Northern Indiana Public Service Company Bailly Generating Station Chesterton, Indiana

CCR Management Unit Referred to as Bailly Secondary 1

# 2017 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

Prepared Pursuant to 40 CFR §257.90(e) and Corresponding Regulations under 329 Indiana Administrative Code 10-9-1



January 2018

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### 1.0 INTRODUCTION

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 require groundwater monitoring and annual reporting of resulting information from subject coal combustion residuals (CCR) management units. Golder Associates Inc. (Golder) on behalf of Northern Indiana Public Service Company (NIPSCO) prepared this 2017 CCR annual groundwater monitoring and corrective action report (2017 Annual Report) for the Bailly Generating Station (BGS, Bailly) Secondary 1 (the CCR Unit) located in Chesterton, Indiana. BGS occupies an area of approximately 100 acres located at 246 Bailly Station Road in Chesterton, Porter County, Indiana (Latitude 41° 38' 40" and Longitude 87° 05' 20", see Figure 1). Secondary 1 is an approximately three-acre surface impoundment (Figure 2).

Routine monitoring activities performed during the reporting period include inspection of wells for integrity and security, measurement of groundwater levels prior to sample collection in order 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 2017 CCR Annual Report:

- Documents the status of the groundwater monitoring and corrective action program
- Provides figures showing the CCR management unit and monitoring well locations
- Summarizes key CCR groundwater activities completed during calendar years 2016 and 2017
- Includes all CCR groundwater monitoring data obtained during calendar years 2016 and 2017
- Describes any problems encountered
- Discusses actions taken to resolve the problems, if applicable
- Projects key activities for the upcoming year

Although the CCR Final Rule (specifically 40 CFR §257.90(e)) states an annual report must provide information only for the preceding calendar year, NIPSCO conducted certain activities (e.g., installed monitoring wells) and collected data (e.g., initiated background sampling) relevant to the CCR groundwater monitoring program beginning prior to 2017. Therefore, in the interest of providing a complete data package and summary of the monitoring program, NIPSCO's consultant, Golder, is including CCR Final Rule-related information collected in calendar years 2016 and 2017 in this first (i.e., 2017) annual report.



# 2.0 GROUNDWATER MONITORING AND CORRECTIVE ACTION 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 at Bailly Secondary 1 pursuant to the requirements of 40 CFR §257.94 and corresponding State of Indiana requirements. Based upon groundwater monitoring results to date, corrective action program requirements have neither been triggered nor implemented at this CCR management unit. A summary of key program actions including completed and projected events are presented in the following subsections, along with discussions of and references to requisite CCR management unit and well location figures and data tables.

### 2.1 Key Actions Completed – 2016-17

NIPSCO completed the following key actions relative to CCR groundwater well installation and monitoring at BGS Secondary 1 prior to the end of calendar year 2017:

- Design, construction, and development of background and downgradient groundwater monitoring wells consistent with NIPSCO written specifications and standard operating procedures (40 CFR §257.91)
- Certification of the groundwater monitoring system by a qualified professional engineer (40 CFR §257.91(f))
- Development of a groundwater sampling program including identification of statistical method(s) appropriate to the data set(s) and site conditions (40 CFR §257.91)
- Certification of the selection of appropriate statistical method(s) by a qualified professional engineer (40 CFR §257.93(f)(6))
- Collection of eight independent background groundwater samples for Appendix III and Appendix IV constituents from each background and downgradient monitoring well (40 CFR §257.94(b))
- Performance of the first Detection Monitoring event (40 CFR §257.94)

### 2.2 Monitoring System Design, Construction, and Development

Consistent with the requirements of 40 CFR §§257.90 and 257.91 and corresponding State of Indiana requirements, NIPSCO designed, constructed, and developed a groundwater monitoring system for Secondary 1.

As shown in Figure 2, and summarized in the table below, the groundwater monitoring network for Secondary 1 includes three background and three downgradient monitoring wells. As shown in Table 1, Golder installed six monitoring wells in June 2016 specifically in compliance with applicable requirements of the CCR Final Rule. Golder developed all of these wells and installed dedicated bladder pumps approximately two weeks after well installation. NIPSCO obtained certification from a qualified professional engineer stating that the groundwater monitoring system was designed and constructed to meet the requirements of 40 CFR §257.91.



CCR Unit	Background Monitoring Wells	Downgradient Monitoring Wells
Secondary 1	GAMW-01, GAMW-08, GAMW-11	GAMW-02, GAMW-03, GAMW-04

### 2.3 Background Monitoring

Between July 2016 and August 2017, Golder collected eight independent background groundwater samples from each background and downgradient well as required by 40 CFR §257.94 at intervals of at least 49 days to account for both seasonal and spatial variability in groundwater quality. Each sample was sent to a contract laboratory in accordance with chain of custody and quality assurance/quality control procedures to be analyzed for 40 CFR Part 257 Appendix III and Appendix IV constituents. In addition, Golder personnel measured field water quality parameters specific conductance, temperature, dissolved oxygen, turbidity, oxidation-reduction potential and pH. The results of the background monitoring phase were used to develop appropriate, statistically valid background values for each constituent/monitoring well. Following completion of the eight background monitoring events, Golder collected the first Detection Monitoring groundwater samples, as described below in Section 2.5. Information including sampling dates, number of groundwater samples collected for each background and downgradient well, and the purpose of sampling is described in Table 2. All analytical results are presented in Table 3.

### 2.4 Development of the Background Population

Subsequent to each background 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. 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 background data using time vs. concentration graphs, and statistical routines included in the Sanitas<sup>™</sup> statistical analysis software package. NIPSCO obtained certification from a qualified professional engineer stating that the selected statistical method, interwell prediction limits utilizing a verification resampling plan, is appropriate for evaluating the groundwater monitoring data for the CCR management area and is consistent with the requirements of 40 CFR §257.93(f)(6).

### 2.4.1 Outlier and Trend Assessment

Golder identified the combined radium and radium-226 results from the groundwater sample collected from background monitoring well GAMW-01 in September 2016 as an outlier and removed this datum from the background data set because trend charts indicated that the combined radium and radium-226



concentrations detected during the September 2016 monitoring event were inconsistent with concentrations detected in other background monitoring wells.

Golder evaluated the background data for trends using Sanitas<sup>™</sup> software. Golder will continue to monitor these trends and if this CCR Unit enters assessment monitoring, detrending routines will be performed before using this data to calculate groundwater protection standards.

- Beryllium concentrations detected in groundwater samples from well GAMW-01 show a downward trend;
- Boron concentrations detected in groundwater samples from well GAMW-01 show a downward trend;
- Selenium concentrations detected in groundwater samples from well GAMW-01 show a downward trend;
- Sulfate concentrations detected in groundwater samples from well GAMW-01 show a downward trend;
- Boron concentrations detected in groundwater samples from well GAMW-08 show a downward trend; and
- Fluoride concentrations detected in groundwater samples from well GAMW-11 show an upward trend.

### 2.5 Detection Monitoring

Golder performed the first Detection Monitoring event in October 2017, followed by calculations and data analysis in January 2018. Groundwater samples were collected at all background and downgradient monitoring well locations and analyzed for 40 CFR Part 257 Appendix III constituents per 40 CFR §257.94. Following receipt and validation of laboratory results, Golder evaluated the results of the first Detection Monitoring sampling event to determine the concentration of Appendix III constituents relative to facility background concentrations. Using Sanitas<sup>™</sup> software, Golder pooled the background data to calculate prediction limits and compared the October 2017 results to the calculated prediction limits to determine statistically significant increases (SSIs). The SSIs are summarized in the table below by downgradient monitoring well and constituent. Although not required under the CCR Final Rule, this 2017 Annual Report provides the results of statistical analyses completed in early 2018. Based on these results, in 2018 NIPSCO will complete an alternative source demonstration (ASD) or establish an Assessment Monitoring Program.



Monitoring Well ID	Boron	Calcium	Chloride	Fluoride	Sulfate	pН	Total Dissolved Solids
GAMW-02	Х			Х			
GAMW-03					Х	Х	
GAMW-04	Х	Х		Х	Х	Х	Х

"X" represents a SSI

### 2.6 Problems Encountered and Follow-On Corrective Actions

No problems were encountered in calendar years 2016 and 2017.



### 3.0 KEY ACTIVITIES PROJECTED FOR 2018

During calendar year 2018, NIPSCO anticipates conducting the following key CCR groundwater monitoring activities for Bailly Secondary 1:

- Complete an alternative source demonstration or establish an Assessment Monitoring program;
- Prepare and submit the appropriate notifications according to the CCR Rule;
- Continue sampling background and downgradient monitoring wells per CCR requirements; and,
- Inspect and maintain monitoring system including wells, pumps, and equipment.



TABLES

# Table 1 Monitoring Well Network CCR Unit Bailly Secondary 1 NIPSCO Bailly Generating Station Chesterton, Indiana

CCR Unit	Monitoring Well ID	Installation Date (If Applicable)	Decommission Date (If Applicable)	Location Relative to Gradient	Basis For Action
	GAMW-01	6/6/2016		Upgradient	
	GAMW-02	6/6/2016		Downgradient	
Consulate 1	GAMW-03	6/6/2016		Downgradient	Installed for groundwater guality monitoring*
Secondary 1	GAMW-04	6/6/2016		Downgradient	Installed for groundwater quality monitoring
	GAMW-08	6/7/2016		Upgradient	
	GAMW-11	6/7/2016		Upgradient	

\* Per the CCR Rule requirements, Golder collected eight rounds of background data prior to October 17, 2017.

Prepared by: DFS Checked by: CRT Reviewed by: MAH



 Table 2
 Summary of Sampling Events

 CCR Unit Bailly Secondary 1

 NIPSCO Bailly Generating Station

 Chesterton, Indiana

Well Purpose	Monitoring Well ID	Sample Event #1	Sample Event #2	Sample Event #3	Sample Event #4	Sample Event #5	Sample Event #6	Sample Event #7	Sample Event #8	Sample Event #11	
Purpose of Sample				Detection Monitoring	Total Number of Samples						
Sample Pa	rameters	Appendix III and Appendix IV	Appendix III								
Destaura	GAMW-01	7/14/2016	9/9/2016	11/14/2016	1/12/2017	3/3/2017	5/1/2017	7/6/2017	8/28/2017	10/5/2017	9
Backgrcund Monitoring Well	GAMW-08	7/14/2016	9/12/2016	11/14/2016	1/13/2017	3/3/2017	5/1/2017	7/6/2017	8/28/2017	10/5/2017	9
wonitoning weir	GAMW-11	7/15/2016	9/12/2016	11/15/2016	1/13/2017	3/3/2017	5/1/2017	7/6/2017	8/28/2017	10/5/2017	9
	GAMW-02	7/14/2016	9/9/2016	11/14/2017	1/12/2017	3/3/2017	5/1/2017	7/6/2017	8/28/2017	10/5/2017	9
Downgradient Monitoring Well	GAMW-03	7/14/2016	9/9/2016	11/14/2016	1/12/2017	3/3/2017	5/1/2017	7/6/2017	8/28/2017	10/5/2017	9
wonitoring weil	GAMW-04	7/14/2016	9/9/2016	11/14/2016	1/12/2017	3/3/2017	5/1/2017	7/6/2017	8/28/2017	10/5/2017	9
Total Number	of Samples	6	6	6	6	6	6	6	6	17	54

Notes:

Sample counts do not include QC/QA samples.

Prepared by: DFS Checked by: CRT Reviewed by: MAH

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#### Table 3: Analytical Data CCR Unit Bailly Secondary 1 NIPSCO Bailly Generating Station Chesterton, Indiana

Analyte	Unit			a		GAMW-01				
		2016-07-14	2016-09-09	2016-11-14	2017-01-12	2017-03-03	2017-05-01	2017-07-06	2017-08-28	2017-10-05
		N	N	N	N	N	N	N	N	N
Appendix III Parameters								3		
Boron	mg/L	0.2	0.19	0.17 J	0.17 J	< 0.2 U	0.11 J	0.099 J	0.079 J	< 0.2 U
Calcium	mg/L	94	87	64	63	62	96	68	65	63
Chloride	mg/L	13	44	21	15	44	170	130	160	98
Flucride	mg/L	0.46 J	0.65 J	0.79 J	0.79 J	0.82 J	0.5 J	0.64 J	0.69 J	0.76 J
Sulfate	mg/L	51	41	32	35	32	27	22	21	29
Total Dissolved Solids	mg/L	400	380	360	360	370	520	430	490	400
pH	SU	7.36	6.7	6.76	7.17	7.54	6.73	6.93	5.66	5.76
Appendix IV Parameters										
Antimony	mg/L	< 0.0020 U	0.0015 J	0.0011 J	0.0026	0.0024 J+	0.0011 J	0.00063 J	0.00063 J	
Arsenic	mg/L	0.0026 J	0.0022 J	0.0019 J	0.0021 J	< 0.005 U	0.0016 J	0.0013 J	0.001 J	
Barium	mg/L	0.028	0.032	0.028	0.026	0.028	0.044	0.034	0.038	
Beryllium	mg/L	< 0.0010 U	0.00049 J	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Cadmium	mg/L	< 0.0010 U	0.00047 J	0.00034 J	< 0.001 U	< 0.001 U	0.00036 J	< 0.001 U	< 0.001 U	
Chromium	mg/L	< 0.0020 U	0.00093 J	0.0022	0.0018 J	< 0.002 U	< 0.002 U	0.0012 J	0.0013 J	
Cobalt	mg/L	< 0.0010 U	0.00032 J	< 0.0010 U	0.00027 J	< 0.001 U	0.0002 J	< 0.001 U	< 0.001 U	
Flucride	mg/L	0.46 J	0.65 J	0.79 J	0.79 J	0.82 J	0.5 J	0.64 J	0.69 J	0.76 J
Lead	mg/L	< 0.0010 U	0.00038 J	< 0.0010 U	< 0.001 U	< 0.001 U	0.00052 J	< 0.001 U	< 0.001 U	
Lithium	mg/L	< 0.0080 U	< 0.0080 U	0.0027 J	0.0016 J	< 0.008 U	0.003 J	< 0.008 U	0.002 J	
Mercury	mg/L	< 0.00020 U	< 0.00020 U	< 0.00020 UJ	< 0.0002 U					
Molybdenum	mg/L	0.03	0.024	0.021	0.031	0.025	0.017	0.013	0.0086 J	
Radium 226 + 228	pci/L	< 0.49 U	1.58 O	0.468 J+	0.394	< 0.461 U	< 0.455 U	0.6 J+	< 0.492 UJ	
Radium-226	pci/L	< 0.143 U	1.02 O	< 0.394 U	0.167 J+	< 0.123 U	0.155 J+	0.326 J+	0.123 J	
Radium-228	pci/L	< 0.49 U	< 0.678 U	< 0.431 U	< 0.387 U	< 0.461 U	< 0.455 U	< 0.28 U	< 0.492 UJ	
Selenium	mg/L	0.026	0.018	0.012	0.014	0.0084	0.0074	0.0057	0.0027 J	
Thallium	mg/L	0.0021	0.003	0.003	0.0025	0.0027	0.0032	0.0031	0.0039	
Field Parameters				2				2	2	
Dissolved Oxygen	mg/L	5.92	5.61	5.62	5.04	5.88	6.14	7.26	6.44	5.8
Oxidation-Reduction Potential	millivolts	52.2	119.8	-38.4	199.7	46.9	144.2	151.5	140	109.8
pН	SU	7.36	6.7	6.76	7.17	7.54	6.73	6.93	5.66	5.76
Specific Conductance	uS/cm	504	677	501	536	629	855	738	851	708
Temperature	deg C	15.38	17.25	17.09	13.19	11.32	11.96	14.85	16.8	16.95
Turbidity	ntu	1.1	0.66	0.53	0.33	0.4	0.97	0.77	0.77	0.32

Note:

mg/L = milligram per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celcius 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 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.



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#### Table 3: Analytical Data CCR Unit Bailly Secondary 1

NIPSCO	Baill	y Generating	Station
Obertest		a dia ma	

Chesterton, Indiana

Analyte	Unit				16	0	GAMW-02					
		2016-07-14	2016-07-14	2016-09-09	2016-11-14	2017-01-12	2017-03-03	2017-05-01	2017-07-06	2017-07-06	2017-08-28	2017-10-05
		FD	N	N	N	N	N	N	FD	N	N	N
Appendix III Parameters					2				1			
Boron	mg/L	0.27	0.28	0.3	0.31	0.27	0.32	0.33	0.33	0.34	0.34	0.39
Calcium	mg/L	86	86	78	97	99	96	82	79	80	83	77
Chloride	mg/L	2.8	2.8	7	4.1	3.3	2.3	1.9 J	1.7 J	1.8 J	1.9 J	1.9 J
Fluoride	mg/L	3.1	3.2	3.3	2.9	2.7	3	3.2	2.9	3	2.8	3.7
Sulfate	mg/L	110	110	99	110	97	100	100	81	82	90	91
Total Dissolved Solids	mg/L	440	420	380	450	420	420	370	360	360	390	380
pH	SU	3 · · · · · · · · · · · · · · · · · · ·	7.54	7.25	6.86	7.04	7.56	7.19		6.66	6.37	6.34
Appendix IV Parameters												
Antimony	mg/L	< 0.0020 U	< 0.0020 U	0.00085 J	0.00072 J	< 0.002 U	< 0.002 U	0.00069 J	< 0.002 U	< 0.002 U	< 0.002 U	
Arsenic	mg/L	0.0022 J	0.0021 J	0.0018 J	0.0033 J	0.0024 J	< 0.005 U	0.0032 J	0.0031 J	0.0029 J	0.0026 J	
Barium	mg/L	0.038	0.038	0.03	0.035	0.031	0.029	0.027	0.026	0.026	0.031	
Beryllium	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	
Cadmium	mg/L	0.0021	0.0021	0.0019	0.0023	0.0022	0.0021	0.0016	0.0017	0.0017	0.0021	
Chromium	mg/L	< 0.0020 U	< 0.0020 U	0.00036 J	0.00028 J	0.00035 J	< 0.002 U	< 0.002 U	< 0.002 U	0.0014 J	< 0.002 U	
Cobalt	mg/L	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.0010 U	0.00014 J	< 0.001 U					
Fluoride	mg/L	3.1	3.2	3.3	2.9	2.7	3	3.2	2.9	3	2.8	3.7
Lead	mg/L	< 0.0010 U	< 0.0010 U	0.00025 J	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	0.018	0.018	0.02	0.022	0.016	0.017	0.016	0.013	0.012	0.017	
Mercury	mg/L	< 0.00020 U	< 0.00020 U	0.00010 J	< 0.00020 UJ	< 0.0002 U	< 0.0002 J	< 0.0002 U	< 0.0002 U	< 0.0002 U	< 0.0002 U	
Molybdenum	mg/L	0.033	0.034	0.023	0.044	0.041	0.043	0.039	0.037	0.037	0.035	
Radium 226 + 228	pci/L	< 0.489 U	0.397	< 0.644 U	< 0.496 U	0.734	< 0.416 U	0.52	0.38 J+	< 0.333 U	< 0.431 UJ	
Radium-226	pci/L	0.178	< 0.121 U	< 0.0844 U	< 0.496 U	< 0.169 U	0.147	0.225 J+	0.274 J+	0.169 J+	< 0.0825 UJ	
Radium-228	pci/L	< 0.489 U	< 0.397 U	< 0.644 U	< 0.439 U	0.628 J+	< 0.416 U	< 0.318 U	< 0.332 U	< 0.333 U	< 0.431 UJ	
Selenium	mg/L	0.018	0.017	0.013	0.027	0.021	0.025	0.024	0.021	0.02	0.02	
Thallium	mg/L	0.0035	0.0035	0.0038	0.0044	0.0033	0.0038	0.0035	0.0038	0.0039	0.0035	
Field Parameters												
Dissolved Oxygen	mg/L		4.39	2.84	2.54	2.52	2.16	1.73		2.45	3.15	1.55
Oxidation-Reduction Potential	millivolts		55.3	104.1	-24.4	171.1	45.2	136.8		174.4	122.9	93
pН	SU		7.54	7.25	6.86	7.04	7.56	7.19		6.66	6.37	6.34
Specific Conductance	uS/cm		517	589	585	643	661	565		522	572	584
Temperature	deg C		16.73	18.87	17.22	13	12.08	12.61		16.35	18.19	18.27
Turbidity	ntu		1.58	0.34	0.49	0.48	0.69	0.78		0.91	0.62	0.4

Note:

mg/L = milligram per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celcius 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 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.

"C" = Indicates the result was identified as an outlier and removed from the background data set.



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### Table 3: Analytical Data CCR Unit Bailly Secondary 1

NIPSCO Bailly Generating Station

Chesterton, Indiana

Analyte	Unit		GAMW-03										
		2016-07-14	2016-09-09	2016-11-14	2016-11-14	2017-01-12	2017-01-12	2017-03-03	2017-05-01	2017-05-01	2017-07-06	2017-08-28	2017-10-05
		N	N	FD	N	FD	N	N	FD	N	N	N	N
Appendix III Parameters									8				1.000
Boron	mg/L	0.35	0.47	0.33	0.33	0.32	0.32	0.3	0.28	0.29	0.28	0.28	0.29
Calcium	mg/L	97	110	99	100	110	110	80	87	83	97	89	84
Chloride	mg/L	6.9	7.8	4.4	4.4	4.8 J	4.8 J	2.5	3.2	3.1	4.1	3.7	4.1
Fluoride	mg/L	1.2	1.3 J	1.4 J	1.5	1.2 J	1.2 J	1.8	1.8 J	1.9 J	1.2 J	1.2 J	1.7 J
Sulfate	mg/L	200	270	180	180	220	220	110	150	150	170	160	160
Total Dissolved Solids	mg/L	530	630	480	460	520	530	380	400	400	450	440	410
pH	SU	7.13	6.58		6.46		7.04	7.13		6.9	5.56	6.15	5.59
Appendix IV Parameters													
Antimony	mg/L	< 0.0020 U	0.00046 J	< 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	0.0031 J	0.0040 J	0.00089 J	0.00097 J	0.0011 J	0.0011 J	< 0.005 U	0.00081 J	0.00088 J	< 0.005 U	< 0.005 U	· · · · · · · · · · · · · · · · · · ·
Barium	mg/L	0.037	0.039	0.035	0.035	0.035	0.036	0.025	0.027	0.027	0.029	0.029	
Beryllium	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	1
Cadmium	mg/L	0.0014	0.0019	0.0017	0.0017	0.002	0.0021	0.0014	0.0014	0.0014	0.0018	0.0017	· · · · · · · · · · · · · · · · · · ·
Chromium	mg/L	< 0.0020 U	0.00039 J	0.00027 J	0.00027 J	< 0.002 U							
Cobalt	mg/L	< 0.0010 U	0.00027 J	0.00022 J	0.00024 J	0.00019 J	0.00021 J	< 0.001 U	< 0.001 U	0.00019 J	< 0.001 U	0.00024 J	· · · · · · · · · · · · · · · · · · ·
Fluoride	mg/L	1.2	1.3 J	1.4 J	1.5	1.2 J	1.2 J	1.8	1.8 J	1.9 J	1.2 J	1.2 J	1.7 J
Lead	mg/L	< 0.0010 U	0.00023 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	
Lithium	mg/L	0.0087	0.0099	0.0092	0.0088	0.0088	0.0079 J	< 0.008 U	0.C066 J	0.0065 J	0.0063 J	0.0089	
Mercury	mg/L	< 0.00020 U	0.0002	< 0.00020 UJ	< 0.00020 UJ	< 0.0002 U							
Molybdenum	mg/L	0.086	0.091	0.073	0.072	0.078	0.081	0.071	0.07	0.071	0.084	0.085	
Radium 226 + 228	pci/L	< 0.372 U	1.38	0.981 J+	< 0.434 U	0.564	< 0.49 U	< 0.49 U	0.818 J	0.417 J	0.595 J+	0.542 J	
Radium-226	pci/L	0.236	0.134	< 0.425 U	< 0.425 U	0.285	0.221 J+	0.177	0.176 J+	0.276 J+	0.402 J+	0.177 J	
Radium-228	pci/L	< 0.372 U	1.24	0.686 J+	< 0.434 U	< 0.434 U	< 0.49 U	< 0.49 U	0.641 J+	< 0.354 U	< 0.269 U	< 0.394 UJ	
Selenium	mg/L	0.035	0.049	0.0046 J	0.0049 J	0.0098	0.0099	< 0.005 U	0.C018 J	0.0019 J	0.0014 J	0.0014 J	
Thallium	mg/L	0.0073	0.0083	0.008	0.0082	0.0071	0.0073	0.0066	0.0056	0.0054	0.0069	0.0074	
Field Parameters				-	2								
Dissolved Oxygen	mg/L	2.94	2.78		1.04		2.31	0.24		0.69	1.54	0.66	0.7
Oxidation-Reduction Potential	millivolts	66.5	118		-35.8		170.3	61.1		157.9	211.2	142.5	121.8
pH	SU	7.13	6.58		6.46		7.04	7.13		6.9	5.56	6.15	5.59
Specific Conductance	uS/cm	596	837		578		717	601		580	603	600	574
Temperature	deg C	15.98	17.15		16.96		14.25	13.46		13.17	15.67	17.04	17.49
Turbidity	ntu	1.07	0.63		0.65		0.21	0.54		0.48	0.44	0.54	0.23

Note:

mg/L = mill gram per liter uS/cm = micro Siemens per centimeter deg C = degrees Celcius NTU = Nephelometric Turbidity Units SU = Standard Units pci/L = picccuries 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 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.



#### Project No.: 164-8171.01

#### Table 3: Analytical Data CCR Unit Bailly Secondary 1

NIPSCO	<b>Bailly Generating Station</b>
Chestert	on, Indiana

GAMW-04 Analyte Unit 2016-07-14 2016-09-09 2016-11-14 2017-01-12 2017-03-03 2017-05-01 2017-07-06 2017-08-28 2017-08-28 2017-10-05 2017-10-05 N N N Ν FD FD N N Ν N Ν Appendix III Parameters 0.66 0.55 0.58 0.87 0.53 0.59 0.39 0.73 0.74 0.37 0.72 Boron mg/L 190 150 130 220 150 170 140 180 180 76 180 Calcium mg/L Chlorice mg/L 66 4.3 2.2 J 7.8 J 3.8 6.8 2.4 6 61 2 luoride mg/L 0.30 J 2.5 2.8 J 1.1 J 3 2.1 J 3.8 2.7 J 2.5 3.6 2.5 J Sulfate 560 330 200 530 250 370 140 350 340 86 360 mg/L **Total Dissolved Solids** 1100 770 1100 720 790 610 920 900 390 890 ma/L 670 8.11 7.95 SU 6.46 6.36 6.77 6.86 6.52 5.89 5.48 Appendix IV Parameters Antimony mg/L < 0.0020 U 0.00054 J 0.00064 J < 0.002 U < 0.002 U < 0.002 U < 0.002 U 0.00057 J < 0.002 U Arsenic mg/L 0.0071 0.005 0.0034 J 0.0015 J < 0.005 U 0.0014 J 0.0042 J 0.0026 J 0.0028 J Barium mg/L 0.061 0.062 0.056 0.11 0.058 0.063 0.046 0.096 0.1 Beryllium < 0.0010 U < 0.0010 U < 0.0010 U < 0.001 U < 0.001 U < 0.001 U < 0.001 U 0.0004 J 0.00046 J mg/L Cadmium < 0.0010 U 0.0054 0.0081 0.0073 0.0095 0.005 0.0098 0.019 0.02 mg/L 0.00083 J 0.00054 J 0.00044 J 0.00073.1 Chromium < 0.002 U mg/L Cobalt mg/L < 0.0010 U 0.00064 J 0.00026 J 0.0018 < 0.001 U 0.00098 J < 0.001 U 0.0019 0.0021 Fluoride mg/L 0.30.1 25 2.8 J 11.1 3 2.1 J 3.8 27.1 2.5 3.6 2.5 J < 0.0010 U 0.00030 J < 0.0010 U < 0.001 U Lead mg/L < 0.0080 U 0.049 0.06 0.035 0.055 0.063 ithium 0.032 0.058 0.063 mg/L < 0.00020 U 0.00012 J < 0.00020 JJ < 0.0002 U Mercury ma/L Molyboenum mg/L 0.032 0.029 0.033 0.033 0.033 0.03 0.026 0.029 0.03 Radium 226 + 228 0.515 J+ 0 909 0.422 0.819 < 0.374 113 pci,L < 0.661 U < 0.44911 1 26 0.403.1 Radium-226 pci,L 0.291 0.284 < 0.449 U 0.374 J+ 0.123 0.278 J+ 0.106 J+ 0.181 J 0.191 J Radium-228 pci.L 0.618 < 0.661 U < 0.4 U 0.887 J+ < 0.417 U 0.541 J+ 0.41.1+ < 0.378 UJ < 0.374 UJ Selenium < 0.0050 U 0.012 0.017 0.002 J 0.013 0.0052 0.022 0.012 0.012 mg/L < 0.0010 U 0.0016 0.0028 0.0013 0.0026 0.0016 0.0026 0.0047 0.0045 hallium mg/L Field Parameters 0.53 Dissolved Oxygen mg/L 1.07 2.15 2.15 1.78 0.68 3.15 0.36 Oxidation-Reduction Potential -35.1 95.8 148.4 millivolts -1.8 782.6 45.2 82 80.8 124.9 SU 6.46 8.11 6.36 6.77 6.86 6.52 7.95 5.89 5.48 Specific Conductance uS/cm 1044 965 747 1331 986 962 790 825 1086 deg C 15.67 17.63 16.97 14.17 13.01 13.14 15.57 16.73 17.01 emperature 0.84 1.7 1.03 0.7 0.67 0.76 2.44 1.73 1.51 Turbidity ntu

Note:

mg/L = milligram per liter uS/cm = micro Siemens per centimeter deg C = degrees Celcius NTU = Nephelometric Turbidity Units SU = Standard Units pc/L = piccouries per liter "U" = Indicates the result is not detected above the method detection limit (MDL) for the sample; the quantitation limit (RL) is provide.)

"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.

 $^{*}\text{UJ}^{*}$  = 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.



#### Project No.: 164-8171.01

#### Table 3: Analytical Data CCR Unit Bailly Secondary 1 NIPSCO Bailly Generating Station Chesterton, Indiana

Analyte	Unit		24	20	0.0	GAN	1W-08	-			
		2016-07-14	2016-09-12	2016-11-14	2017-01-13	2017-03-03	2017-03-03	2017-05-01	2017-07-06	2017-08-28	2017-10-05
		N	N	N	N	FD	N	N	N	N	N
Appendix III Parameters			2	2		1		1			
Boron	mg/L	0.14	0.13	0.12 J	0.13 J	< 0.2 U	< 0.2 U	0.12 J	0.11 J	0.1 J	< 0.2 U
Calcium	mg/L	59	56	58	66	67	66	69	57	55	52
Chloride	mg/L	2.1	2.1	2	2.2	2.3	2.3	3.5	2.1	2.4	2.6
Fluoride	mg/L	1.3	1.4	1.1	1.1 J	1.2	1.2	1.3 J	1.2	1.2	1.5
Sulfate	mg/L	22	18	14	16	22	22	65	25	19	17
Total Dissolved Solids	mg/L	250	210	230	270	290	260	300	220	220	200
pН	SU	7.23	6.99	7.21	7.38		7.16	7.46	7.4	7.45	7.63
Appendix IV Parameters											
Antimony	mg/L	< 0.0020 U	0.0016 J	0.0017 J	< 0.002 U	< 0.002 U	< 0.002 U	0.0013 J	0.0012 J	0.0016 J	
Arsenic	mg/L	0.0024 J	0.0019 J	0.0018 J	0.0022 J	< 0.005 U	< 0.005 U	0.0036 J	0.0033 J	0.0031 J	-
Barium	mg/L	0.025	0.021	0.021	0.024	0.026	0.026	0.03	0.022	0.022	
Beryllium	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	
Cadmium	mg/L	0.0014	0.0012	0.0016	0.0015	0.0015	0.0015	0.0018	0.0014	0.0015	
Chromium	mg/L	0.0016 J	0.0016 J	0.0015 J	< 0.002 U	< 0.002 U	< 0.002 U	0.0015 J	0.0016 J	0.0013 J	
Cobalt	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	-
Fluoride	mg/L	1.3	1.4	1.1	1.1 J	1.2	1.2	1.3 J	1.2	1.2	1.5
Lead	mg/L	< 0.0010 U	0.00016 J	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	
Lithium	mg/L	0.017	0.019	0.023	0.016	0.017	0.018	0.019	0.013	0.016	
Mercury	mg/L	< 0.00020 U	< 0.00020 U	< 0.00020 UJ	< 0.0002 U						
Molybdenum	mg/L	0.015	0.015	0.016	0.013	0.015	0.015	0.02	0.015	0.015	
Radium 226 + 228	pci/L	< 0.354 U	0.589	0.564 J+	0.424	< 0.451 U	< 0.357 U	< 0.329 U	< 0.325 U	< 0.49 UJ	
Radium-226	pci/L	0.166	< 0.0906 U	< 0.424 U	< 0.167 U	< 0.121 U	< 0.124 U	< 0.124 U	0.135 J+	< 0.0605 UJ	
Radium-228	pci/L	< 0.354 U	< 0.582 U	< 0.391 U	< 0.396 U	< 0.451 U	< 0.357 U	< 0.329 U	< 0.325 U	< 0.49 UJ	-
Selenium	mg/L	0.0062	0.0054	0.0041 J	0.0064	0.0062	0.0063	0.0095	0.0053	0.0046 J	
Thallium	mg/L	0.0029	0.0024	0.0022	0.002	0.0023	0.0022	0.0023	0.0021	0.0024	
Field Parameters											
Dissolved Oxygen	mg/L	6.5	5.93	7.96	6.47		6.31	7.86	9.1	8.83	6.89
Oxidation-Reduction Potential	millivolts	130.9	109	132.4	110.9		87.5	110.7	196.9	98.3	87.5
pН	SU	7.23	6.99	7.21	7.38	8	7.16	7.46	7.4	7.45	7.63
Specific Conductance	uS/cm	346	365	324	375		413	495	334	326	332
Temperature	deg C	15.4	18	17.1	14.3		12.83	13	15.3	16.8	17.2
Turbidity	ntu	0.95	1.98	2.88	1.34		1.94	0.9	1.34	0.43	0.34

Note:

mg/L = milligram per liter

uS/cm = micro Siemens per centimeter

deg C = degrees Celcius 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 may be biased high; the estimated value is provided.

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#### Project No.: 164-8171.01

#### Table 3: Analytical Data CCR Unit Bailly Secondary 1

NIPSCO Baill	y Generating Station

Chesterton, Indiana

Analyte	Unit	GAMW-11										
		2016-07-15	2016-09-12	2016-11-15	2017-01-13	2017-03-03	2017-05-01	2017-07-06	2017-08-28	2017-08-28	2017-10-05	2017-10-05
		N	N	N	N	N	N	N	FD	N	FD	N
Appendix III Parameters			2							2		
Boron	mg/L	0.25	0.22	0.29	0.31	0.31	0.28	0.31	0.25	0.25	0.28	0.27
Calcium	mg/L	77	71	84	79	82	81	92	91	93	86	88
Chloride	mg/L	11	15	11	12	15	12	8.9	12	11	12	11
Fluoride	mg/L	1.1	1.1	1.1	1.2 J	1.1	1.3 J	1.4 J	1.3 J	1.3 J	1.8 J	1.8 J
Sulfate	mg/L	120	120	130	94	100	110	110	140	130	150	160
Total Dissolved Solids	mg/L	430	400	420	370	420	390	430	460	450	440	470
pH	SU	7.06	7.04	7.63	6.96	6.93	7.23	6.93		7.16		7.21
Appendix IV Parameters												
Antimory	mg/L	< 0.0020 U	0.00030 J	0.00036 J	< 0.002 U	0.0008 J						
Arsenic	mg/L	0.0035 J	0.0018 J	0.0087	0.006	0.0082	0.0043 J	0.0043 J	0.0039 J	0.0043 J		
Barium	mg/L	0.03	0.028	0.034	0.03	0.034	0.033	0.031	0.041	0.042		
Beryllium	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	0.00044 J		
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	0.00036 J		
Chromium	mg/L	0.0016 J	0.0012 J	0.00080 J	< 0.002 U	< 0.002 U	< 0.002 U	0.0013 J	< 0.002 U	0.001 J		
Cobalt	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	0.00043 J		
Fluoride	mg/L	1.1	1.1	1.1	1.2 J	1.1	1.3 J	1.4 J	1.3 J	1.3 J	1.8 J	1.8 J
Lead	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		
Lithium	mg/L	0.00043 J	< 0.0080 U	< 0.0080 U	< 0.008 U	< 0.008 U	< 0.008 U	< 0.008 U	< 0.008 U	< 0.008 U		
Mercury	mg/L	< 0.00020 U	< 0.00020 U	< 0.00020 U.	< 0.0002 U							
Molybdenum	mg/L	0.052	0.037	0.05	0.047	0.052	0.049	0.054	0.045	0.046		
Radium 226 + 228	pci/L	< 0.376 U	< 0.613 U	0.508 J+	< 0.367 U	< 0.402 U	0.657	0.528 J+	< 0.348 UJ	0.415 J		
Radium-226	pci/L	< 0.149 U	< 0.127 U	< 0.409 U	< 0.148 U	0.105	0.173 J+	< 0.0858 U	0.0924 J	0.102 J		
Radium-228	pci/L	< 0.376 U	< 0.613 U	< 0.375 U	< 0.367 U	< 0.402 U	0.484 J+	0.455 J+	< 0.348 UJ	< 0.337 UJ		
Selenium	mg/L	0.039	0.017	0.09	0.073	0.057	0.035	0.033	0.033	0.034		
Thallium	mg/L	< 0.0010 U	< 0.0010 U	< 0.0010 U	< 0.001 U	< 0.001 U	< 0.001 U	< 0.001 U	0.00025 J	0.00044 J		
Field Parameters			s									
Dissolved Oxygen	mg/L	5.88	3.86	6.45	6.53	5.1	5.07	6.89		7.53		6.53
Oxidation-Reduction Potential	millivolts	115.5	124.5	109.2	118.4	132.4	99.9	240.4		82.5		110.1
pН	SU	7.06	7.04	7.63	6.96	6.93	7.23	6.93		7.16		7.21
Specific Conductance	uS/cm	525	610	601	541	600	566	558		672		663
Temperature	deg C	15.3	17.7	16.1	13.7	12.53	12.53	14.8		16		16.5
Turbidity	ntu	1.1	3.31	2.15	2.39	1.86	0.99	1.17		0.74		0.73

Note:

mg/L = milligram per liter uScm = micro Siemens per centimeter deg C = degrees Celcius NTU = Nephelometric Turbidity Units SU = Standard Units pci.L = piocuries 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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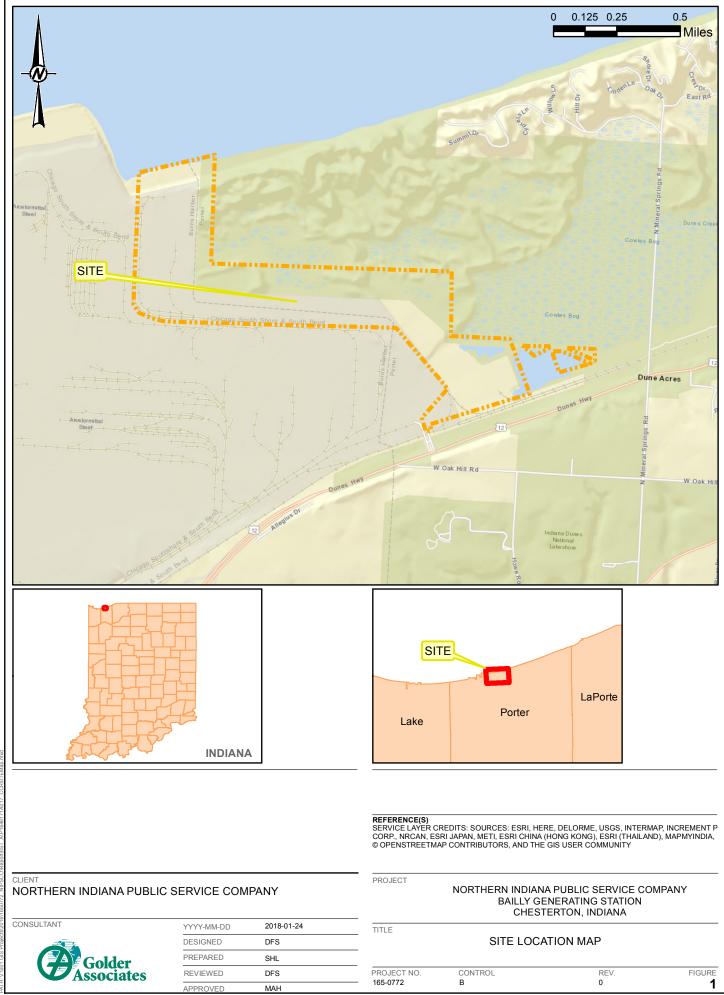
"UJ" = Indicates the result was not detected above the MDL, the estimated RL is provided.

"O" = Indicates the result was identified as an outlier and removed from the background data set.

Prepared by: DFS Checked by: SHL Reviewed by: MAH



FIGURES





Path: V:\001 GIS Projects\2016\1650772\_NIPSCO\Reports\ST\_A\P1648171A017\_(

### LEGEND



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CCR Downgradient Groundwater Monitoring Well

CCR Background Groundwater Monitoring Well

Approximate Property Line

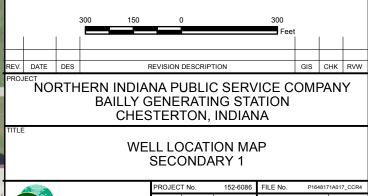
CCR Units

PHASE V CCR Unit Designation

## REFERENCES

Service Layer Credits: ESRI, USDA Farm Service Agency

Elevations are in North American Vertical Datum 88



	PROJECT	I NO.	152-6086	FILE NO.	P164817	1A017_CCR4	ć
Golder	DESIGN	DFS	2018-01-24	SCALE: AS	SHOWN	REV. 0	
	GIS	SHL	2018-01-24				
Associates	CHECK	DFS	2018-01-24	FIG	= 2	2	
Manchester, New Hampshire	REVIEW	MAH	2018-01-24				
							-