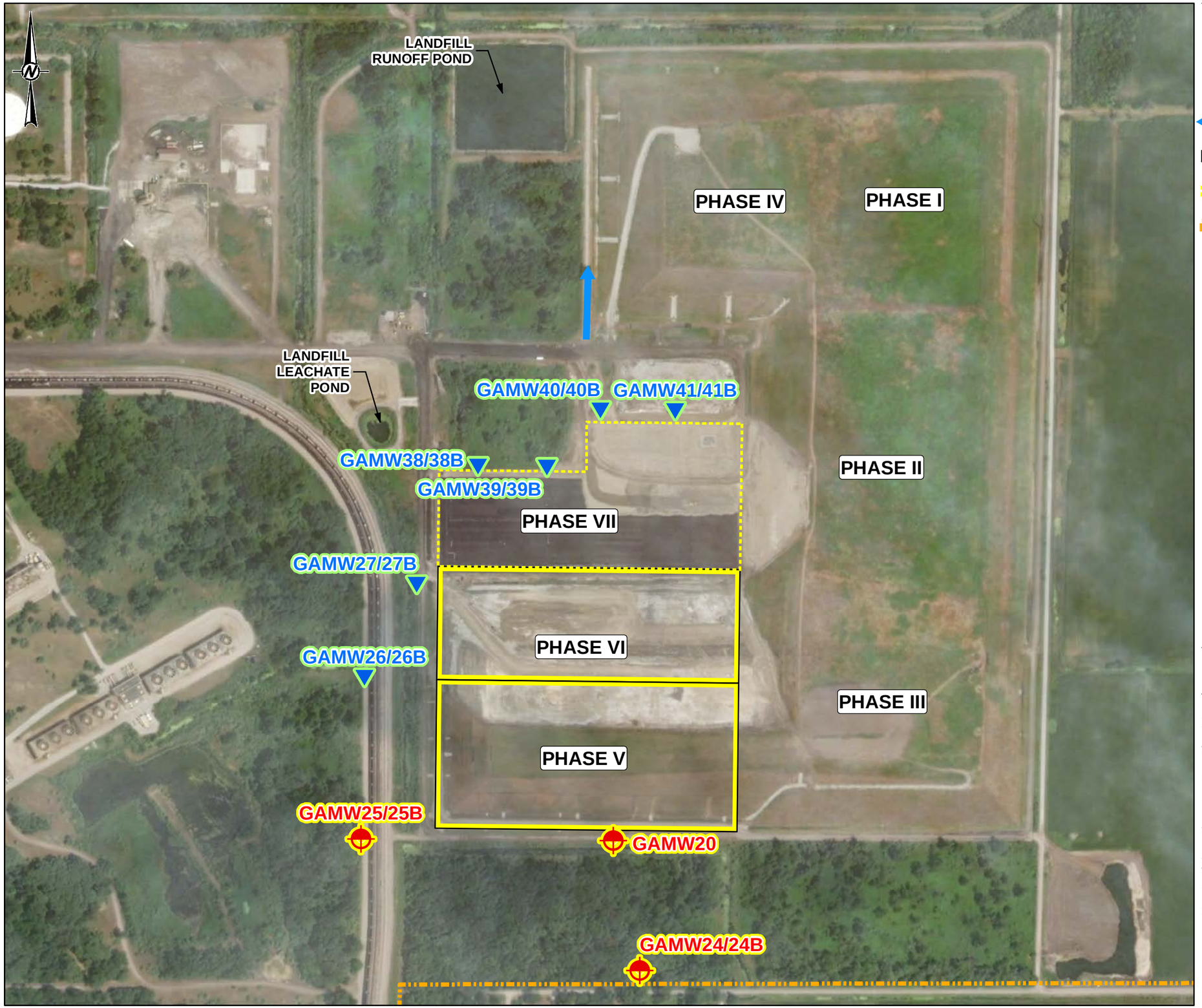
YYYY-MM-DD	12/31/2019
DESIGNED	DFS
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

1 in
0



LEGEND

- Background Monitoring Well
- Downgradient Monitoring Well
- Generalized Groundwater Flow Direction
- CCR Units
- Phase VII (Constructed but not yet receiving waste)
- Approximate Property Line

0 400 800

1 " = 400 feet Feet

NOTE(S)

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY LLC

PROJECT

R.M. SCHAHFER GENERATING STATION
WHEATFIELD, INDIANA

TITLE

WELL LOCATION MAP
SCHAHFER LANDFILL PHASE V AND VI

CONSULTANT

GOLDER

YYYY-MM-DD	1/22/2020
DESIGNED	DFS
PREPARED	SHL
REVIEWED	JSP
APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
19121567	A	0	2

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

APPENDIX A

RMSGS Landfill Phases V and VI Alternative Source Demonstration March 2019

Northern Indiana Public Service Company

R. M. Schahfer Generating Station

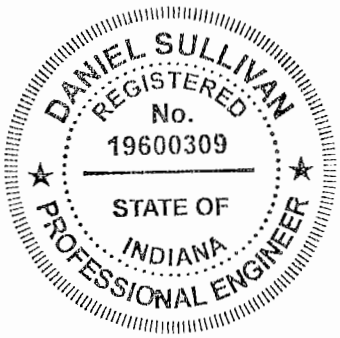
Wheatfield, Indiana

Schahfer Landfill Phase V and Phase VI

Certification of Alternative Source Demonstration

40 CFR §257.94(e)(2) & Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

I, Daniel Sullivan, being a Professional Engineer in accordance with the laws of the State of Indiana, and having experience in the design, construction, and operation of restricted waste landfills and groundwater monitoring systems for them, do hereby state that I am qualified in the subject matter of CCR management, groundwater monitoring, data interpretation, and groundwater impacts. I have personally examined and am familiar with this alternative source demonstration (ASD), the subject of which is non-CCR regulated landfill cells located at the NIPSCO R. M. Schahfer Generating Station, prepared by Golder, and dated March 2019. Based on an inquiry of those individuals immediately responsible, and on supporting data which I understand to be true, accurate and complete, I verify the information in this ASD is accurate and meets the applicable requirements of the CCR Final Rule. In consideration of the above, I certify to the best of my knowledge, information, and belief, that the ASD for the regulated CCR management unit referred to as Phase V and Phase VI has been prepared and meets the applicable requirements of 40 CFR §257.94(e)(2) and corresponding State of Indiana requirements.



Daniel Sullivan
Indiana Professional Engineer
License # 19600309

3-21-19
Date

TECHNICAL MEMORANDUM

DATE March 21, 2019 **Project No.** 164817101

TO Marc Okin, Dan Sullivan, NiSourceNiSource

CC Sasha Reyes, Maureen Turman, Craig Myers, Joe Kutch, Mark Haney, Jim Peace

FROM Danielle Sylvia **EMAIL dsylvia@golder.com**

RE: R.M. SCHAHFER LANDFILL PHASE V AND VI ALTERNATIVE SOURCE DEMONSTRATION

On behalf of Northern Indiana Public Service Company (NIPSCO), Golder Associates Inc. (Golder) performed a statistical evaluation of groundwater analytical results from the third (September 2018) groundwater Detection Monitoring event at the Rollin M. Schahfer Generating Station (RMSGS) Landfill Phase V and Phase VI (CCR Unit) in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, “Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule” (CCR Final Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

The statistical analyses of Appendix III groundwater Detection Monitoring results indicated statistically significant increases (SSIs) for seven analytes in downgradient wells compared to background levels. Although determination of an SSI generally indicates that the groundwater monitoring program should transition from Detection Monitoring to Assessment Monitoring, 40 CFR §257.94(e)(2) allows the owner or operator (i.e., NIPSCO) to demonstrate that a source other than the CCR unit or another condition caused the apparent SSI(s). Golder identified similar SSIs after the first (October 2017) Detection Monitoring event at the RMSGS Landfill Phase V and Phase VI and submitted an Alternative Source Demonstration (ASD) on April 13, 2018. As described in the ASD, the conceptual site model, historical groundwater data, and landfill design indicate that the source of the identified SSIs is the non-regulated, unlined portion of the landfill, Phases I and II. Golder recertified the ASD based on the second (February/March 2018) Detection Monitoring Event, on August 28, 2018.

NIPSCO began construction of a new landfill cell (Phase VII) immediately north of Phase VI in 2018. Due to the proximity of Phase VII to Phase VI, Golder decommissioned monitoring wells GAMW-21/21B, GAMW-22/22B, GAMW-23/23B, and GAMW-28/28B, which were part of the original landfill monitoring network. Golder collected groundwater samples from these four well pairs from July 2016 to March 2018. To replace the decommissioned wells, Golder installed monitoring wells GAMW-38/38B, GAMW-39/39B, GAMW-40/40B, and GAMW-41/41B downgradient and along the waste boundary of Phase VII in April and May 2018.

Golder collected groundwater samples from the existing and newly-installed monitoring wells during the September 2018 semi-annual monitoring event with the exception of GAMW-41/41B, which were inaccessible due to landfill construction activities. Groundwater analytical data obtained from groundwater samples collected from the downgradient wells in September 2018 were consistent with historical analytical results, therefore, collection of groundwater samples from GAMW-41/41B were not considered necessary at this time and no further action was taken. Golder plans to collect groundwater samples from GAMW-41/41B during the next semi-annual groundwater monitoring event scheduled for February/March 2019.

Golder Associates Inc.
670 North Commercial Street, Suite 103, Manchester, NH 03101 T: +1 603 668-0880 F: +1 603 668-1199

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1.0 SUMMARY OF RESULTS

The results of the third Detection Monitoring event were included in the 2018 Annual Report and the results of the statistical analysis are summarized below. SSIs were detected in groundwater samples collected from monitoring wells downgradient of the RMSGS Landfill Phase V and Phase VI, for all Appendix III parameters. Overall, results are consistent with those collected previously and indicate few differences from the SSIs detected during the first and second Detection Monitoring events. The differences are likely due to normal or temporal fluctuations in groundwater quality. The third Detection Monitoring event SSI results are summarized by well number and compared to the results from the previous sample rounds in the table below.

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
GAMW21*							
GAMW21B*	1,2	1,2	1		1,2		1,2
GAMW22*		2					
GAMW22B*	1,2	1,2	1,2		1,2		1,2
GAMW23*	1,2	1,2			1,2	1,2	1,2
GAMW23B*	1,2	1,2	1,2		1,2	1,2	1,2
GAMW26				1,3			2
GAMW26B		1,3	3		1,3	3	1,3
GAMW27	1,2,3	1,2,3			1,2,3		1,2,3
GAMW27B	1,2,3	1,2,3	1,2,3		1,2,3	3	1,2,3
GAMW28*	1,2	1,2	1		1,2		1,2
GAMW28B*	1,2	1,2	1,2		1,2		1,2
GAMW38							
GAMW38B	3	3	3		3		3
GAMW39	3	3			3		3
GAMW39B	3	3	3		3		3
GAMW40	3	3			3		3
GAMW40B	3	3	3		3	3	3

“1” Indicates a statistically significant increase detected in the first Detection Monitoring event
“2” Indicates a statistically significant increase detected in the second Detection Monitoring event
“3” Indicates a statistically significant increase detected in the third Detection Monitoring event
“*” Indicates monitoring well was decommissioned prior to the third Detection Monitoring event

2.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSION

The preceding information indicates the results of the third Detection Monitoring event were similar to those from the first and second Detection Monitoring events, and the ASD dated April 13, 2018 is still applicable. Golder prepared the ASD in accordance with 40 CFR 257.94(e)(2) and supports the finding that the SSIs determined on December 23, 2018 are not due to release from the CCR Unit. As described in the ASD, the conceptual site model, historical groundwater data, and landfill design indicate that a release from the non-regulated, unlined portion of the landfill, Phases I and II, is the source of the identified SSIs. Therefore, no further action (i.e., Assessment Monitoring) is warranted, and the Schahfer Landfill Phases V and VI will remain in Detection Monitoring.

3.0 REFERENCES

Golder Associates, “Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration”, August 28, 2018.

Golder Associates, “Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration”, April 13, 2018.

APPENDIX B

RMSGS Landfill Phases V and VI Alternative Source Demonstration September 2019

Northern Indiana Public Service Company

R. M. Schahfer Generating Station

Wheatfield, Indiana

Schahfer Landfill Phase V and Phase VI

Certification of Alternative Source Demonstration

40 CFR §257.94{e)(2) & Corresponding Regulations under 329 Indiana Administrative Code 10-9-1

I, Daniel Sullivan, being a Professional Engineer in accordance with the laws of the State of Indiana, and having experience in the design, construction, and operation of restricted waste landfills and groundwater monitoring systems for them, do hereby state that I am qualified in the subject matter of CCR management, groundwater monitoring, data interpretation, and groundwater impacts. I have personally examined and am familiar with this alternative source demonstration (ASD), the subject of which is non-CCR regulated landfill cells located at the NIPSCO R. M. Schahfer Generating Station, prepared by Golder, and dated September 2019. Based on an inquiry of those individuals immediately responsible, and on supporting data which I understand to be true, accurate and complete, I verify the information in this ASD is accurate and meets the applicable requirements of the CCR Final Rule. In consideration of the above, I certify to the best of my knowledge, information, and belief, that the ASD for the regulated CCR management unit referred to as Phase V and Phase VI has been prepared and meets the applicable requirements of 40 CFR §257.94(e)(2) and corresponding State of Indiana requirements.

Daniel Sullivan

Daniel Sullivan
Indiana Professional Engineer
License # 19600309

9-6-19

Date



TECHNICAL MEMORANDUM

DATE September 6, 2019 **Project No.** 19126075

TO Marc Okin, Dan Sullivan NIPSCO

CC Sasha Reyes, Maureen Turman, Craig Myers, Joe Kutch, Mark Haney, Jim Peace

FROM Danielle Sylvia **EMAIL dsylvia@golder.com**

RE: R.M. SCHAHFER LANDFILL PHASES V AND VI ALTERNATIVE SOURCE DEMONSTRATION

On behalf of Northern Indiana Public Service Company (NIPSCO), Golder Associates Inc. (Golder) performed a statistical evaluation of groundwater analytical results from the fourth (March 2019) groundwater Detection Monitoring event at the Rollin M. Schahfer Generating Station (RMSGS) Landfill Phase V and Phase VI (CCR Unit) in accordance with 40 Code of Federal Regulations (CFR) Parts 257 and 261, “Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule” (CCR Final Rule), as amended, and corresponding regulations under 329 Indiana Administrative Code (IAC) 10-9-1.

Statistical analyses of Appendix III groundwater Detection Monitoring results indicated statistically significant increases (SSIs) for six analytes detected in groundwater samples collected from downgradient wells compared to background levels. Although determination of an SSI generally indicates that the groundwater monitoring program should transition from Detection Monitoring to Assessment Monitoring, 40 CFR §257.94(e)(2) allows the owner or operator (i.e., NIPSCO) to demonstrate that a source other than the CCR unit or another condition caused the apparent SSI(s). Golder identified similar SSIs after the first (October 2017) Detection Monitoring event at the RMSGS Landfill Phase V and Phase VI and submitted an Alternative Source Demonstration (ASD) on April 13, 2018. As described in that ASD, the conceptual site model, historical groundwater data, and landfill design indicate the source of the identified SSIs is the unlined portion of the landfill, Phases I and II, which is not regulated by the CCR Final Rule. Golder recertified the ASD based on the second (February/March 2018) Detection Monitoring Event, on August 28, 2018 and the third (September 2018) Detection Monitoring Event, on March 21, 2019.

NIPSCO began construction of a new landfill cell (Phase VII) immediately north of Phase VI in 2018. Due to the proximity of Phase VII to Phase VI and landfill construction activities, Golder decommissioned monitoring wells GAMW-21/21B, GAMW-22/22B, GAMW-23/23B, and GAMW-28/28B, which were part of the original CCR Rule-required landfill monitoring network. Golder collected groundwater samples from these four well pairs from July 2016 to March 2018. To replace the decommissioned wells, Golder installed monitoring wells GAMW-38/38B, GAMW-39/39B, GAMW-40/40B, and GAMW-41/41B downgradient and along the waste boundary of Phase VII in April and May 2018.

Golder collected groundwater samples from the existing and newly-installed monitoring wells during the March 2019 semi-annual monitoring event. Groundwater analytical data obtained from groundwater samples collected from the downgradient wells in March 2019 were consistent with historical analytical results. Golder reviewed the analytical data collected to date and considered the option to update the prediction limits. The Groundwater Monitoring Program Implementation Manual (GMPIM, 2017) and the Unified Guidance allow for updating

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statistical limits after a minimum of four “new measurements” are available. The periodic update of background datasets improves statistical power and accuracy by providing a more complete approximation of the true background population. Based on the relatively short period of time (i.e., less than 16 months) in which the background samples were collected, it is likely that the changes being observed in data population are due to natural variability. The analytical data collected, and groundwater flow directions observed to date, indicate that the chosen background wells are still representative of background conditions. Consequently, Golder calculated new prediction limits in June 2019 using all background data collected to date. The table below provides the original prediction limits calculated in January 2018 and the revised prediction limits calculated in June 2019. Golder will re-evaluate the background dataset following collection of an additional four rounds of groundwater data from the background wells.

1.0 SUMMARY OF RESULTS

The results of the fourth Detection Monitoring event are included in the 2019 Annual Report and the results of the statistical analysis are summarized below. SSIs were detected in groundwater samples collected from monitoring wells downgradient of the RMSGS Landfill Phase V and Phase VI, for all Appendix III parameters. Overall, results are consistent with those collected previously and indicate few differences from the SSIs detected during the previous Detection Monitoring events. The differences are likely due to normal or temporal fluctuations in groundwater quality. The SSI results are summarized in the table below by well location and timeframe of the SSI exceedance.

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
Prediction Level (January 2018)	**1.7**	**116.1**	**34.91**	**2.3**	**300**	**6.465-7.739**	**653.4**
Prediction Level (June 2019)	**3.2**	**130.9**	**39.93**	**2.3**	**470**	**6.353-7.82**	**1100**
GAMW21*							
GAMW21B*	1,2	1,2	1		1,2		1,2
GAMW22*		2					
GAMW22B*	1,2	1,2	1,2		1,2		1,2
GAMW23*	1,2	1,2			1,2	1,2	1,2
GAMW23B*	1,2	1,2	1,2		1,2	1,2	1,2
GAMW26				1,3			2
GAMW26B		1,3	3		1,3	3	1,3
GAMW27	1,2,3,4	1,2,3,4			1,2,3,4		1,2,3,4
GAMW27B	1,2,3,4	1,2,3	1,2,3,4		1,2,3,4	3	1,2,3,4

Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pH	TDS
Prediction Level (January 2018)	**1.7**	**116.1**	**34.91**	**2.3**	**300**	**6.465-7.739**	**653.4**
Prediction Level (June 2019)	**3.2**	**130.9**	**39.93**	**2.3**	**470**	**6.353-7.82**	**1100**
GAMW28*	1,2	1,2	1		1,2		1,2
GAMW28B*	1,2	1,2	1,2		1,2		1,2
GAMW38							
GAMW38B	3,4	3,4	3,4		3,4		3,4
GAMW39	3	3,4			3		3
GAMW39B	3,4	3,4	3,4		3,4		3,4
GAMW40	3,4	3,4			3		3,4
GAMW40B	3,4	3,4	3,4		3,4	3,4	3,4
GAMW41	4	4	4		4		4
GAMW41B	4	4	4		4		4

"1" Indicates a statistically significant increase detected in the first Detection Monitoring event
"2" Indicates a statistically significant increase detected in the second Detection Monitoring event
"3" Indicates a statistically significant increase detected in the third Detection Monitoring event
"4" Indicates a statistically significant increase detected in the fourth Detection Monitoring event
"*" Indicates monitoring well was decommissioned prior to the third Detection Monitoring event

2.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSION

The preceding information indicates the results of the fourth Detection Monitoring event are consistent with the previous Detection Monitoring events, and the rationale behind the ASD dated April 13, 2018 is still applicable. Golder prepared the ASD in accordance with 40 CFR 257.94(e)(2) and it supports the finding that the SSIs determined on June 8, 2019 are not due to a release from the CCR Unit. As described in that ASD, the conceptual site model, historical groundwater data, and landfill design indicate that a release from the unlined portion of the landfill not subject to the CCR Final Rule, Phases I and II, is the source of the identified SSIs. Therefore, no further action (i.e., Assessment Monitoring) is warranted, and the Schahfer Landfill Phases V and VI will remain in Detection Monitoring.

3.0 REFERENCES

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", March 31, 2019.

Golder Associates, "Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration", August 28, 2018.

Golder Associates, “Northern Indiana Public Service Company R.M. Schahfer Generating Station Wheatfield, Indiana- Schahfer Landfill Phase V and Phase VI - Alternative Source Demonstration”, April 13, 2018.

https://golderassociates.sharepoint.com/sites/nipscoccrgwmonitoring/shared documents/r.m. schahfer generating station/reports/landfill asd recertification september 2019/final/landfill asd recertification 090619.docx



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