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New York State Department of Environmental Conservation

Site Number 7-54-012

Tioga Casting Site Quarterly Report

Fourth Quarter 2013

September 2014

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Tioga Castings Site Quarterly Report

Fourth Quarter 2013

Site Number 7-54-012

Prepared for:
New York State Department of Environmental Conservation

Prepared by:
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Our Ref.:
00266403.0000

Date:
September 2014

Malcolm Pirnie was acquired by ARCADIS in June 2009

Table of Contents

1. Introduction

The New York State Department of Environmental Conservation (NYSDEC) has issued a Work Assignment (# D004443-8) to Malcolm Pirnie, Inc. (Malcolm Pirnie), for Operation, Maintenance, and Monitoring at the Tioga Castings Site (NYSDEC site number 7-54-012) in New York State. This Quarterly Report and Annual Groundwater Monitoring Summary has been prepared in accordance with the NYSDEC-approved Site Management Plan (SMP) to summarize fourth quarter 2013 operation and maintenance (O&M) and monitoring activities.

2. Site Description

The Tioga Castings site is located on Foundry Street, Owego, Broome County, New York (Figure 2-1). The former foundry buildings have been razed, leaving the concrete slabs in-place. A capped, closed landfill is present at the western end of the site. In August 2011, the boundaries of the site (originally encompassing approximately seven acres) were reduced by the NYSDEC to only include the approximately one acre landfill (Figure 2-2).

3. Operation and Maintenance

Operation and Maintenance (O&M) activities were performed on October 14, 2013 in accordance with the NYSDEC-approved SMP. A Post Closure O&M Checklist (Appendix A) was used to document the current status of the landfill, including security and landfill cap maintenance and repairs. The next O&M event is scheduled to be performed during the first quarter 2014.

3.1 Landfill Security

The landfill perimeter fence, entry gate, and locks were inspected for proper operation and signs of deterioration. As indicated in the O&M Checklist, no problems were observed with the integrity of these components. In addition, the Foundry Street entry gate warning sign was in place and in acceptable condition.

3.2 Landfill Cap Maintenance

A visual inspection of the landfill cap was performed to assess the landfill for burrowing rodents, erosion, woody vegetation, and settlement. As shown in the O&M Checklist (Appendix A), no burrowing rodent holes were observed in the landfill and no woody vegetation or settlement was observed on the landfill cap. The condition of the landfill cap was in acceptable condition.

4. Groundwater Monitoring Program

Groundwater sampling was conducted on October 14, 2013 in accordance with the SMP to provide information on groundwater quality, monitor contaminant migration in groundwater, and assess hydrogeologic site conditions, including groundwater flow. Groundwater samples are collected on a five-quarter sampling interval in accordance with the SMP. The next groundwater sampling event is scheduled to occur during the first quarter 2015.

4.1. Groundwater Monitoring Well Inspection

The integrity of each well was inspected and the results recorded on a groundwater monitoring well inspection form (Appendix B). As indicated in the inspection forms, the monitoring wells are in acceptable condition and no significant problems were reported.

4.2. Water Level Measurements

Monitoring well locations are presented on Figure 4-1. Prior to collecting groundwater samples, water levels were measured to the nearest hundredth of a foot and recorded on a groundwater level data form (Appendix C).

Table 4-1 summarizes the groundwater levels and elevations from the site. As shown in Table 4-1, groundwater elevations ranged from 792.09 (MW-5) feet above mean sea level (amsl) to 795.22 (MW-4) feet amsl. Table 4-1 shows that the groundwater elevations measured in 2013 are approximately one foot higher than in 2012.

A potentiometric surface map is presented on Figure 4-2. As shown on Figure 4-2, the direction of groundwater flow in the vicinity of the landfill is generally to the east and the Susquehanna River. Figure 4-2 also shows that the water table is relatively flat in the eastern portion of the site.

4.3. Groundwater Sampling

Groundwater samples were collected from eight groundwater monitoring wells (MW-1R, MW-2, MW-3D, MW-4, MW-5, MW-6, MW-7, and MW-8) using low-flow groundwater purging and sampling procedures in accordance with the SMP. Due to insufficient water in groundwater monitoring well MW-3, no samples were collected from this well.

Prior to collecting groundwater samples, pH, conductivity, turbidity, dissolved oxygen (DO), temperature, salinity, total dissolved solids (TDS), and oxidation-reduction potential (REDOX) were measured using a Horiba U-52 water quality meter and recorded on groundwater sampling purge logs. Groundwater sampling purge logs are presented in Appendix D.

Groundwater samples were submitted to Test America – Buffalo by chain-of-custody procedures and analyzed for Target Analyte List (TAL) metals by USEPA Method 6010B. Analytical data packages are provided in Appendix E.

4.4. Groundwater Sampling Results

Groundwater sample results are summarized in Table 4-2.

As shown in Table 4-2, sodium was detected in groundwater samples MW-1R (28,300 micrograms per liter (ug/L)), MW-2 (74,200 ug/L), MW-5 (20,500 ug/L), MW-6 (22,400 ug/L), and MW-7 (22,100 ug/L) at concentrations above the corresponding NYSDEC Class GA Standard of 20,000 ug/L. Table 4-2 shows that the concentrations of sodium in the samples from these wells are within the range of sodium results reported for previous sampling events. It is anticipated that the elevated concentrations of sodium may be related to the local application of road de-icing agents.

Table 4-2 shows that the iron concentrations in the samples from MW-1R (1,000 ug/L), MW-2 (3,900 ug/L), MW-3D (390 ug/L), MW-6 (330 ug/L), and MW-7 (660 ug/L) exceed the NYSEC Class GA Standard of 300 ug/L. As shown in Table 4-2, the last iron exceedances in the samples from monitoring wells MW-1R, MW-2, and MW-3D were reported during the 2009 groundwater sampling event. The iron concentrations in the samples from MW-6 and MW-7 are within the range of previous sampling results.

Manganese was detected in the groundwater sample from MW-2 (2,800 ug/L), exceeding the NYSDEC Class GA Standard of 300 ug/L. This was the first manganese exceedance reported at this location since 2007. The concentration of manganese in the groundwater sample collected from MW-7 (340 ug/L) exceed the NYSDEC Class GA Standard of 300 ug/L. The last manganese exceedance at this location (989 ug/L) was in the groundwater sample from the 2009 sampling event. No other metals were detected at concentrations greater than the applicable NYSDEC Class GA Standards.

5. Recommendations

Long-term groundwater monitoring indicates that the selected remedy for the Tigoa Castings site is operating as intended. As indicated below, the concentrations of the contaminants of concern (cadmium, chromium, and lead) in groundwater have been below the respective site-specific cleanup goals and/or NYSDEC Class GA Standards since 2009. Therefore, it is recommend that the groundwater monitoring network be reduced by decommissioning six groundwater monitoring wells (MW-1R, MW-2, MW-3, MW-5, MW-7, and MW-8) located down-gradient of the existing landfill and former foundry. These wells will be replaced by installing one new monitoring well down-gradient of the landfill. Reduction of the monitoring well network, with the proposed installation of one groundwater monitoring well down-gradient of the landfill, will continue to provide groundwater quality data that is sufficient to monitor whether the remedy is effective and protective to human health and the environment.

The site-specific cleanup goals for groundwater are presented in the Tioga Casting Site Record of Decision (NYSDEC, 1995). The contaminants of concern and associated cleanup goals are cadmium (10 ug/L) chromium (50 ug/L), and lead (25 ug/L). Based on groundwater data from samples collected at the site since 2009, only one groundwater sample collected from monitoring well MW-7 contained a concentration of lead (30.2 B ug/L) that exceeded the corresponding site-specific cleanup goal and/or equivalent NYSDEC Class GA Standard of 25 ug/L. Since then, none of the groundwater samples collected from the monitoring well network have contained cadmium, chromium, or lead at concentrations greater than the respective site-specific cleanup goals or NYSDEC Class GA Standards.

Sodium has historically been detected in six of the nine groundwater samples collected from the monitoring well network at concentrations greater than the NYSDEC Class GA Standard of 20,000 ug/L. However, the elevated concentrations of sodium are likely attributed to the application of road de-icing agents and are not considered site-related contaminants.

Iron and/or manganese have been detected only intermittently above the respective NYSDEC Class GA Standard of 300 ug/L in wells generally located down-gradient from the landfill and former foundry area.

6. Summary

Landfill O&M activities were conducted in accordance with the SMP during the fourth quarter 2013. No significant issues were reported with the condition of the perimeter fence or the condition of the landfill. The next O&M event is scheduled for the first quarter 2014.

Groundwater monitoring wells were in acceptable condition. The direction of groundwater flow in the vicinity of the landfill is toward the east. With the exception of sodium, iron, and manganese, none of the samples contained concentrations of metals greater than the applicable NYSDEC Class GA Standards. Sodium concentrations exceeded the NYSDEC Class GA Standard in five out of the nine samples collected during the supplemental groundwater monitoring event. The sodium exceedances may be related to the localized application of road de-icing agents. Iron exceedances were reported in samples from MW-1R, MW-2, MW-3D, MW-6, and MW-7. The exceedances in the samples from MW-1R, MW-2, and MW3D were reported for the first time since 2009. Iron concentrations in the samples from MW-6 and MW-7 were consistent with previous results. Manganese exceedances were reported in samples from MW-2 for the first time since 2009. The manganese exceedance in the sample from MW-7 is consistent within the range of previous results.

It is recommended that the groundwater monitoring network be reduced down-gradient of the site by decommissioning six wells. One new groundwater monitoring well would be installed down-gradient of the landfill to monitor the effectiveness and protectiveness of the remedy.

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Appendix A

O&M Checklists

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Appendix B

Well Inspection Forms

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Appendix C

Groundwater Level Data Form

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Appendix D

Groundwater Sampling Purge Logs

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Appendix E

Analytical Data Packages

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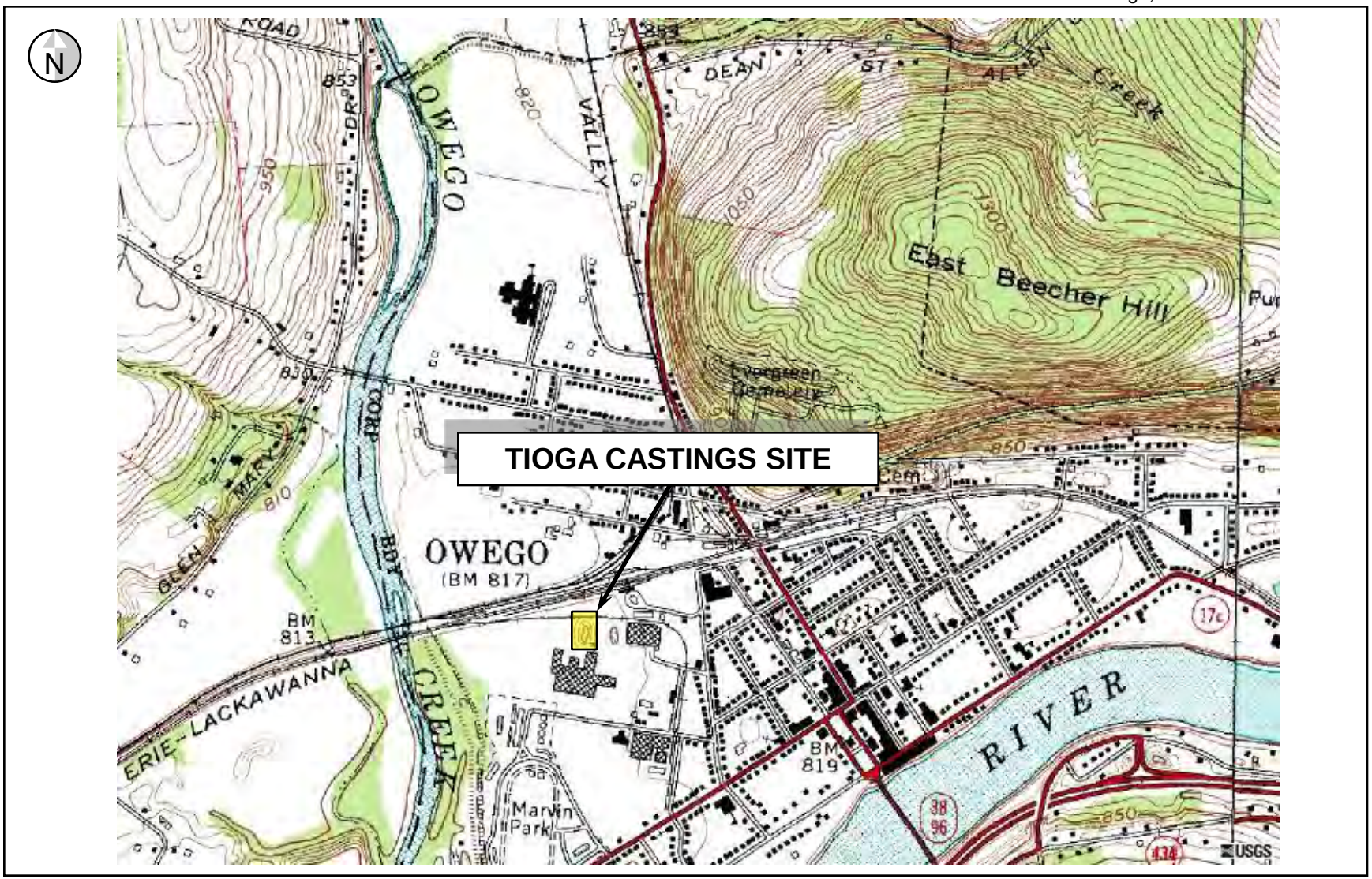
Figure 2-1
Site Location
Tioga Castings Site
NYSDEC Site Number 7-54-012
Owego, New York

0 2,000 ft



Source: USGS 7.5-minute Series Topographic Quadrangle, OWEGO (1990).

G:Project/0266362/File/Reports/1st Qtr 2012/Figure 2-1.ppt

0 60 120 240 360 480 Feet

N

Legend

- Monitoring Well
- Former Casting Facility
- On-Site Landfill/Site Boundary
- Approximate Parcel Boundary

Note: Site feature boundaries are approximate.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SITE NUMBER 754012

Tioga Casting Facility, Owego, New York

SITE FEATURES

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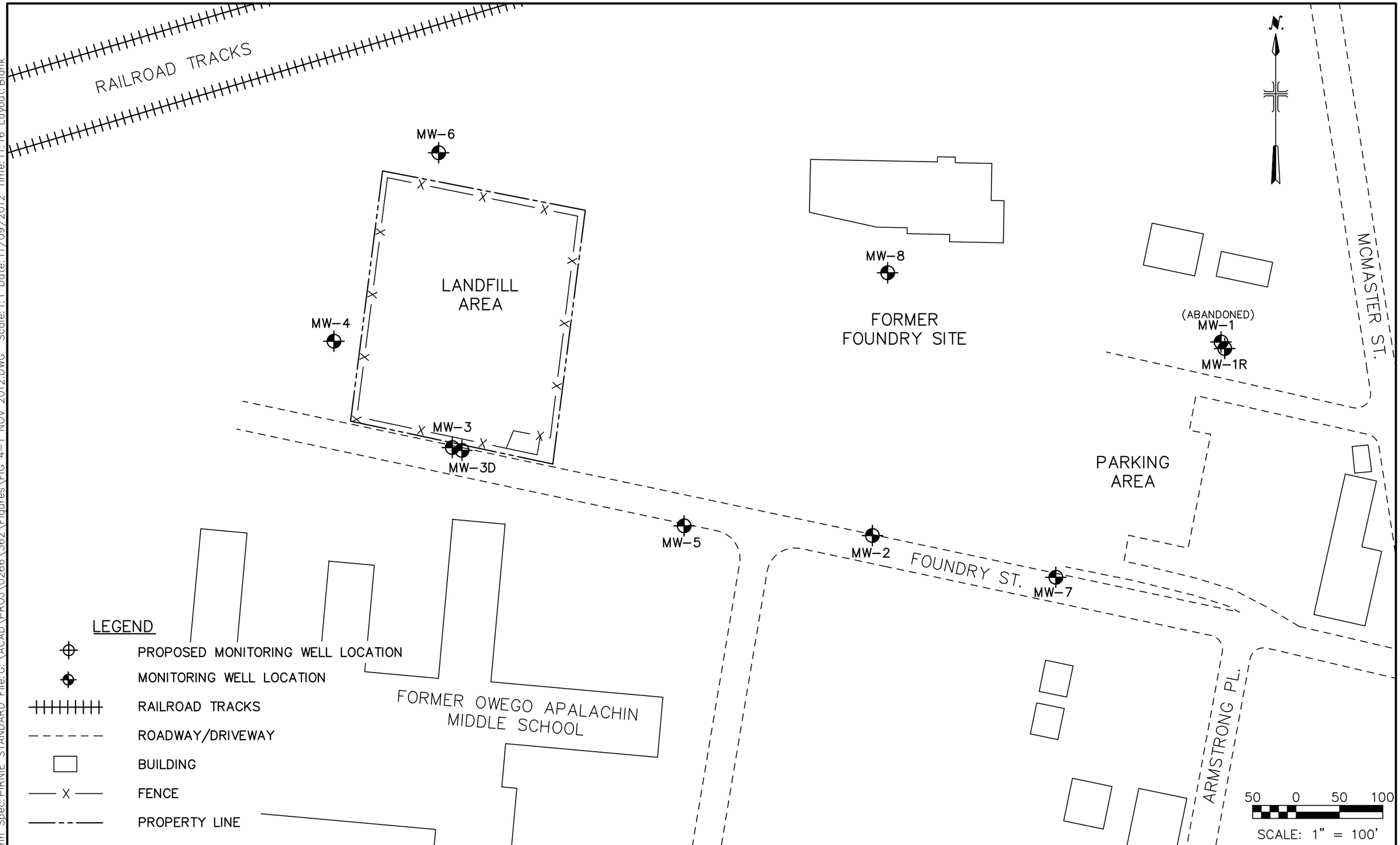
FIGURE
2-2

G:\GIS\MXD\002664O3.0000\Site Map.mxd
G:\PROJECT\002664O3.0000\PRR\Figure 2-2.pdf



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NYSDEC STANDBY CONTRACT NO. D007618-12
NYSDEC SITE NO. 7-54-012
TIOGA CASTING FACILITY
OWEGO, NEW YORK

MONITORING WELL LOCATIONS

SCALE: AS SHOWN

NOVEMBER 2012
FIGURE 4-1

RAILROAD TRACKS

MW–6
794.93'

794.0'

795.0'

LANDFILL
AREA

MW–4
795.22'

795.0'

MW–3
794.73'
MW–3D

794.0'

793.0'

793.0'

MW–8
792.61'

FORMER
FOUNDRY SITE

(ABANDONED)
MW–1
792.80'
MW–1R

MCMASTER ST.

PARKING
AREA

MW–5
792.09'

793.00'
MW–2

FOUNDRY ST.

MW–7
792.82'

ARMSTRONG PL.

FORMER OWEGO APALACHIN
MIDDLE SCHOOL

N

50 0 50 100
SCALE: 1" = 100'

LEGEND

- PROPOSED MONITORING WELL LOCATION
- MONITORING WELL LOCATION
- RAILROAD TRACKS
- ROADWAY/DRIVEWAY
- BUILDING
- FENCE
- PROPERTY LINE

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NYSDEC STANDBY CONTRACT NO. D007618–12
NYSDEC SITE NO. 7–54–012
TIOGA CASTING FACILITY
OWEGO, NEW YORK

POTENTIOMETIRC SURFACE (10/14/2013)

SCALE: AS SHOWN

JANUARY 2014
FIGURE 4–2

USER: HAUSMANN FILENAME: G:\ACAD\PROJ\0266\362\FIGURES\FIG 4–2 JAN 2014.DWG SAVE DATE: 5/15/2014 6:22 AM PLOT DATE: 5/15/2014 6:23 AM

Table 4-1
Summary of Groundwater Elevations
Tioga Casting
Owego, New York
NYSDEC Site No. 7-54-012

Well	Measuring Point Elevation (feet)		11/24/2008		5/18/2010		10/28/2010		2/28/2011		7/19/2012		10/14/2013	
			DTW (feet)	Elevation (feet)	DTW (feet)	Elevation (feet)	DTW (feet)	Elevation (feet)	DTW (feet)	Elevation (feet)	DTW (feet)	Elevation (feet)	DTW (feet)	Elevation (feet)
MW-1R	813.82	(2)	20.90		17.03		19.77	794.05	19.99	793.83	21.99	791.83	21.02	792.80
MW-2	807.68	(1)	14.56	793.12	10.69	796.99	13.59	794.09	13.45	794.23	15.74	791.94	14.68	793.00
MW-3	812.61	(2)	17.51	795.10	14.35	798.26	16.74	795.87	16.68	795.93	18.15	794.46	17.79	794.82
MW-3D	812.42	(2)	17.52		14.17		16.58	795.84	16.47	795.95	18.56	793.86	17.69	794.73
MW-4	806.33	(1)	10.87	795.46	7.81	798.52	10.04	796.29	9.91	796.42	11.71	794.62	11.11	795.22
MW-5	803.89	(1)	10.74	793.15	6.60	797.29	9.72	794.17	9.25	794.64	12.01	791.88	11.80	792.09
MW-6	815.53	(3)	10.74		7.60		10.72		19.67	795.86	21.63	793.90	20.60	794.93
MW-7	807.12	(2)	14.17		10.30		13.07	794.05	13.14	793.98	15.29	791.83	14.30	792.82
MW-8	813.73	(2)	20.98		17.05		20.04	793.69	20.00	793.73	22.18	791.55	21.12	792.61

(1) - Source: Monitoring Plan: Tioga Casting (NYSDEC, April 25, 2005)
(2) - From Malcolm Pirnie, Inc. level survey performed 10/28/2010
(3) - From Malcolm Pirnie, Inc. level survey performed 2/28/2011

Table 4-2
Summary of Groundwater Sample Results - Metals
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date Units	NYSDEC Class GA Standards	MW-1R 4/13/2009 ug/L		MW-1R 3/18/2010 ug/L		MW-1R 10/28/2010 ug/L		MW-1R 2/28/2011 ug/L		MW-1R 7/19/2012 ug/L		MW-1R 10/14/2013 ug/L	
Aluminum		1050		41.0	BE	20.8	J	37.7	J	200	U	930	
Antimony	3	6.7	U	6.8	U	8.0	U	15.0	U	20.0	U	20.0	U
Arsenic	25	3.0	U	5.6	U	4.2	U	15.0	U	10.0	U	10.0	U
Barium	1000	59.8	B	51.9	BE	50.7		48.7		57.0		58.0	
Beryllium	3*	0.5	U	0.2	BE	0.7	U	5.0	U	2.0	U	2.0	U
Cadmium	5 [10]	0.3	U	0.6	BE	0.5	U	5.0	U	1.0	U	1.0	U
Calcium		61200		63700		58900		58700		67500		58700	
Chromium	50 [50]	10.4	B	0.9	U	1.1	U	5.0	U	2.1	J B	1.9	J
Cobalt		3.8	U	0.6	U	5.8	U	5.0	U	4.0	U	4.0	U
Copper	200	181		1.3	U	2.3	J	10.0	U	10.0	U	10.0	U
Iron	300	**1410**		48.9	BE	43.7	J	86.4	J	50.0	U	**1000**	
Lead	25 [25]	1.4	U	3.0	U	4.4	J	15.0	U	5.0	U	5.0	U
Magnesium		11500		12100		10900		11500		12700		11900	
Manganese	300	106		16.5		3.9	J	11.3		0.73	J B	61.0	
Mercury	0.7	NA		0.1	U	0.1	U	0.2	U	0.20	U	0.2	U
Nickel	100	6.9	B	1.4	BE	4.2	U	5.0	U	10.0	U	10	U
Potassium		2070	B	1640	BE	1640		1570		1900		2000	
Selenium	10	11.4	U	8.7	U	4.8	U	38.0	U	15.0	U	15.0	U
Silver	50	2.2	U	1.2	U	1.5	U	5.0	U	2.20	J	3.0	U
Sodium	20000	**25600**		**25100**		**23300**		**23300**		**32100**		**28300**	
Thallium	0.5*	3.0	U	10.2	U	2.4	U	15.0	U	20.0	U	20.0	U
Titanium		8.8	B	NA		NA		NA		NA		NA	
Vanadium		4.7	U	1.1	U	6.1	U	5.0	U	5.0	U	1.5	J
Zinc	2000*	13.5	U	4.1	BE	21.1		25.0	U	2.0	J	5.2	J

* - NYSDEC Guidance Value.
1- Duplicate sample from MW-6
NA - Not analyzed.
U - Analyte not detected.
J- Greater than the MDL but below the CRDL
B - Greater than MDL but less than RL.
MDL - Method detection limit.
RL - Reporting limit.
E - Estimated value.
[25] - Site-specific cleanup goal.

Table 4-2
Summary of Groundwater Sample Results - Metals
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date Units	NYSDEC Class GA Standards	MW-2 8/2/2007 ug/L		MW-2 7/17/2008 ug/L		MW-2 4/13/2009 ug/L		MW-2 3/19/2010 ug/L		MW-2 10/28/2010 ug/L		MW-2 2/28/2011 ug/L		MW-2 7/19/2012 ug/L		MW-2 10/14/2013 ug/L	
Aluminum		60.2	B	23.6	U	632		57.8	BE	9.2	J	250.0	U	200.0	U	2500	
Antimony	3	5.6	U	5.5	U	6.7	U	6.8	U	8.0	U	15.0	U	200.0	U	20.0	U
Arsenic	25	4.2	U	3.7	U	3.0	U	5.6	U	4.2	U	15.0	U	10.0	U	10.0	U
Barium	1000	61.6	B	54.3	B	102		48.8	BE	78.9		45.5		78.0		210	
Beryllium	3*	0.40	B	0.3	U	0.5	U	0.2	U	0.7	U	5.0	U	2.0	U	2.0	U
Cadmium	5 [10]	0.36	U	0.3	U	0.3	U	0.3	BE	0.5	U	5.0	U	1.0	U	1.3	
Calcium		54500	E	48800		50900		51400		62900		42400		58700		81800	
Chromium	50 [50]	0.84	U	0.9	U	5.8	B	0.9	U	1.1	U	5.0	U	1.7	J B	6.5	
Cobalt		1.1	B	1.1	U	3.8	U	0.6	U	5.8	U	5.0	U	4.0	U	1.5	J
Copper	200	1.3	U	1.3	U	105		1.3	U	2.0	U	10.0	U	10.0	U	7.3	J
Iron	300	19.3	U	19	U	**532**		28.6	BE	29.4	J	125.0	U	19.0	J	**3900**	
Lead	25 [25]	2.9	U	2.9	U	1.4	U	3.0	U	3.3	J	15.0	U	5.0	U	5.0	U
Magnesium		8650	E	7670		8320		8290		10100		6960		9500		14200	
Manganese	300	2.8	B	8.2	B	211		54.2		5.0	J	3.9	J	8.2	B	**2800**	
Mercury	0.7	0.12	U	0.1	U	NA		0.1	U	0.1	U	0.2	U	0.2	U	0.2	U
Nickel	100	1.2	U	1.0	U	7.3	B	1.3	U	4.2	U	5.0	U	10.0	U	8.0	J
Potassium		4710	BE	3900	B	4550		4550	BE	5830		4450		5700		7400	
Selenium	10	6.1	U	6.1	U	11.4	U	8.7	U	4.8	U	38.0	U	15.0	U	15.0	U
Silver	50	1.7	B	1.3	U	2.2	U	1.2	U	1.5	U	5.0	U	3.0	U	3.0	U
Sodium	20000	**36100**	**E**	18700		**25200**		**24000**		**35000**		**22000**		**46500**		**74200**	
Thallium	0.5*	7.0	U	5.9	U	3.0	U	10.2	U	2.4	U	15.0	U	20.0	U	20.0	U
Titanium		NA		NA		5.0	U	NA		NA		NA		NA		NA	
Vanadium		0.80	B	1.0	U	4.7	U	1.1	U	6.1	U	5.0	U	5.0	U	3.9	J
Zinc	2000*	3.6	U	3.6	U	13.5	U	2.3	BE	12.9	J	25.0	U	1.5	J	19.0	

* - NYSDEC Guidance Value.
1- Duplicate sample from MW-6
NA - Not analyzed.
U - Analyte not detected.
J- Greater than the MDL but below the CRDL
B - Greater than MDL but less than RL.
MDL - Method detection limit.
RL - Reporting limit.
E - Estimated value.
[25] - Site-specific cleanup goal.

Table 4-2
Summary of Groundwater Sample Results - Metals
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date Units	NYSDEC Class GA Standards	MW-3 4/13/2009 ug/L		MW-3 3/19/2010 ug/L		MW-3 10/28/2010 ug/L		MW-3 2/28/2011 ug/L	
Aluminum		195.0		39.8	U	17.7	J	250.0	U
Antimony	3	6.7	U	6.8	U	8.0	U	15.0	U
Arsenic	25	3.0	U	5.6	U	4.2	U	15.0	U
Barium	1000	38.3	B	46.5	BE	57.1		44.6	
Beryllium	3*	0.5	U	0.2	U	0.7	U	5.0	U
Cadmium	5 [10]	0.3	U	0.3	U	0.5	U	5.0	U
Calcium		42900		51300		54400		49800	
Chromium	50 [50]	3.5	B	0.9	U	1.1	U	5.0	U
Cobalt		3.8	U	0.6	U	5.8	U	5.0	U
Copper	200	71.3		1.3	U	2.0	U	10.0	U
Iron	300	144	B	19.3	U	55.6		125.0	U
Lead	25 [25]	1.5	B	3.0	U	5.1	J	15.0	U
Magnesium		7450		9270		9550		9300	
Manganese	300	14.0	B	0.3	BE	3.0	J	8.0	U
Mercury	0.7	NA		0.1	U	0.1	U	0.2	U
Nickel	100	4.2	B	1.3	U	4.2	U	5.0	U
Potassium		1430	B	1890	BE	1480		1230	
Selenium	10	11.4	U	8.7	U	4.8	U	38.0	U
Silver	50	2.2	U	1.2	U	1.5	U	5.0	U
Sodium	20000	17000		16900		17000		15200	
Thallium	0.5*	3.0	U	10.2	U	2.4	U	15.0	U
Titanium		5.0	U	NA		NA		NA	
Vanadium		4.7	U	1.1	U	6.1	U	5.0	U
Zinc	2000*	13.5	U	1.5	U	44.3		25.0	U

* - NYSDEC Guidance Value.
1- Duplicate sample from MW-6
NA - Not analyzed.
U - Analyte not detected.
J- Greater than the MDL but below the CRDL
B - Greater than MDL but less than RL.
MDL - Method detection limit.
RL - Reporting limit.
E - Estimated value.
[25] - Site-specific cleanup goal.

Table 4-2
Summary of Groundwater Sample Results - Metals
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date Units	NYSDEC Class GA Standards	MW-3D 4/13/2009 ug/L		MW-3D 3/18/2010 ug/L		MW-3D 10/28/2010 ug/L		MW-3D 2/28/2011 ug/L		MW-3D 7/19/2012 ug/L		MW-3D 10/14/2013 ug/L	
Aluminum		668		39.8	U	11.7	J	250.0	U	200.0	U	310	
Antimony	3	6.7	U	6.8	U	8.0	U	15.0	U	20.0	U	20.0	U
Arsenic	25	3.0	U	5.6	U	4.2	U	15.0	U	10.0	U	10.0	U
Barium	1000	39.2	B	45.3	BE	56.7		43.6		51.0		46.0	
Beryllium	3*	0.5	U	0.2	U	0.7	U	5.0	U	2.0	U	2.0	U
Cadmium	5 [10]	0.3	U	0.3	U	0.5	U	5.0	U	1.0	U	1.0	U
Calcium		42300		50000		54000		48600		55200		45800	
Chromium	50 [50]	3.8	B	0.9	U	1.1	U	5.0	U	1.6	J B	4.0	U
Cobalt		3.8	U	0.6	U	5.8	U	5.0	U	4.0	U	4.0	U
Copper	200	56.6		1.3	U	2.3	J	10.0	U	10.0	U	10.0	U
Iron	300	**558**		19.3	U	52.9		24.4	J	26.0	J	**390**	
Lead	25 [25]	1.4	U	3.0	U	4.6	J	15.0	U	5.0	U	5.0	U
Magnesium		7490		9120		9680		9120		10000		8800	
Manganese	300	40.3	B	0.9	BE	2.2	J	1.2	J	2.4	J B	21.0	
Mercury	0.7	NA		0.1	U	0.1	U	0.2	U	0.2	U	0.2	U
Nickel	100	3.9	B	1.3	U	4.2	U	5.0	U	10.0	U	10.0	U
Potassium		1550	B	1610	BE	1490		1260		1500		1400	
Selenium	10	11.4	U	8.7	U	4.8	U	38.0	U	15.0	U	15.0	U
Silver	50	2.2	U	1.2	U	1.5	U	5.0	U	3.0	U	3.0	U
Sodium	20000	17300		16900		17400		15600		18400		15700	
Thallium	0.5*	3.0	U	10.2	U	2.4	U	15.0	U	20.0	U	20.0	U
Titanium		5.0	U	NA		NA		NA		NA		NA	
Vanadium		4.7	U	1.1	U	6.1	U	5.0	U	5.0	U	5.0	U
Zinc	2000*	13.5	U	1.5	U	14.5	J	25.0	U	1.9	J	3.6	J

* - NYSDEC Guidance Value.
1- Duplicate sample from MW-6
NA - Not analyzed.
U - Analyte not detected.
J- Greater than the MDL but below the CRDL
B - Greater than MDL but less than RL.
MDL - Method detection limit.
RL - Reporting limit.
E - Estimated value.
[25] - Site-specific cleanup goal.

Table 4-2
Summary of Groundwater Sample Results - Metals
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date Units	NYSDEC Class GA Standards	MW-4 8/2/2007 ug/L		MW-4 7/17/2008 ug/L		MW-4 4/13/2009 ug/L		MW-4 3/18/2010 ug/L		MW-4 10/28/2010 ug/L		MW-4 2/28/2011 ug/L		MW-4 7/19/2012 ug/L		MW-4 10/14/2013 ug/L	
Aluminum		40.0	U	32.6	B	754		39.8	U	10.6	J	26.6	J	200.0	U	200.0	U
Antimony	3	5.6	U	5.5	U	6.7	U	6.8	U	8.0	U	15.0	U	20.0	U	20.0	U
Arsenic	25	4.2	U	3.7	U	3.0	U	5.6	U	4.2	U	15.0	U	10.0	U	10.0	U
Barium	1000	40.0	B	38.3	B	60.9	B	42.6	BE	50.3		40.8		48.0		43.0	
Beryllium	3*	0.27	U	0.3	U	0.5	U	0.2	U	0.7	U	5.0	U	2.0	U	2.0	U
Cadmium	5 [10]	0.36	U	0.7	B	0.3	U	0.5	BE	0.5	U	1.7	J	1.0	U	1.0	U
Calcium		42700	E	42400		40500		48000		47900		43100		50900		46000	
Chromium	50 [50]	0.84	U	0.9	U	3.4	B	0.9	U	1.1	U	5.0	U	1.6	J B	4.0	U
Cobalt		0.89	U	1.1	U	3.8	U	0.6	U	5.8	U	5.0	U	4.0	U	4.0	U
Copper	200	1.4	B	1.3	U	49.7		1.3	U	2.0	U	10.0	U	10.0	U	10.0	U
Iron	300	47.6	B	34	B	**667**		22.2	BE	33.4	J	57.3	J	50.0	U	34.0	J
Lead	25 [25]	2.9	U	2.9	U	1.4	U	3.0	U	2.6	U	15.0	U	5.0	U	5.0	U
Magnesium		8190	E	7830		7080		8820		8390		8140		9400		8800	
Manganese	300	0.79	B	1.2	B	79.4		1.5	BE	2.0	J	2.2	J	0.7	J B	1.6	J
Mercury	0.7	0.12	U	0.1	U	NA		0.1	U	0.1	U	0.2	U	0.2	U	0.2	U
Nickel	100	1.2	U	1.0	U	4.5	B	1.3	U	4.2	U	1.5	J	10.0	U	10.0	U
Potassium		1020	BE	1860	B	1190	B	1130	BE	1230		1330		1300		1100	
Selenium	10	6.1	U	6.1	U	11.4	U	8.7	U	4.8	U	38.0	U	15.0	U	15.0	U
Silver	50	1.0	U	1.3	U	2.2	U	1.2	U	1.5	U	5.0	U	2.7	J	3.0	U
Sodium	20000	12000	E	12800		15200		16100		15000		13900		17400		15700	
Thallium	0.5*	7.0	U	5.9	U	3.0	U	10.2	U	2.4	U	15.0	U	20.0	U	20.0	U
Titanium		NA		NA		5.0	U	NA		NA		NA		NA		NA	
Vanadium		0.78	U	1.0	U	4.7	U	1.1	U	6.1	U	5.0	U	5.0	U	5.0	U
Zinc	2000*	3.6	U	3.6	U	13.5	U	1.5	U	6.5	U	25.0	U	1.5	J	10.0	U

* - NYSDEC Guidance Value.
1- Duplicate sample from MW-6
NA - Not analyzed.
U - Analyte not detected.
J- Greater than the MDL but below the CRDL
B - Greater than MDL but less than RL.
MDL - Method detection limit.
RL - Reporting limit.
E - Estimated value.
[25] - Site-specific cleanup goal.

Table 4-2
Summary of Groundwater Sample Results - Metals
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date Units	NYSDEC Class GA Standards	MW-5 8/2/2007 ug/L		MW-5 7/17/2008 ug/L		MW-5 4/13/2009 ug/L		MW-5 3/18/2010 ug/L		MW-5 10/28/2010 ug/L		MW-5 2/28/2011 ug/L		MW-5 7/19/2012 ug/L		MW-5 10/14/2013 ug/L	
Aluminum		79.0	B	28.9	B	102	B	39.8	U	22.4	J	250.0	U	85.0	J	120.0	J
Antimony	3	5.6	U	5.5	U	6.7	U	6.8	U	8.0	U	15.0	U	20.0	U	20.0	U
Arsenic	25	4.2	U	3.7	U	3.0	U	5.6	U	4.2	U	15.0	U	10.0	U	10.0	U
Barium	1000	56.4	B	55.7	B	47.1	B	47.4	BE	67.3		52.0		63.0		72.0	
Beryllium	3*	0.51	B	0.3	U	0.5	U	0.2	U	0.7	U	5.0	U	2.0	U	2.0	U
Cadmium	5 [10]	0.36	U	0.3	U	0.3	U	0.3	U	0.5	U	5.0	U	1.0	U	1.0	U
Calcium		44400	E	45200		44000		45100		49500		43900		50600		55100	
Chromium	50 [50]	0.84	U	0.9	U	3.9	B	0.9	U	1.1	U	5.0	U	1.6	J B	4.0	U
Cobalt		0.89	U	1.1	U	3.8	U	0.6	U	5.8	U	5.0	U	4.0	U	4.0	U
Copper	200	1.3	U	1.3	U	89.3		1.3	U	2.0	U	10.0	U	10.0	U	10.0	U
Iron	300	19.3	U	19	U	246		19.3	U	94.1		52.9	J	150.0		40.0	J
Lead	25 [25]	2.9	U	2.9	U	6.0	B	3.0	U	7.2		15.0	U	5.0	U	5.0	U
Magnesium		7600	E	7570		7440		7330		7980		7500		8500		9600	
Manganese	300	0.90	B	0.7	B	10.1	B	0.8	BE	5.6	J	1.8	J	5.8	B	3.6	
Mercury	0.7	0.12	U	0.1	U	NA		0.1	U	0.1	U	0.2	U	0.2	U	0.2	U
Nickel	100	1.2	U	1.4	B	5.0	B	1.3	U	4.2	U	5.0	U	10.0	U	10.0	U
Potassium		3330	BE	3340	B	2880	B	3530	BE	3620		3210		3700		3900	
Selenium	10	6.1	U	6.1	U	11.4	U	8.7	U	4.8	U	38.0	U	15.0	U	15.0	U
Silver	50	1.6	B	1.3	U	2.2	U	1.2	U	1.5	U	5.0	U	3.0	U	3.0	U
Sodium	20000	14200	E	15400		13300		8320		13600		9080		**21400**		**20500**	
Thallium	0.5*	7.0	U	5.9	U	3.0	U	10.2	U	2.4	U	15.0	U	20.0	U	20.0	U
Titanium		NA		NA		5.0	U	NA		NA		NA		NA		NA	
Vanadium		0.80	B	1.0	U	4.7	U	1.1	U	6.1	U	5.0	U	5.0	U	5.0	U
Zinc	2000*	3.6	U	3.6	U	13.5	U	3.6	BE	15.3	J	25.0	U	4.7	J	3.6	J

* - NYSDEC Guidance Value.
1- Duplicate sample from MW-6
NA - Not analyzed.
U - Analyte not detected.
J- Greater than the MDL but below the CRDL
B - Greater than MDL but less than RL.
MDL - Method detection limit.
RL - Reporting limit.
E - Estimated value.
[25] - Site-specific cleanup goal.

Table 4-2
Summary of Groundwater Sample Results - Metals
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date Units	NYSDEC Class GA Standards	MW-6 2/28/2011 ug/L		MW-6 7/24/2012 ug/L		MW-6 10/14/2013 ug/L		MW-X[(1)] 10/14/2013 ug/L	
Aluminum		49.5	J	520.0		310.0		340.0	
Antimony	3	15.0	U	20.0	U	20.0	U	20.0	U
Arsenic	25	15.0	U	10.0	U	10.0	U	10.0	U
Barium	1000	53.1		61.0		62.0		63.0	
Beryllium	3*	5.0	U	2.0	U	2.0	U	2.0	U
Cadmium	5 [10]	5.0	U	1.0	U	1.0	U	1.0	U
Calcium		54200		73500		54200		55100	
Chromium	50 [50]	5.0	U	2.7	J B	4.0	U	4.0	U
Cobalt		5.0	U	4.0	U	4.0	U	4.0	U
Copper	200	10.0	U	10.0	U	10.0	U	10.0	U
Iron	300	98.8	J	**670.0**		**330.0**		**360.0**	
Lead	25 [25]	15.0	U	5.0	U	5.0	U	5.0	U
Magnesium		9280		11300		10100		10200	
Manganese	300	7.5	J	36.0	B	15.0		17.0	
Mercury	0.7	0.2	U	0.2	U	0.2	U	0.2	U
Nickel	100	5.0	U	10.0	U	10.0	U	10.0	U
Potassium		2090.0		2300		2000		2000	
Selenium	10	38.0	U	15.0	U	15.0	U	15.0	U
Silver	50	5	U	3.0	U	3.0	U	3.0	U
Sodium	20000	**21900**		**26900**		**22400**		**22500**	
Thallium	0.5*	15.0	U	20.0	U	20.0	U	20.0	U
Titanium		NA		NA		NA		NA	
Vanadium		5	U	5.0	U	5.0	U	5.0	U
Zinc	2000*	25.0	U	4.6	J	2.8	J	2.2	J

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1- Duplicate sample from MW-6
NA - Not analyzed.
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B - Greater than MDL but less than RL.
MDL - Method detection limit.
RL - Reporting limit.
E - Estimated value.
[25] - Site-specific cleanup goal.

Table 4-2
Summary of Groundwater Sample Results - Metals
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date Units	NYSDEC Class GA Standards	MW-7 4/13/2009 ug/L		MW-7 3/18/2010 ug/L		MW-7 10/28/2010 ug/L		MW-7 2/28/2011 ug/L		MW-7 7/19/2012 ug/L		MW-7 10/14/2013 ug/L	
Aluminum		1810		140	BE	28.2	J	162.0	J	200.0	U	100.0	J
Antimony	3	6.7	U	6.8	U	8.0	U	15.0	U	20.0	U	20.0	U
Arsenic	25	3.0	U	5.6	U	4.2	U	15.0	U	10.0	U	10.0	U
Barium	1000	165		133	BE	96.0		66.8		92.0		100.0	
Beryllium	3*	0.5	U	0.2	U	0.7	U	5.0	U	2.0	U	2.0	U
Cadmium	5 [10]	0.3	U	0.4	BE	0.5	U	5.0	U	1.0	U	1.0	U
Calcium		64300		85600		60300		45200		61200		64000	
Chromium	50 [50]	10.4	B	0.9	U	1.1	U	0.8	J	1.5	J B	4.0	U
Cobalt		5.8	B	0.6	U	5.8	U	5.0	U	4.0	U	4.0	U
Copper	200	178		3.1	BE	3.6	J	4.5	J	1.7	J	5.1	J
Iron	300	**2880**		192		297.0		**457.0**		170.0		**660**	
Lead	25 [25]	**30.2**	**B**	3.0	U	3.1	J	2.9	J	5.0	U	5.0	U
Magnesium		10000		13600		9230		7030		9300		10300	
Manganese	300	**989**		115		**474.0**		130.0		210.0	B	**340.0**	
Mercury	0.7	NA		0.1	U	0.1	U	0.2	U	0.2	U	0.2	U
Nickel	100	10.6	B	2.8	BE	4.2	U	1.1	J	10.0	U	2.1	J
Potassium		4510		5190		4170		3270		4200		4400	
Selenium	10	11.4	U	8.7	U	4.8	U	38.0	U	15.0	U	15.0	U
Silver	50	2.2	U	1.2	U	1.5	U	5.0	U	3.0	U	3.0	U
Sodium	20000	**57500**		**58900**		**20700**		**32700**		**27600**		**22100**	
Thallium	0.5*	3.0	U	10.2	U	2.4	U	15.0	U	20.0	U	20.0	U
Titanium		5.0	U	NA		NA		NA		NA		NA	
Vanadium		7.2	B	1.1	U	6.1	U	5.0	U	5.0	U	5.0	U
Zinc	2000*	40.4	B	10.4	BE	18.0	J	18.3	J	4.8	J	7.3	J

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B - Greater than MDL but less than RL.
MDL - Method detection limit.
RL - Reporting limit.
E - Estimated value.
[25] - Site-specific cleanup goal.

Table 4-2
Summary of Groundwater Sample Results - Metals
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date Units	NYSDEC Class GA Standards	MW-8 4/13/2009 ug/L		MW-8 3/18/2010 ug/L		MW-8 10/28/2010 ug/L		MW-8 2/28/2011 ug/L		MW-8 7/19/2012 ug/L		MW-8 10/14/2013 ug/L	
Aluminum		6190		39.8	U	45.5	J	324.0		230.0		130.0	J
Antimony	3	6.7	U	6.8	U	8.0	U	15.0	U	20.0	U	20.0	U
Arsenic	25	3.0	U	5.6	U	4.2	U	15.0	U	10.0	U	10.0	U
Barium	1000	219		64.6	BE	71.6		67.0		66.0		67.0	
Beryllium	3*	0.5	U	0.2	U	0.7	U	5.0	U	2.0	U	2.0	U
Cadmium	5 [10]	0.3	U	0.3	BE	0.5	U	5.0	U	1.0	U	1.0	U
Calcium		52400		52600		52800		50300		50000		49200	
Chromium	50 [50]	8.9	B	0.9	U	1.9	J	5.0	U	1.9	J B	4.0	U
Cobalt		3.8	U	0.6	U	5.8	U	5.0	U	4.0	U	4.0	U
Copper	200	66.3		1.3	U	2.3	J	1.6	J	10.0	U	10.0	U
Iron	300	**4530**		40.2	BE	104.0		**560.0**		140.0		190.0	
Lead	25 [25]	17.3	B	3.0	U	2.6	U	15.0	U	5.0	U	5.0	U
Magnesium		8740		8870		8300		8430		8000		8300	
Manganese	300	**524**		2.7	BE	5.0	J	28.9		4.0	B	8.5	
Mercury	0.7	NA		0.1	U	0.1	U	0.2	U	0.2	U	0.2	U
Nickel	100	9.5	B	1.3	U	4.2	U	5.0	U	10.0	U	10.0	U
Potassium		3770		2440	BE	2630		2630		2900		2600	
Selenium	10	11.4	U	8.7	U	4.8	U	38.0	U	15.0	U	15.0	U
Silver	50	2.2	U	1.2	U	1.5	U	5.0	U	3.0	U	3.0	U
Sodium	20000	**26700**		**23300**		**21300**		**21900**		**28500**		18600	
Thallium	0.5*	3.0	U	10.2	U	2.4	U	15.0	U	20.0	U	20.0	U
Titanium		34.4	B	NA		NA		NA		NA		NA	
Vanadium		9.8	B	1.1	U	6.1	U	5.0	U	5.0	U	5.0	U
Zinc	2000*	40.2	B	3.0	BE	23.8		25.0	U	4.1	J	3.3	J

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B - Greater than MDL but less than RL.
MDL - Method detection limit.
RL - Reporting limit.
E - Estimated value.
[25] - Site-specific cleanup goal.

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Appendix A

O&M Checklists

TIOGA CASTINGS SITE LANDFILL

Post-Closure Operation and Maintenance Checklist

Inspected by: EJM

Date: 10/14/13 Time: 1500

Weather Conditions: OVERCAST ~ 60 °F

LANDFILL COVER SYSTEM

Erosion		YES	✓	NO
Holes or Cracks in Cover		YES	✓	NO
Cap Settlement		YES	✓	NO
Ponded Water or Wet Areas		YES	✓	NO
Burrowing Rodents		YES	✓	NO
Sparse Vegetation/Bare Soil		YES	✓	NO
Brush or Other Woody Vegetation, had been cut		YES	✓	NO
Excessive Weeds in Grass		YES	✓	NO
Grass Mowed	✓	YES		NO

DRAINAGE DITCHES

Erosion		YES	✓	NO
Obstructions		YES	✓	NO
Sediment Accumulation		YES	✓	NO
Evidence of Surcharging		YES	✓	NO
Presence of Brush		YES	✓	NO

Comments: _____

Continued

FENCING

Gates and Locks	✓	OK		OTHER
Posts	✓	OK		OTHER
Top Tension Wire	✓	OK		OTHER
Barbed Wire		OK	N/A	OTHER

Comments: _____

_____

MONITORING WELLS

Capped and Locked	✓	YES		NO
Casing Damage		YES	✓	NO

Comments: _____

_____

INSPECTOR'S SIGNATURE _____ DATE 10/14/13

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Appendix B

Well Inspection Forms

ARCADIS

GROUNDWATER MONITORING WELL INSPECTION

SITE/PROJECT NAME: TIOGA CASTINGS PROJECT NUMBER: 00266403.0000

DATE OF INSPECTION: 10/14/13 INSPECTOR: EJM

WELL DESIGNATION: MW-1R

WELL LOCATION: _____

Outward Appearance

Flushmount Diameter	_____ inches	N/A [X]	
Approximate Stickup Height	3.0 feet	N/A [ ]	
Integrity of Protective Casing	Describe: OK		
Protective Casing Material	Steel [X]	Stainless Steel [ ]	Other _____
Protective Casing Width or Dia.	4 inches		
Weep Hole in Protective Casing	Yes [ ]	No [X]	
Surface Seal/Apron Material	Cement [X]	Bentonite [ ]	Not apparent [ ] Other _____
Integrity of Surface Seal/Apron	Describe: OK		
Surface Drainage	Away from Wellhead [ ]	Toward Wellhead [ ]	FLAT
Bollards Present?	Yes [ ]	No [X]	Describe: _____
Well ID. Visible?	Yes [X]	No [ ]	Describe: _____
Lock Present and Functional?	Yes [X]	No [ ]	Describe: _____
Photograph Taken? Photo #	Yes [ ]	No [X]	Describe: _____

Inner Appearance

Integrity of Well Casing	Describe: OK		
Integrity of Cap Seal	Describe: OK		
Surface Water in Casing?	Yes [ ]	No [X]	Describe: _____
Well Casing Diameter	2 inches		
Well Casing Material	PVC [X]	Steel [ ]	Stainless Steel [ ]
Inner Cap	Threaded [ ]	Slip [ ]	Expansion Plug [X] None [ ]
Reference/Measuring Point	Groove [ ]	Indelible Mark [X]	None [ ]
Evidence of Double Casing?	Yes [ ]	No [X]	Describe: _____

Downhole

Odor	Yes [ ]	No [X]	Describe: _____
PID Reading	NM ppm		
Depth to Water (to top of casing)	21.02 feet (nearest 0.01)	Depth to LNAPL	_____ feet (nearest 0.01) N/A [ ]
Total Well Depth (to top of casing)	25.30 feet (nearest 0.1)		
Sediment (Hard/Soft Bottom)	Describe: _____		

Additional Comments:

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ARCADIS

GROUNDWATER MONITORING WELL INSPECTION

SITE/PROJECT NAME: NOGA CASTINGS PROJECT NUMBER: 00266403.0000

DATE OF INSPECTION: 10/14/13 INSPECTOR: EJM

WELL DESIGNATION: MW-2

WELL LOCATION: _____

Outward Appearance

Flushmount Diameter	_____ inches	N/A [X]	
Approximate Stickup Height	2.5 feet	N/A [ ]	
Integrity of Protective Casing	Describe: OK		
Protective Casing Material	Steel [X]	Stainless Steel [ ]	Other _____
Protective Casing Width or Dia.	4 inches		
Weep Hole in Protective Casing	Yes [ ]	No [X]	
Surface Seal/Apron Material	Cement [X]	Bentonite [ ]	Not apparent [X] Other _____
Integrity of Surface Seal/Apron	Describe: COVERED BY GRAVEL		
Surface Drainage	Away from Wellhead [ ]	Toward Wellhead [X]	
Bollards Present?	Yes [ ]	No [X]	Describe: _____
Well ID. Visible?	Yes [X]	No [ ]	Describe: _____
Lock Present and Functional?	Yes [X]	No [ ]	Describe: _____
Photograph Taken? Photo #	Yes [ ]	No [X]	Describe: _____

Inner Appearance

Integrity of Well Casing	Describe: OK		
Integrity of Cap Seal	Describe: OK		
Surface Water in Casing?	Yes [ ]	No [X]	Describe: _____
Well Casing Diameter	2 inches		
Well Casing Material	PVC [X]	Steel [ ]	Stainless Steel [ ]
Inner Cap	Threaded [ ]	Slip [X]	Expansion Plug [ ] None [ ]
Reference/Measuring Point	Groove [ ]	Indelible Mark [X]	None [ ]
Evidence of Double Casing?	Yes [ ]	No [X]	Describe: _____

Downhole

Odor	Yes [ ]	No [X]	Describe: _____
PID Reading	NM ppm		
Depth to Water (to top of casing)	14.68 feet (nearest 0.01)	Depth to LNAPL	_____ feet (nearest 0.01) N/A [ ]
Total Well Depth (to top of casing)	19.74 feet (nearest 0.1)		
Sediment (Hard/Soft Bottom)	Describe: _____		

Additional Comments:

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ARCADIS

GROUNDWATER MONITORING WELL INSPECTION

SITE/PROJECT NAME: TIOGA CASTINGS PROJECT NUMBER: 00266403.0000

DATE OF INSPECTION: 10/14/13 INSPECTOR: EJM

WELL DESIGNATION: MW-35

WELL LOCATION: _____

Outward Appearance

Flushmount Diameter	_____ inches	N/A [X]	
Approximate Stickup Height	2.5 feet	N/A [ ]	
Integrity of Protective Casing	Describe: OK		
Protective Casing Material	Steel [X]	Stainless Steel [ ]	Other _____
Protective Casing Width or Dia.	4 inches		
Weep Hole in Protective Casing	Yes [ ]	No [X]	
Surface Seal/Apron Material	Cement [ ]	Bentonite [ ]	Not apparent [X] Other _____
Integrity of Surface Seal/Apron	Describe: CONCEALED BY SOIL		
Surface Drainage	Away from Wellhead [X]	Toward Wellhead [ ]	
Bollards Present?	Yes [ ]	No [X]	Describe: _____
Well ID. Visible?	Yes [X]	No [ ]	Describe: _____
Lock Present and Functional?	Yes [X]	No [ ]	Describe: _____
Photograph Taken? Photo #	Yes [ ]	No [X]	Describe: _____

Inner Appearance

Integrity of Well Casing	Describe: OK		
Integrity of Cap Seal	Describe: OK		
Surface Water in Casing?	Yes [ ]	No [X]	Describe: _____
Well Casing Diameter	2 inches		
Well Casing Material	PVC [X]	Steel [ ]	Stainless Steel [ ]
Inner Cap	Threaded [ ]	Slip [ ]	Expansion Plug [X] None [ ]
Reference/Measuring Point	Groove [ ]	Indelible Mark [X]	None [ ]
Evidence of Double Casing?	Yes [ ]	No [X]	Describe: _____

Downhole

Odor	Yes [ ]	No [X]	Describe: _____
PID Reading	NM ppm		
Depth to Water (to top of casing)	17.79 feet (nearest 0.01)	Depth to LNAPL	_____ feet (nearest 0.01) N/A [ ]
Total Well Depth (to top of casing)	18.70 feet (nearest 0.1)		
Sediment (Hard/Soft Bottom)	Describe: _____		

Additional Comments:

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ARCADIS

GROUNDWATER MONITORING WELL INSPECTION

SITE/PROJECT NAME: TIOGA CASTINGS PROJECT NUMBER: 00266403.0000

DATE OF INSPECTION: 10/14/13 INSPECTOR: EJM

WELL DESIGNATION: MW-3D

WELL LOCATION: _____

Outward Appearance

Flushmount Diameter	_____ inches	N/A [X]	
Approximate Stickup Height	2.5 feet	N/A [ ]	
Integrity of Protective Casing	Describe: OK		
Protective Casing Material	Steel [X]	Stainless Steel [ ]	Other _____
Protective Casing Width or Dia.	4 inches		
Weep Hole in Protective Casing	Yes [ ]	No [X]	
Surface Seal/Apron Material	Cement [X]	Bentonite [ ]	Not apparent [ ] Other _____
Integrity of Surface Seal/Apron	Describe: OK		
Surface Drainage	Away from Wellhead [X]	Toward Wellhead [ ]	
Bollards Present?	Yes [ ]	No [X]	Describe: _____
Well ID. Visible?	Yes [X]	No [ ]	Describe: _____
Lock Present and Functional?	Yes [X]	No [ ]	Describe: _____
Photograph Taken? Photo #	Yes [ ]	No [X]	Describe: _____

Inner Appearance

Integrity of Well Casing	Describe: OK		
Integrity of Cap Seal	Describe: OK		
Surface Water in Casing?	Yes [ ]	No [X]	Describe: _____
Well Casing Diameter	2 inches		
Well Casing Material	PVC [X]	Steel [ ]	Stainless Steel [ ]
Inner Cap	Threaded [ ]	Slip [ ]	Expansion Plug [X] None [ ]
Reference/Measuring Point	Groove [ ]	Indelible Mark [X]	None [ ]
Evidence of Double Casing?	Yes [ ]	No [X]	Describe: _____

Downhole

Odor	Yes [ ]	No [X]	Describe: _____
PID Reading	NM ppm		
Depth to Water (to top of casing)	12.69 feet (nearest 0.01)	Depth to LNAPL	_____ feet (nearest 0.01) N/A [ ]
Total Well Depth (to top of casing)	25.15 feet (nearest 0.1)		
Sediment (Hard/Soft Bottom)	Describe: _____		

Additional Comments:

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ARCADIS

GROUNDWATER MONITORING WELL INSPECTION

SITE/PROJECT NAME: TIOGA CASTINGS PROJECT NUMBER: 00266403.0000

DATE OF INSPECTION: 10/14/13 INSPECTOR: KTM

WELL DESIGNATION: MW-4

WELL LOCATION: _____

Outward Appearance

Flushmount Diameter	8 inches	N/A [X]	
Approximate Stickup Height	_____ feet	N/A [X]	
Integrity of Protective Casing	Describe: _____		
Protective Casing Material	Steel [ ]	Stainless Steel [ ]	Other _____
Protective Casing Width or Dia.	_____ inches		
Weep Hole in Protective Casing	Yes [ ]	No [ ]	
Surface Seal/Apron Material	Cement [X]	Bentonite [ ]	Not apparent [ ] Other _____
Integrity of Surface Seal/Apron	Describe: SLIGHT TILT		
Surface Drainage	Away from Wellhead [X]	Toward Wellhead [ ]	
Bollards Present?	Yes [X]	No [X]	Describe: _____
Well ID. Visible?	Yes [ ]	No [X]	Describe: _____
Lock Present and Functional?	Yes [ ]	No [X]	Describe: _____
Photograph Taken? Photo #	Yes [ ]	No [X]	Describe: _____

Inner Appearance

Integrity of Well Casing	Describe: OK		
Integrity of Cap Seal	Describe: OK		
Surface Water in Casing?	Yes [X]	No [ ]	Describe: _____
Well Casing Diameter	2 inches		
Well Casing Material	PVC [X]	Steel [ ]	Stainless Steel [ ]
Inner Cap	Threaded [ ]	Slip [ ]	Expansion Plug [X] None [ ]
Reference/Measuring Point	Groove [ ]	Indelible Mark [X]	None [ ]
Evidence of Double Casing?	Yes [ ]	No [X]	Describe: _____

Downhole

Odor	Yes [ ]	No [X]	Describe: _____
PID Reading	NM ppm		
Depth to Water (to top of casing)	11.11 feet (nearest 0.01)	Depth to LNAPL	_____ feet (nearest 0.01) N/A [ ]
Total Well Depth (to top of casing)	15.08 feet (nearest 0.1)		
Sediment (Hard/Soft Bottom)	Describe: _____		

Additional Comments:

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ARCADIS

GROUNDWATER MONITORING WELL INSPECTION

SITE/PROJECT NAME: TIOGA CASTINGS PROJECT NUMBER: 00266403.0000

DATE OF INSPECTION: 10/14/13 INSPECTOR: KTM

WELL DESIGNATION: MW-5

WELL LOCATION: _____

Outward Appearance

Flushmount Diameter	8 inches	N/A [ ]	
Approximate Stickup Height	_____ feet	N/A [X]	
Integrity of Protective Casing	Describe: _____		
Protective Casing Material	Steel [ ]	Stainless Steel [ ]	Other _____
Protective Casing Width or Dia.	_____ inches		
Weep Hole in Protective Casing	Yes [ ]	No [ ]	
Surface Seal/Apron Material	Cement [ ]	Bentonite [ ]	Not apparent [X] Other _____
Integrity of Surface Seal/Apron	Describe: COVERED BY GRASS		
Surface Drainage	Away from Wellhead [ ]	Toward Wellhead [X]	
Bollards Present?	Yes [ ]	No [X]	Describe: _____
Well ID. Visible?	Yes [ ]	No [X]	Describe: _____
Lock Present and Functional?	Yes [ ]	No [X]	Describe: _____
Photograph Taken? Photo #	Yes [ ]	No [X]	Describe: _____

Inner Appearance

Integrity of Well Casing	Describe: OK		
Integrity of Cap Seal	Describe: OK		
Surface Water in Casing?	Yes [X]	No [ ]	Describe: _____
Well Casing Diameter	2 inches		
Well Casing Material	PVC [X]	Steel [ ]	Stainless Steel [ ]
Inner Cap	Threaded [ ]	Slip [ ]	Expansion Plug [X] None [ ]
Reference/Measuring Point	Groove [ ]	Indelible Mark [X]	None [ ]
Evidence of Double Casing?	Yes [ ]	No [X]	Describe: _____

Downhole

Odor	Yes [ ]	No [X]	Describe: _____
PID Reading	NM ppm		
Depth to Water (to top of casing)	11.80 feet (nearest 0.01)	Depth to LNAPL	_____ feet (nearest 0.01) N/A [ ]
Total Well Depth (to top of casing)	16.40 feet (nearest 0.1)		
Sediment (Hard/Soft Bottom)	Describe: _____		

Additional Comments:

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ARCADIS

GROUNDWATER MONITORING WELL INSPECTION

SITE/PROJECT NAME: TIOGA CASTINGS PROJECT NUMBER: 00206403.0000

DATE OF INSPECTION: 10/14/13 INSPECTOR: KTM

WELL DESIGNATION: MW-6

WELL LOCATION: _____

Outward Appearance

Flushmount Diameter	____ inches	N/A [X]	
Approximate Stickup Height	3.5 feet	N/A [ ]	
Integrity of Protective Casing	Describe: OK		
Protective Casing Material	Steel [X]	Stainless Steel [ ]	Other _____
Protective Casing Width or Dia.	4 inches		
Weep Hole in Protective Casing	Yes [ ]	No [X]	
Surface Seal/Apron Material	Cement [X]	Bentonite [ ]	Not apparent [ ] Other _____
Integrity of Surface Seal/Apron	Describe: Good		
Surface Drainage	Away from Wellhead [X]	Toward Wellhead [ ]	
Bollards Present?	Yes [ ]	No [X]	Describe: _____
Well ID. Visible?	Yes [X]	No [ ]	Describe: _____
Lock Present and Functional?	Yes [ ]	No [X]	Describe: _____
Photograph Taken? Photo #	Yes [ ]	No [X]	Describe: _____

Inner Appearance

Integrity of Well Casing	Describe: OK		
Integrity of Cap Seal	Describe: OK		
Surface Water in Casing?	Yes [ ]	No [X]	Describe: _____
Well Casing Diameter	2 inches		
Well Casing Material	PVC [X]	Steel [ ]	Stainless Steel [ ]
Inner Cap	Threaded [ ]	Slip [ ]	Expansion Plug [X] None [ ]
Reference/Measuring Point	Groove [ ]	Indelible Mark [X]	None [ ]
Evidence of Double Casing?	Yes [ ]	No [X]	Describe: _____

Downhole

Odor	Yes [ ]	No [X]	Describe: _____
PID Reading	NM ppm		
Depth to Water (to top of casing)	20.00 feet (nearest 0.01)	Depth to LNAPL	_____ feet (nearest 0.01) N/A [ ]
Total Well Depth (to top of casing)	27.27 feet (nearest 0.1)		
Sediment (Hard/Soft Bottom)	Describe: _____		

Additional Comments:

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ARCADIS

GROUNDWATER MONITORING WELL INSPECTION

SITE/PROJECT NAME: TUCKA CASTINGS PROJECT NUMBER: 00266403.0000

DATE OF INSPECTION: 10/14/13 INSPECTOR: EDM

WELL DESIGNATION: MW-7

WELL LOCATION: _____

Outward Appearance

Flushmount Diameter	6 inches	N/A [ ]	
Approximate Stickup Height	_____ feet	N/A [X]	
Integrity of Protective Casing	Describe: OK		
Protective Casing Material	Steel [ ]	Stainless Steel [ ]	Other _____
Protective Casing Width or Dia.	_____ inches		
Weep Hole in Protective Casing	Yes [ ]	No [ ]	
Surface Seal/Apron Material	Cement [X]	Bentonite [ ]	Not apparent [ ] Other _____
Integrity of Surface Seal/Apron	Describe: OK		
Surface Drainage	Away from Wellhead [X]	Toward Wellhead [ ]	
Bollards Present?	Yes [ ]	No [X]	Describe: _____
Well ID. Visible?	Yes [X]	No [ ]	Describe: _____
Lock Present and Functional?	Yes [ ]	No [X]	Describe: _____
Photograph Taken? Photo #	Yes [ ]	No [X]	Describe: _____

Inner Appearance

Integrity of Well Casing	Describe: OK			
Integrity of Cap Seal	Describe: OK			
Surface Water in Casing?	Yes [X]	No [ ]	Describe: _____	
Well Casing Diameter	2 inches			
Well Casing Material	PVC [X]	Steel [ ]	Stainless Steel [ ]	
Inner Cap	Threaded [ ]	Slip [ ]	Expansion Plug [X]	None [ ]
Reference/Measuring Point	Groove [ ]	Indelible Mark [X]	None [ ]	
Evidence of Double Casing?	Yes [ ]	No [X]	Describe: _____	

Downhole

Odor	Yes [ ]	No [X]	Describe: _____
PID Reading	NM ppm		
Depth to Water (to top of casing)	14.30 feet (nearest 0.01)	Depth to LNAPL	_____ feet (nearest 0.01) N/A [ ]
Total Well Depth (to top of casing)	27.43 feet (nearest 0.1)		
Sediment (Hard/Soft Bottom)	Describe: _____		

Additional Comments:

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ARCADIS

GROUNDWATER MONITORING WELL INSPECTION

SITE/PROJECT NAME: TIOGA CASTINGS PROJECT NUMBER: 00206403.0000

DATE OF INSPECTION: 10/14/13 INSPECTOR: EJM

WELL DESIGNATION: MW-8

WELL LOCATION: _____

Outward Appearance

Flushmount Diameter	_____ inches	N/A [X]	
Approximate Stickup Height	3 feet	N/A [ ]	
Integrity of Protective Casing	Describe: OK		
Protective Casing Material	Steel [X]	Stainless Steel [ ]	Other _____
Protective Casing Width or Dia.	4 inches		
Weep Hole in Protective Casing	Yes [ ]	No [X]	
Surface Seal/Apron Material	Cement [ ]	Bentonite [ ]	Not apparent [X] Other _____
Integrity of Surface Seal/Apron	Describe: COVERED		
Surface Drainage	Away from Wellhead [X]	Toward Wellhead [ ]	
Bollards Present?	Yes [ ]	No [X]	Describe: _____
Well ID. Visible?	Yes [X]	No [ ]	Describe: _____
Lock Present and Functional?	Yes [X]	No [ ]	Describe: _____
Photograph Taken? Photo #	Yes [ ]	No [X]	Describe: _____

Inner Appearance

Integrity of Well Casing	Describe: OK		
Integrity of Cap Seal	Describe: OK		
Surface Water in Casing?	Yes [ ]	No [ ]	Describe: _____
Well Casing Diameter	2 inches		
Well Casing Material	PVC [X]	Steel [ ]	Stainless Steel [ ]
Inner Cap	Threaded [ ]	Slip [ ]	Expansion Plug [X] None [ ]
Reference/Measuring Point	Groove [ ]	Indelible Mark [X]	None [ ]
Evidence of Double Casing?	Yes [ ]	No [X]	Describe: _____

Downhole

Odor	Yes [ ]	No [X]	Describe: _____
PID Reading	NM ppm		
Depth to Water (to top of casing)	21.12 feet (nearest 0.01)	Depth to LNAPL	_____ feet (nearest 0.01) N/A [ ]
Total Well Depth (to top of casing)	27.70 feet (nearest 0.1)		
Sediment (Hard/Soft Bottom)	Describe: _____		

Additional Comments:

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Appendix C

Groundwater Level Data Form

GROUNDWATER LEVEL DATA FORM

PROJECT NAME: Tioga Casting
PROJECT NUMBER: 00266403.0000
DATE: 10/14/2013
PERSONNEL: E. Moskal

WELL ID	Date	Time	Headspace VOCs (ppm)	Depth to LNAPL (feet)	Depth to Water (feet)	Reference Point
MW-1R	10/14/2013		NM	-	21.02	TOC
MW-2	10/14/2013		NM	-	14.68	TOC
MW-3D	10/14/2013		NM	-	12.69	TOC
MW-4	10/14/2013		NM	-	11.11	TOC
MW-5	10/14/2013		NM	-	11.80	TOC
MW-6	10/14/2013		NM	-	20.60	TOC
MW-7	10/14/2013		NM	-	14.30	TOC
MW-8	10/14/2013		NM	-	21.12	TOC

Notes:
NM - Not Measured
TOC - Top of Casing

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Appendix D

Groundwater Sampling Purge Logs

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WELL DEVELOPMENT/ PURGING LOG

WELL NUMBER: MW-6 DATE: 10/14/13

PROJECT NAME: TIOGA CASINGS

PROJECT NUMBER:

SAMPLERS: EJM

A: Total Casing and Screen Length: 27.27

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 20.60

D: Volume of Water in Casing: 1.13 gals.

v = 0.0408 (B)^2 x (A-C) = D

v = 0.0408 ( )^2 x (-) = _____ gal.

Well I.D.	Vol. Gal./ft.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETER	ACCUMULATED VOLUME PURGED												
Time	1425	1430	1435	1440									
Gallons	-	~1	~2	~3									
Depth to Water (ft bgs)	20.96	20.99	20.99	20.99									
Temperature (°C)	14.45	13.73	13.79	13.79									
pH	6.89	6.72	6.71	6.72									
Redox (mV)	189	183	182	183									
Conductivity (mohm/cm	0.510	0.474	0.474	0.474									
Turbidity (ntu)	0	0	0	0									
Disolved Oxygen (mg/l)	9.47	7.05	7.01	6.99									
TDS (g/L)	0.330	0.308	0.308	0.308									
Salinity PPT	0.2	0.2	0.2	0.2									

Notes: Collected sample for 7470A, 6010C analysis @ 1440. Purged approx. 3 gals. Collected MW-6 MS, MW-6 MSD & DUPLICATE MW-X

ARCADIS

WELL DEVELOPMENT/ PURGING LOG

WELL NUMBER: MW-1R DATE: 10 14 13

PROJECT NAME: Tioga Castings

PROJECT NUMBER:

SAMPLERS: AM

A: Total Casing and Screen Length: 25.36

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: ~21.02

D: Volume of Water in Casing: 0.741

Well I.D.	Vol. Gal./ft.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$v = 0.0408 (B)^2 \times (A-C) = D$

$v = 0.0408 (2)^2 \times (25.36 - 21.02) =$ 0.685 gal.

PARAMETER	ACCUMULATED VOLUME PURGED													
Time	1425	1430	1435	1440										
Gallons	0	0.75	1.5	2.25										
Depth to Water	21.02	21.03	21.03	21.02										
Temperature (°C)	13.14	12.38	12.36	12.34										
pH	6.82	7.16	7.24	7.25										
Redox (mV)	6	9	14	14										
Conductivity (mohm/cm ms/cm	0.555	0.550	0.548	0.547										
Turbidity (ntu)	932	766	97.8	44.2										
Disolved Oxygen (mg/l)	12.64	8.06	6.87	6.39										
TDS	0.359	0.352	0.351	0.350										
Salinity	0.3	0.3	0.3	.3										
S T	0.0	0	6	0.0										

Notes: 1445 collected MW-1R Clear no odor

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WELL DEVELOPMENT/ PURGING LOG

WELL NUMBER: MW-8 DATE: 10/14/13

PROJECT NAME: TIOGA CASTINGS

PROJECT NUMBER:

SAMPLERS: EJM

A: Total Casing and Screen Length: 27.70'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 21.12'

D: Volume of Water in Casing: 1.12 gal

$v = 0.0408 (B)^2 \times (A-C) = D$

v = 0.0408 ( )² x (-) = _____ gal.

Well I.D.	Vol. Gal./ft.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETER	ACCUMULATED VOLUME PURGED													
Time	1335	1340	1345	1350	1355									
Gallons	—	~1	~2	~3	~4									
Depth to Water	21.14	21.14	21.14	21.14	21.14									
Temperature (°C)	13.46	12.37	12.31	12.30	12.30									
pH	7.10	6.62	6.59	6.58	6.58									
Redox (mV)	176	204	204	200	200									
Conductivity (mohm/cm	0.469	0.436	0.432	0.430	0.430									
Turbidity (ntu)	0	0	0	0	0									
Disolved Oxygen (mg/l)	11.24	5.92	5.70	5.72	5.74									
TDS (g/L)	0.303	0.284	0.281	0.279	0.279									
Salinity ppt	0.2	0.2	0.2	0.2	0.2									

Notes: Collected Sample for 7470A, 6010C analysis @ 1355
Purged approx. 4 gals.

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WELL DEVELOPMENT/ PURGING LOG

WELL NUMBER: MW-7 DATE: 10 4 2013

PROJECT NAME: Tioga County
PROJECT NUMBER:
SAMPLERS: AM

A: Total Casing and Screen Length: 22.43

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 14.30

D: Volume of Water in Casing: 1.38

$v = 0.0408 (B)^2 \times (A-C) = D$

$v = 0.0408 (2)^2 \times (22.43 - 14.30) =$ 1.32 gal.

Well I.D.	Vol. Gal./ft.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETER	ACCUMULATED VOLUME PURGED													
Time	1330	1335	1338	1342										
Gallons	0	1.0	2	3										
Depth to Water	14.30	14.31	14.32	14.32										
Temperature (°C)	14.67	13.22	13.37	13.39										
pH	6.59	6.46	6.44	6.43										
Redox (mV)	24	32	32	32										
Conductivity (mohm/cm us/cm	0.731	0.512	0.512	0.513										
Turbidity (ntu)	145	20.9	8.2	4.3										
Disolved Oxygen (mg/L	17.81	3.82	2.89	2.48										
TDS	0.423	0.327	0.328	0.328										
Salinity ppt	0.3	0.2	0.2	0.2										
6+	0.0	0.0	0.0	0.0										

Notes: Sampled 1345 Clear Moodor

ARCADIS

WELL DEVELOPMENT/ PURGING LOG

WELL NUMBER: MW-2 DATE: 11/14/13

PROJECT NAME: TIOGA CASTINGS

PROJECT NUMBER:

SAMPLERS: EJM

A: Total Casing and Screen Length: 19.74

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 14.68'

D: Volume of Water in Casing: 0.86 gal

Well I.D.	Vol. Gal./ft.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$v = 0.0408 (B)^2 \times (A-C) = D$

$v = 0.0408 (\quad)^2 \times (\quad - \quad) = \_\_\_\_\_$ gal.

PARAMETER	ACCUMULATED VOLUME PURGED												
Time	1230	1235	1240	1245	1250	1255							
Gallons	-	~1	~2	~3	~4	~5							
Depth to Water	14.68	14.71	14.73	14.73	14.73	14.73							
Temperature (°C)	13.56	13.58	13.80	13.90	13.91	13.92							
pH	6.73	6.76	6.72	6.72	6.72	6.72							
Redox (mV)	198	181	184	186	189	190							
Conductivity (mohm/cm	1.70	1.11	0.743	0.753	0.758	0.757							
Turbidity (ntu)	0	0	0	0	0	0							
Disolved Oxygen (mg/l)	5.72	4.41	11.11	10.43	10.41	10.39							
TDS (g/L)	1.02	0.699	0.476	0.480	0.473	0.471							
Salinity	0.8	0.5	0.4	0.4	0.4	0.4							

Notes: Collected Sample for 7470A, 6010C analysis @ 1255. Purged approx. 5 gals.

ARCADIS

WELL DEVELOPMENT/ PURGING LOG

WELL NUMBER: MW-3D DATE: 10-24-13

PROJECT NAME: Tioga Castings
PROJECT NUMBER:
SAMPLERS: AM

A: Total Casing and Screen Length: 25.15

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 12.69

D: Volume of Water in Casing: 12.56

v = 0.0408 (B)^2 x (A-C) = D

v = 0.0408 (2)^2 x (25.15 - 12.69) = ~~2.13~~ 1.03 gal.

Well I.D.	Vol. Gal./ft.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETER	ACCUMULATED VOLUME PURGED												
Time	1230	1235	1238	1242									
Gallons	0	1	2	3									
Depth to Water													
Temperature (°C)	16.04	13.54	13.65	14.22									
pH	6.40	6.78	6.78	6.84									
Redox (mV)	35	12	12	9									
Conductivity (mohm/cm ms/cm	0.173	0.398	0.398	0.387									
Turbidity (ntu)	524	33.0	14.6	15.8									
Disolved Oxygen (mg/l)	10.40	6.40	6.05	5.79									
TDS	0.132	0.259	0.255	0.251									
Salinity	0.1	0.2	0.2	0.2									
@T	0.0	0.0	0.0	0.0									

Notes: Sampled @ 1245 Clear water

ARCADIS

WELL DEVELOPMENT/ PURGING LOG

WELL NUMBER: MW-35 DATE: 10-14-13

PROJECT NAME: Tioga Castings

PROJECT NUMBER:

SAMPLERS: AM

A: Total Casing and Screen Length: 18.70

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 17.79

D: Volume of Water in Casing:

$v = 0.0408 (B)^2 \times (A-C) = D$

$v = 0.0408 (\quad)^2 \times (\quad - \quad) =$ _____ gal.

Well I.D.	Vol. Gal./ft.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETER	ACCUMULATED VOLUME PURGED												
Time													
Gallons													
Depth to Water													
Temperature (°C)													
pH													
Redox (mV)													
Conductivity (mohm/cm													
Turbidity (ntu)													
Disolved Oxygen (mg/l)													
TDS													
Salinity													

Notes:

ARCADIS

WELL DEVELOPMENT/ PURGING LOG

WELL NUMBER: MW-4 DATE: 10/14/13

PROJECT NAME: TIOGA CASTINGS

PROJECT NUMBER:

SAMPLERS: EJM & AM

A: Total Casing and Screen Length: 15.08'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 11.11'

D: Volume of Water in Casing: ~~15.08~~ 0.66

Well I.D.	Vol. Gal./ft.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$v = 0.0408 (B)^2 \times (A-C) = D$

$v = 0.0408 (\quad)^2 \times (\quad - \quad) =$ _____ gal.

PARAMETER	ACCUMULATED VOLUME PURGED												
Time	1145	1150	1155	1200	1205	1210							
Gallons	–	~1	~2	~3	~4	~5							
Depth to Water (ft bgs)	11.11	11.11	11.11	11.11	11.11	11.11							
Temperature (°C)	14.84	13.98	13.92	13.87	13.81	13.80							
pH	7.18	7.14	7.05	7.00	7.00	6.99							
Redox (mV)	232	206	201	198	197	197							
Conductivity (mohm/cm	0.436	0.404	0.401	0.400	0.400	0.400							
Turbidity (ntu)	63	0	0	0	0	0							
Disolved Oxygen (mg/l)	10.91	13.34	12.73	12.19	12.11	12.09							
TDS (g/L)	0.282	0.263	0.261	0.260	0.260	0.260							
Salinity	0.2	0.2	0.2	0.2	0.2	0.2							

Notes: Collected sample for 7470A, 6010C analysis @ 1210. Purged approx. 5 gallons.

ARCADIS

WELL DEVELOPMENT/ PURGING LOG

WELL NUMBER: MW-5 DATE: 10 14 2013

PROJECT NAME: Tioga Castings

PROJECT NUMBER:

SAMPLERS: AM

A: Total Casing and Screen Length: 16.40

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 11.80

D: Volume of Water in Casing: 0.782

Well I.D.	Vol. Gal./ft.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$v = 0.0408 (B)^2 \times (A-C) = D$

$v = 0.0408 (2)^2 \times (16.40 - 11.80) =$ 0.75 gal.

PARAMETER	ACCUMULATED VOLUME PURGED													
Time	11:45	1148	1150	1152										
Gallons	0	1												
Depth to Water														
Temperature (°C)	15.62	15.52	15.44	15.43										
pH	6.68	6.47	6.38	6.40										
Redox (mV)	27	30	35	34										
S/cm Conductivity (mohm/cm	0.478	0.476	0.474	0.474										
Turbidity (ntu)	5.8	0.3	0.0	0.0										
Disolved Oxygen (mg/l)	5.95	4.76	4.01	3.91										
TDS g/L ~~ppt~~	0.311	0.309	0.308	0.308										
Salinity ~~ppt~~ ppt	0.2	0.2	0.2	0.2										
GT	0	0	0.0	0.0										

Notes: Sampled 1200 Clear Noodor

ARCADIS

Appendix E

Analytical Data Packages

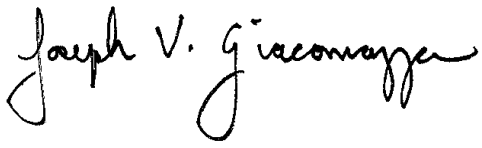
ANALYTICAL REPORT

Job Number: 480-47938-1

Job Description: NYSDEC-Standby TIOGA CASTINGS

For:
Malcolm Pirnie, Inc. Invoice to Arcadis
855 Route 146
Suite 210
Clifton Park, NY 12065

Attention: Mr. Jeremy Wyckoff



Approved for release.
Joe V Giacomazza
Project Administrator
10/24/2013 12:44 PM

Designee for
Sally J Hoffman, Project Manager II
10 Hazelwood Drive, Amherst, NY, 14228-2298
(716)504-9839
sally.hoffman@testamericainc.com
10/24/2013

The test results in this report meet all NELAP requirements for analytes for which accreditation is required or available. Any exceptions to the NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. All questions regarding this test report should be directed to the TestAmerica Project Manager who has signed this report. TestAmerica Buffalo NELAC Certifications: CADPH 01169CA, FLDOH E87672, ILEPA 200003, KSDOH E-10187, LADEQ 30708, MDH 036-999-337, NHELAP 2973, NJDEP NY455, NHDOH 10026, ORELAP NY200003, PADEP 68-00281, TXCEQ T-104704412-10-1

Table of Contents

Table of Contents

Receipt
The samples were received on 10/15/2013 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.4° C.

Metals
No analytical or quality issues were noted.

SAMPLE SUMMARY

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
480-47938-1	MW-5	Water	10/14/2013 1200	10/15/2013 0900
480-47938-2	MW-4	Water	10/14/2013 1210	10/15/2013 0900
480-47938-3	MW-3D	Water	10/14/2013 1245	10/15/2013 0900
480-47938-4	MW-2	Water	10/14/2013 1255	10/15/2013 0900
480-47938-5	MW-7	Water	10/14/2013 1345	10/15/2013 0900
480-47938-6	MW-8	Water	10/14/2013 1355	10/15/2013 0900
480-47938-7	MW-6	Water	10/14/2013 1440	10/15/2013 0900
480-47938-7MS	MW-6	Water	10/14/2013 1440	10/15/2013 0900
480-47938-7MSD	MW-6	Water	10/14/2013 1440	10/15/2013 0900
480-47938-8	MW-1R	Water	10/14/2013 1445	10/15/2013 0900
480-47938-9	MW-X	Water	10/14/2013 0000	10/15/2013 0900

EXECUTIVE SUMMARY - Detections

Client: Malcolm Pirnie, Inc. Invoice to Arcadis Job Number: 480-47938-1

Lab Sample ID / Analyte	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
480-47938-1	**MW-5**					
Aluminum		0.12	J	0.20	mg/L	6010C
Barium		0.072		0.0020	mg/L	6010C
Calcium		55.1		0.50	mg/L	6010C
Iron		0.040	J	0.050	mg/L	6010C
Magnesium		9.6		0.20	mg/L	6010C
Manganese		0.0036		0.0030	mg/L	6010C
Potassium		3.9		0.50	mg/L	6010C
Sodium		20.5		1.0	mg/L	6010C
Zinc		0.0036	J	0.010	mg/L	6010C
480-47938-2	**MW-4**					
Barium		0.043		0.0020	mg/L	6010C
Calcium		46.0		0.50	mg/L	6010C
Iron		0.034	J	0.050	mg/L	6010C
Magnesium		8.8		0.20	mg/L	6010C
Manganese		0.0016	J	0.0030	mg/L	6010C
Potassium		1.1		0.50	mg/L	6010C
Sodium		15.7		1.0	mg/L	6010C
480-47938-3	**MW-3D**					
Aluminum		0.31		0.20	mg/L	6010C
Barium		0.046		0.0020	mg/L	6010C
Calcium		45.8		0.50	mg/L	6010C
Iron		0.39		0.050	mg/L	6010C
Magnesium		8.8		0.20	mg/L	6010C
Manganese		0.021		0.0030	mg/L	6010C
Potassium		1.4		0.50	mg/L	6010C
Sodium		15.7		1.0	mg/L	6010C
Zinc		0.0036	J	0.010	mg/L	6010C

EXECUTIVE SUMMARY - Detections

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Lab Sample ID / Analyte	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
480-47938-4	**MW-2**					
Aluminum		2.5		0.20	mg/L	6010C
Barium		0.21		0.0020	mg/L	6010C
Cadmium		0.0013		0.0010	mg/L	6010C
Calcium		81.8		0.50	mg/L	6010C
Chromium		0.0065		0.0040	mg/L	6010C
Cobalt		0.0015	J	0.0040	mg/L	6010C
Copper		0.0073	J	0.010	mg/L	6010C
Iron		3.9		0.050	mg/L	6010C
Magnesium		14.2		0.20	mg/L	6010C
Manganese		2.8		0.0030	mg/L	6010C
Nickel		0.0080	J	0.010	mg/L	6010C
Potassium		7.4		0.50	mg/L	6010C
Sodium		74.2		1.0	mg/L	6010C
Vanadium		0.0039	J	0.0050	mg/L	6010C
Zinc		0.019		0.010	mg/L	6010C
480-47938-5	**MW-7**					
Aluminum		0.10	J	0.20	mg/L	6010C
Barium		0.10		0.0020	mg/L	6010C
Calcium		64.0		0.50	mg/L	6010C
Copper		0.0051	J	0.010	mg/L	6010C
Iron		0.66		0.050	mg/L	6010C
Magnesium		10.3		0.20	mg/L	6010C
Manganese		0.34		0.0030	mg/L	6010C
Nickel		0.0021	J	0.010	mg/L	6010C
Potassium		4.4		0.50	mg/L	6010C
Sodium		22.1		1.0	mg/L	6010C
Zinc		0.0073	J	0.010	mg/L	6010C
480-47938-6	**MW-8**					
Aluminum		0.13	J	0.20	mg/L	6010C
Barium		0.067		0.0020	mg/L	6010C
Calcium		49.2		0.50	mg/L	6010C
Iron		0.19		0.050	mg/L	6010C
Magnesium		8.3		0.20	mg/L	6010C
Manganese		0.0085		0.0030	mg/L	6010C
Potassium		2.6		0.50	mg/L	6010C
Sodium		18.6		1.0	mg/L	6010C
Zinc		0.0033	J	0.010	mg/L	6010C

EXECUTIVE SUMMARY - Detections

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Lab Sample ID / Analyte	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
480-47938-7	**MW-6**					
Aluminum		0.31		0.20	mg/L	6010C
Barium		0.062		0.0020	mg/L	6010C
Calcium		54.2		0.50	mg/L	6010C
Iron		0.33		0.050	mg/L	6010C
Magnesium		10.1		0.20	mg/L	6010C
Manganese		0.015		0.0030	mg/L	6010C
Potassium		2.0		0.50	mg/L	6010C
Sodium		22.4		1.0	mg/L	6010C
Zinc		0.0028	J	0.010	mg/L	6010C
480-47938-8	**MW-1R**					
Aluminum		0.93		0.20	mg/L	6010C
Barium		0.058		0.0020	mg/L	6010C
Calcium		58.7		0.50	mg/L	6010C
Chromium		0.0019	J	0.0040	mg/L	6010C
Iron		1.0		0.050	mg/L	6010C
Magnesium		11.9		0.20	mg/L	6010C
Manganese		0.061		0.0030	mg/L	6010C
Potassium		2.0		0.50	mg/L	6010C
Sodium		28.3		1.0	mg/L	6010C
Vanadium		0.0015	J	0.0050	mg/L	6010C
Zinc		0.0052	J	0.010	mg/L	6010C
480-47938-9	**MW-X**					
Aluminum		0.34		0.20	mg/L	6010C
Barium		0.063		0.0020	mg/L	6010C
Calcium		55.1		0.50	mg/L	6010C
Iron		0.36		0.050	mg/L	6010C
Magnesium		10.2		0.20	mg/L	6010C
Manganese		0.017		0.0030	mg/L	6010C
Potassium		2.0		0.50	mg/L	6010C
Sodium		22.5		1.0	mg/L	6010C
Zinc		0.0022	J	0.010	mg/L	6010C

METHOD SUMMARY

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Description	Lab Location	Method	Preparation Method
Matrix: Water			
Metals (ICP)	TAL BUF	SW846 6010C	
Preparation, Total Metals	TAL BUF		SW846 3005A
Mercury (CVAA)	TAL BUF	SW846 7470A	
Preparation, Mercury	TAL BUF		SW846 7470A

Lab References:

TAL BUF = TestAmerica Buffalo

Method References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

METHOD / ANALYST SUMMARY

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Method	Analyst	Analyst ID
SW846 6010C	Hanks, Lisa M	LMH
SW846 7470A	Kacalski, Jason R	JRK

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Client Sample ID: **MW-5**

Lab Sample ID: 480-47938-1
Client Matrix: Water

Date Sampled: 10/14/2013 1200
Date Received: 10/15/2013 0900

6010C Metals (ICP)

Analysis Method:	6010C	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Prep Method:	3005A	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1656			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Aluminum	0.12	J	0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.072		0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0010	U	0.00050	0.0010
Calcium	55.1		0.10	0.50
Chromium	0.0040	U	0.0010	0.0040
Cobalt	0.0040	U	0.00063	0.0040
Copper	0.010	U	0.0016	0.010
Iron	0.040	J	0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	9.6		0.043	0.20
Manganese	0.0036		0.00040	0.0030
Nickel	0.010	U	0.0013	0.010
Potassium	3.9		0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	20.5		0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0050	U	0.0015	0.0050
Zinc	0.0036	J	0.0015	0.010

7470A Mercury (CVAA)

Analysis Method:	7470A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Prep Method:	7470A	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0			Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1251			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Client Sample ID: **MW-4**

Lab Sample ID: 480-47938-2
Client Matrix: Water

Date Sampled: 10/14/2013 1210
Date Received: 10/15/2013 0900

6010C Metals (ICP)

Analysis Method:	6010C	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Prep Method:	3005A	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1658			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Aluminum	0.20	U	0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.043		0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0010	U	0.00050	0.0010
Calcium	46.0		0.10	0.50
Chromium	0.0040	U	0.0010	0.0040
Cobalt	0.0040	U	0.00063	0.0040
Copper	0.010	U	0.0016	0.010
Iron	0.034	J	0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	8.8		0.043	0.20
Manganese	0.0016	J	0.00040	0.0030
Nickel	0.010	U	0.0013	0.010
Potassium	1.1		0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	15.7		0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0050	U	0.0015	0.0050
Zinc	0.010	U	0.0015	0.010

7470A Mercury (CVAA)

Analysis Method:	7470A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Prep Method:	7470A	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0			Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1252			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Client Sample ID: **MW-3D**

Lab Sample ID: 480-47938-3
Client Matrix: Water

Date Sampled: 10/14/2013 1245
Date Received: 10/15/2013 0900

6010C Metals (ICP)

Analysis Method:	6010C	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Prep Method:	3005A	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1700			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Aluminum	0.31		0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.046		0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0010	U	0.00050	0.0010
Calcium	45.8		0.10	0.50
Chromium	0.0040	U	0.0010	0.0040
Cobalt	0.0040	U	0.00063	0.0040
Copper	0.010	U	0.0016	0.010
Iron	0.39		0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	8.8		0.043	0.20
Manganese	0.021		0.00040	0.0030
Nickel	0.010	U	0.0013	0.010
Potassium	1.4		0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	15.7		0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0050	U	0.0015	0.0050
Zinc	0.0036	J	0.0015	0.010

7470A Mercury (CVAA)

Analysis Method:	7470A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Prep Method:	7470A	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0			Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1257			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Client Sample ID: **MW-2**

Lab Sample ID: 480-47938-4
Client Matrix: Water

Date Sampled: 10/14/2013 1255
Date Received: 10/15/2013 0900

6010C Metals (ICP)

Analysis Method:	6010C	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Prep Method:	3005A	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1703			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Aluminum	2.5		0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.21		0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0013		0.00050	0.0010
Calcium	81.8		0.10	0.50
Chromium	0.0065		0.0010	0.0040
Cobalt	0.0015	J	0.00063	0.0040
Copper	0.0073	J	0.0016	0.010
Iron	3.9		0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	14.2		0.043	0.20
Manganese	2.8		0.00040	0.0030
Nickel	0.0080	J	0.0013	0.010
Potassium	7.4		0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	74.2		0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0039	J	0.0015	0.0050
Zinc	0.019		0.0015	0.010

7470A Mercury (CVAA)

Analysis Method:	7470A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Prep Method:	7470A	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0			Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1259			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Client Sample ID: **MW-7**

Lab Sample ID: 480-47938-5
Client Matrix: Water

Date Sampled: 10/14/2013 1345
Date Received: 10/15/2013 0900

6010C Metals (ICP)

Analysis Method:	6010C	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Prep Method:	3005A	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1705			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Aluminum	0.10	J	0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.10		0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0010	U	0.00050	0.0010
Calcium	64.0		0.10	0.50
Chromium	0.0040	U	0.0010	0.0040
Cobalt	0.0040	U	0.00063	0.0040
Copper	0.0051	J	0.0016	0.010
Iron	0.66		0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	10.3		0.043	0.20
Manganese	0.34		0.00040	0.0030
Nickel	0.0021	J	0.0013	0.010
Potassium	4.4		0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	22.1		0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0050	U	0.0015	0.0050
Zinc	0.0073	J	0.0015	0.010

7470A Mercury (CVAA)

Analysis Method:	7470A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Prep Method:	7470A	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0			Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1301			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Client Sample ID: **MW-8**

Lab Sample ID: 480-47938-6
Client Matrix: Water

Date Sampled: 10/14/2013 1355
Date Received: 10/15/2013 0900

6010C Metals (ICP)

Analysis Method:	6010C	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Prep Method:	3005A	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1707			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Aluminum	0.13	J	0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.067		0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0010	U	0.00050	0.0010
Calcium	49.2		0.10	0.50
Chromium	0.0040	U	0.0010	0.0040
Cobalt	0.0040	U	0.00063	0.0040
Copper	0.010	U	0.0016	0.010
Iron	0.19		0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	8.3		0.043	0.20
Manganese	0.0085		0.00040	0.0030
Nickel	0.010	U	0.0013	0.010
Potassium	2.6		0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	18.6		0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0050	U	0.0015	0.0050
Zinc	0.0033	J	0.0015	0.010

7470A Mercury (CVAA)

Analysis Method:	7470A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Prep Method:	7470A	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0			Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1303			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Client Sample ID: **MW-6**

Lab Sample ID: 480-47938-7
Client Matrix: Water

Date Sampled: 10/14/2013 1440
Date Received: 10/15/2013 0900

6010C Metals (ICP)

Analysis Method:	6010C	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Prep Method:	3005A	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1717			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Aluminum	0.31		0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.062		0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0010	U	0.00050	0.0010
Calcium	54.2		0.10	0.50
Chromium	0.0040	U	0.0010	0.0040
Cobalt	0.0040	U	0.00063	0.0040
Copper	0.010	U	0.0016	0.010
Iron	0.33		0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	10.1		0.043	0.20
Manganese	0.015		0.00040	0.0030
Nickel	0.010	U	0.0013	0.010
Potassium	2.0		0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	22.4		0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0050	U	0.0015	0.0050
Zinc	0.0028	J	0.0015	0.010

7470A Mercury (CVAA)

Analysis Method:	7470A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Prep Method:	7470A	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0			Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1304			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Client Sample ID: **MW-1R**

Lab Sample ID: 480-47938-8
Client Matrix: Water

Date Sampled: 10/14/2013 1445
Date Received: 10/15/2013 0900

6010C Metals (ICP)

Analysis Method:	6010C	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Prep Method:	3005A	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1729			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Aluminum	0.93		0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.058		0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0010	U	0.00050	0.0010
Calcium	58.7		0.10	0.50
Chromium	0.0019	J	0.0010	0.0040
Cobalt	0.0040	U	0.00063	0.0040
Copper	0.010	U	0.0016	0.010
Iron	1.0		0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	11.9		0.043	0.20
Manganese	0.061		0.00040	0.0030
Nickel	0.010	U	0.0013	0.010
Potassium	2.0		0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	28.3		0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0015	J	0.0015	0.0050
Zinc	0.0052	J	0.0015	0.010

7470A Mercury (CVAA)

Analysis Method:	7470A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Prep Method:	7470A	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0			Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1311			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Client Sample ID: **MW-X**

Lab Sample ID: 480-47938-9
Client Matrix: Water

Date Sampled: 10/14/2013 0000
Date Received: 10/15/2013 0900

6010C Metals (ICP)

Analysis Method:	6010C	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Prep Method:	3005A	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1731			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Aluminum	0.34		0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.063		0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0010	U	0.00050	0.0010
Calcium	55.1		0.10	0.50
Chromium	0.0040	U	0.0010	0.0040
Cobalt	0.0040	U	0.00063	0.0040
Copper	0.010	U	0.0016	0.010
Iron	0.36		0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	10.2		0.043	0.20
Manganese	0.017		0.00040	0.0030
Nickel	0.010	U	0.0013	0.010
Potassium	2.0		0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	22.5		0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0050	U	0.0015	0.0050
Zinc	0.0022	J	0.0015	0.010

7470A Mercury (CVAA)

Analysis Method:	7470A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Prep Method:	7470A	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0			Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1313			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Method Blank - Batch: 480-145224

Method: 6010C
Preparation: 3005A

Lab Sample ID:	MB 480-145224/1-A	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Client Matrix:	Water	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1651	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Aluminum	0.20	U	0.060	0.20
Antimony	0.020	U	0.0068	0.020
Arsenic	0.010	U	0.0056	0.010
Barium	0.0020	U	0.00070	0.0020
Beryllium	0.0020	U	0.00030	0.0020
Cadmium	0.0010	U	0.00050	0.0010
Calcium	0.50	U	0.10	0.50
Chromium	0.0040	U	0.0010	0.0040
Cobalt	0.0040	U	0.00063	0.0040
Copper	0.010	U	0.0016	0.010
Iron	0.050	U	0.019	0.050
Lead	0.0050	U	0.0030	0.0050
Magnesium	0.20	U	0.043	0.20
Manganese	0.0030	U	0.00040	0.0030
Nickel	0.010	U	0.0013	0.010
Potassium	0.50	U	0.10	0.50
Selenium	0.015	U	0.0087	0.015
Silver	0.0030	U	0.0017	0.0030
Sodium	1.0	U	0.32	1.0
Thallium	0.020	U	0.010	0.020
Vanadium	0.0050	U	0.0015	0.0050
Zinc	0.010	U	0.0015	0.010

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Lab Control Sample - Batch: 480-145224

Method: 6010C
Preparation: 3005A

Lab Sample ID:	LCS 480-145224/2-A	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Client Matrix:	Water	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1653	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Aluminum	10.0	10.36	104	80 - 120	
Antimony	0.200	0.213	107	80 - 120	
Arsenic	0.200	0.207	104	80 - 120	
Barium	0.200	0.205	102	80 - 120	
Beryllium	0.200	0.210	105	80 - 120	
Cadmium	0.200	0.207	104	80 - 120	
Calcium	10.0	9.95	100	80 - 120	
Chromium	0.200	0.198	99	80 - 120	
Cobalt	0.200	0.204	102	80 - 120	
Copper	0.200	0.198	99	80 - 120	
Iron	10.0	10.39	104	80 - 120	
Lead	0.200	0.205	103	80 - 120	
Magnesium	10.0	10.30	103	80 - 120	
Manganese	0.200	0.207	103	80 - 120	
Nickel	0.200	0.204	102	80 - 120	
Potassium	10.0	9.88	99	80 - 120	
Selenium	0.200	0.206	103	80 - 120	
Silver	0.0500	0.0494	99	80 - 120	
Sodium	10.0	9.81	98	80 - 120	
Thallium	0.200	0.210	105	80 - 120	
Vanadium	0.200	0.193	97	80 - 120	
Zinc	0.200	0.193	97	80 - 120	

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Post Digestion Spike - Batch: 480-145224

Method: 6010C
Preparation: 3005A

Lab Sample ID:	480-47938-7	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Client Matrix:	Water	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1722	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				
Leach Date:	N/A				

Analyte	Sample Result/Qual		Spike Amount	Result	% Rec.	Limit	Qual
Aluminum	0.31		10.0	10.97	107	75 - 125	
Antimony	0.020	U	0.200	0.212	106	75 - 125	
Arsenic	0.010	U	0.200	0.211	105	75 - 125	
Barium	0.062		0.200	0.271	104	75 - 125	
Beryllium	0.0020	U	0.200	0.212	106	75 - 125	
Cadmium	0.0010	U	0.200	0.208	104	75 - 125	
Calcium	54.2		10.0	62.93	87	75 - 125	
Chromium	0.0040	U	0.200	0.202	101	75 - 125	
Cobalt	0.0040	U	0.200	0.206	103	75 - 125	
Copper	0.010	U	0.200	0.202	101	75 - 125	
Iron	0.33		10.0	10.69	104	75 - 125	
Lead	0.0050	U	0.200	0.207	104	75 - 125	
Magnesium	10.1		10.0	20.19	101	75 - 125	
Manganese	0.015		0.200	0.221	103	75 - 125	
Nickel	0.010	U	0.200	0.206	103	75 - 125	
Potassium	2.0		10.0	12.75	107	75 - 125	
Selenium	0.015	U	0.200	0.211	105	75 - 125	
Silver	0.0030	U	0.0500	0.0492	98	75 - 125	
Sodium	22.4		10.0	32.98	105	75 - 125	
Thallium	0.020	U	0.200	0.212	106	75 - 125	
Vanadium	0.0050	U	0.200	0.200	100	75 - 125	
Zinc	0.0028	J	0.200	0.197	97	75 - 125	

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 480-145224

Method: 6010C
Preparation: 3005A

MS Lab Sample ID:	480-47938-7	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Client Matrix:	Water	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1724			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				
Leach Date:	N/A				

MSD Lab Sample ID:	480-47938-7	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Client Matrix:	Water	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1727			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				
Leach Date:	N/A				

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Aluminum	102	102	75 - 125	0	20		
Antimony	105	104	75 - 125	0	20		
Arsenic	104	104	75 - 125	0	20		
Barium	99	98	75 - 125	0	20		
Beryllium	104	104	75 - 125	0	20		
Cadmium	102	101	75 - 125	0	20		
Calcium	95	99	75 - 125	1	20	4	4
Chromium	96	96	75 - 125	0	20		
Cobalt	100	100	75 - 125	0	20		
Copper	97	97	75 - 125	0	20		
Iron	102	102	75 - 125	0	20		
Lead	100	101	75 - 125	1	20		
Magnesium	100	100	75 - 125	0	20		
Manganese	100	100	75 - 125	0	20		
Nickel	101	101	75 - 125	0	20		
Potassium	102	102	75 - 125	0	20		
Selenium	104	103	75 - 125	1	20		
Silver	97	100	75 - 125	3	20		
Sodium	101	102	75 - 125	0	20		
Thallium	102	103	75 - 125	1	20		
Vanadium	94	94	75 - 125	0	20		
Zinc	92	92	75 - 125	0	20		

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 480-145224

Method: 6010C
Preparation: 3005A

MS Lab Sample ID:	480-47938-7	Units:	mg/L	MSD Lab Sample ID:	480-47938-7
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	10/18/2013 1724			Analysis Date:	10/18/2013 1727
Prep Date:	10/16/2013 0845			Prep Date:	10/16/2013 0845
Leach Date:	N/A			Leach Date:	N/A

Analyte	Sample Result/Qual		MS Spike Amount	MSD Spike Amount	MS Result/Qual		MSD Result/Qual	
Aluminum	0.31		10.0	10.0	10.49		10.47	
Antimony	0.020	U	0.200	0.200	0.210		0.209	
Arsenic	0.010	U	0.200	0.200	0.208		0.208	
Barium	0.062		0.200	0.200	0.260		0.259	
Beryllium	0.0020	U	0.200	0.200	0.207		0.208	
Cadmium	0.0010	U	0.200	0.200	0.204		0.203	
Calcium	54.2		10.0	10.0	63.71	4	64.11	4
Chromium	0.0040	U	0.200	0.200	0.193		0.193	
Cobalt	0.0040	U	0.200	0.200	0.200		0.200	
Copper	0.010	U	0.200	0.200	0.194		0.194	
Iron	0.33		10.0	10.0	10.49		10.52	
Lead	0.0050	U	0.200	0.200	0.200		0.202	
Magnesium	10.1		10.0	10.0	20.09		20.04	
Manganese	0.015		0.200	0.200	0.215		0.215	
Nickel	0.010	U	0.200	0.200	0.202		0.201	
Potassium	2.0		10.0	10.0	12.18		12.22	
Selenium	0.015	U	0.200	0.200	0.207		0.206	
Silver	0.0030	U	0.0500	0.0500	0.0485		0.0498	
Sodium	22.4		10.0	10.0	32.58		32.66	
Thallium	0.020	U	0.200	0.200	0.204		0.206	
Vanadium	0.0050	U	0.200	0.200	0.188		0.188	
Zinc	0.0028	J	0.200	0.200	0.187		0.187	

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Serial Dilution - Batch: 480-145224

Method: 6010C
Preparation: 3005A

Lab Sample ID:	480-47938-7	Analysis Batch:	480-146309	Instrument ID:	ICAP1
Client Matrix:	Water	Prep Batch:	480-145224	Lab File ID:	N/A
Dilution:	5.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	10/18/2013 1719	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0845				
Leach Date:	N/A				

Analyte	Sample Result/Qual		Result	%Diff	Limit	Qual
Aluminum	0.31		0.394	NC	10	J
Antimony	0.020	U	0.10	NC	10	U
Arsenic	0.010	U	0.050	NC	10	U
Barium	0.062		0.0642	2.8	10	
Beryllium	0.0020	U	0.010	NC	10	U
Cadmium	0.0010	U	0.0050	NC	10	U
Calcium	54.2		54.67	0.83	10	
Chromium	0.0040	U	0.020	NC	10	U
Cobalt	0.0040	U	0.020	NC	10	U
Copper	0.010	U	0.050	NC	10	U
Iron	0.33		0.307	NC	10	
Lead	0.0050	U	0.025	NC	10	U
Magnesium	10.1		10.15	0.58	10	
Manganese	0.015		0.0153	0.07	10	
Nickel	0.010	U	0.050	NC	10	U
Potassium	2.0		1.82	NC	10	J
Selenium	0.015	U	0.075	NC	10	U
Silver	0.0030	U	0.015	NC	10	U
Sodium	22.4		21.64	3.6	10	
Thallium	0.020	U	0.10	NC	10	U
Vanadium	0.0050	U	0.025	NC	10	U
Zinc	0.0028	J	0.050	NC	10	U

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Method Blank - Batch: 480-145279

Method: 7470A
Preparation: 7470A

Lab Sample ID:	MB 480-145279/1-A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Client Matrix:	Water	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1244	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Mercury	0.00020	U	0.00012	0.00020

Lab Control Sample - Batch: 480-145279

Method: 7470A
Preparation: 7470A

Lab Sample ID:	LCS 480-145279/2-A	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Client Matrix:	Water	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1246	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Mercury	0.00667	0.00653	98	80 - 120	

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 480-145279

Method: 7470A
Preparation: 7470A

MS Lab Sample ID:	480-47938-7	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Client Matrix:	Water	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1308			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				
Leach Date:	N/A				

MSD Lab Sample ID:	480-47938-7	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Client Matrix:	Water	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1309			Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				
Leach Date:	N/A				

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Mercury	96	98	75 - 125	2	20		

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 480-145279

Method: 7470A
Preparation: 7470A

MS Lab Sample ID:	480-47938-7	Units: mg/L	MSD Lab Sample ID:	480-47938-7
Client Matrix:	Water		Client Matrix:	Water
Dilution:	1.0		Dilution:	1.0
Analysis Date:	10/16/2013 1308		Analysis Date:	10/16/2013 1309
Prep Date:	10/16/2013 0828		Prep Date:	10/16/2013 0828
Leach Date:	N/A		Leach Date:	N/A

Analyte	Sample Result/Qual		MS Spike Amount	MSD Spike Amount	MS Result/Qual	MSD Result/Qual
Mercury	0.00020	U	0.00667	0.00667	0.00638	0.00652

Serial Dilution - Batch: 480-145279

Method: 7470A
Preparation: 7470A

Lab Sample ID:	480-47938-7	Analysis Batch:	480-145371	Instrument ID:	LEEMAN2
Client Matrix:	Water	Prep Batch:	480-145279	Lab File ID:	H10163W1.PRN
Dilution:	5.0	Leach Batch:	N/A	Initial Weight/Volume:	30 mL
Analysis Date:	10/16/2013 1306	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	10/16/2013 0828				
Leach Date:	N/A				

Analyte	Sample Result/Qual		Result	%Diff	Limit	Qual
Mercury	0.00020	U	0.0010	NC	10	U

DATA REPORTING QUALIFIERS

Client: Malcolm Pirnie, Inc. Invoice to Arcadis Job Number: 480-47938-1

Lab Section	Qualifier	Description
Metals		
	U	Indicates analyzed for but not detected.
	4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
	J	Sample result is greater than the MDL but below the CRDL

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
Metals					
Prep Batch: 480-145224					
LCS 480-145224/2-A	Lab Control Sample	T	Water	3005A	
MB 480-145224/1-A	Method Blank	T	Water	3005A	
480-47938-1	MW-5	T	Water	3005A	
480-47938-2	MW-4	T	Water	3005A	
480-47938-3	MW-3D	T	Water	3005A	
480-47938-4	MW-2	T	Water	3005A	
480-47938-5	MW-7	T	Water	3005A	
480-47938-6	MW-8	T	Water	3005A	
480-47938-7	MW-6	T	Water	3005A	
480-47938-7MS	Matrix Spike	T	Water	3005A	
480-47938-7MSD	Matrix Spike Duplicate	T	Water	3005A	
480-47938-8	MW-1R	T	Water	3005A	
480-47938-9	MW-X	T	Water	3005A	
Prep Batch: 480-145279					
LCS 480-145279/2-A	Lab Control Sample	T	Water	7470A	
MB 480-145279/1-A	Method Blank	T	Water	7470A	
480-47938-1	MW-5	T	Water	7470A	
480-47938-2	MW-4	T	Water	7470A	
480-47938-3	MW-3D	T	Water	7470A	
480-47938-4	MW-2	T	Water	7470A	
480-47938-5	MW-7	T	Water	7470A	
480-47938-6	MW-8	T	Water	7470A	
480-47938-7	MW-6	T	Water	7470A	
480-47938-7MS	Matrix Spike	T	Water	7470A	
480-47938-7MSD	Matrix Spike Duplicate	T	Water	7470A	
480-47938-8	MW-1R	T	Water	7470A	
480-47938-9	MW-X	T	Water	7470A	
Analysis Batch:480-145371					
LCS 480-145279/2-A	Lab Control Sample	T	Water	7470A	480-145279
MB 480-145279/1-A	Method Blank	T	Water	7470A	480-145279
480-47938-1	MW-5	T	Water	7470A	480-145279
480-47938-2	MW-4	T	Water	7470A	480-145279
480-47938-3	MW-3D	T	Water	7470A	480-145279
480-47938-4	MW-2	T	Water	7470A	480-145279
480-47938-5	MW-7	T	Water	7470A	480-145279
480-47938-6	MW-8	T	Water	7470A	480-145279
480-47938-7	MW-6	T	Water	7470A	480-145279
480-47938-7MS	Matrix Spike	T	Water	7470A	480-145279
480-47938-7MSD	Matrix Spike Duplicate	T	Water	7470A	480-145279
480-47938-8	MW-1R	T	Water	7470A	480-145279
480-47938-9	MW-X	T	Water	7470A	480-145279

Client: Malcolm Pirnie, Inc. Invoice to Arcadis

Job Number: 480-47938-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
Metals					
Analysis Batch:480-146309					
LCS 480-145224/2-A	Lab Control Sample	T	Water	6010C	480-145224
MB 480-145224/1-A	Method Blank	T	Water	6010C	480-145224
480-47938-1	MW-5	T	Water	6010C	480-145224
480-47938-2	MW-4	T	Water	6010C	480-145224
480-47938-3	MW-3D	T	Water	6010C	480-145224
480-47938-4	MW-2	T	Water	6010C	480-145224
480-47938-5	MW-7	T	Water	6010C	480-145224
480-47938-6	MW-8	T	Water	6010C	480-145224
480-47938-7	MW-6	T	Water	6010C	480-145224
480-47938-7MS	Matrix Spike	T	Water	6010C	480-145224
480-47938-7MSD	Matrix Spike Duplicate	T	Water	6010C	480-145224
480-47938-8	MW-1R	T	Water	6010C	480-145224
480-47938-9	MW-X	T	Water	6010C	480-145224

Report Basis

T = Total