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NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

New York State Department of Environmental Conservation – Division of Environmental Remediation

PERIODIC REVIEW REPORT

Tioga Castings Site

Site Number 754012

February 2020

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TIOGA CASTINGS SITE

PERIODIC REVIEW REPORT

Site Number 754012

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February 2020

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EXECUTIVE SUMMARY

The New York State Department of Environmental Conservation (NYSDEC) has issued a Work Assignment (WA) (# D007618-12) to Arcadis CE, Inc. (Arcadis) for Operation, Maintenance, and Monitoring (OM&M) at the Tioga Castings Site (NYSDEC site number 7-54-012) in Owego, New York (the Site). This Periodic Review Report (PRR) documents the findings and observations associated with the monitoring program for the Site since the last PRR in 2017.

The Site had been contaminated with cadmium, chromium, and lead during operations as a cupola-type foundry for the production of gray iron castings between 1945 and the late 1980s. The process produced wastes which included sand molds, bentonite, fly ash, cast iron grindings, and fine baghouse ash/cupola dust. In March 1979, the facility began operating an on-site landfill for their foundry wastes. In 1988, the facility closed, and many casting materials were left on-site, including the materials left at the facility's on-site landfill. In 1989, a fire inside the facility destroyed most of the foundry. Two Interim Remedial Measures (IRMs) were carried out to address potential physical/chemical hazards in 1989 and 1991.

A Record of Decision (ROD) was signed in 1995 for the Site (NYSDEC 1995). The selected remedy was developed to consolidate the waste materials still on-site, cover the on-site landfill, clean and fill an on-site septic tank with cement, establish institutional controls to limit future use, and establish a groundwater monitoring program. Waste consolidation and landfill construction were completed in 1997.

Additional investigations were performed between 2008 and 2009 to support reclassification of the site from Class 2 to Class 4 on the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites.

In August 2011, the boundaries of the site were reduced to only include the approximately one acre landfill.

A landfill liner and cap repair were performed in 2013 following flood damage that occurred during a 2011 tropical storm. The work was performed in accordance with a NYSDEC-approved Work Plan.

In October 2014, six monitoring wells that were no longer required for monitoring were abandoned and replaced with one new monitoring well to monitor site-related contaminants down-gradient of the landfill.

A Site Management Plan (SMP) was prepared in 2015. This includes site wide inspections at least annually and groundwater sampling every 5-quarters. OM&M activities are currently conducted according to this SMP.

At this time, the remedial actions have performed as expected and, while continued monitoring should be conducted, no significant changes to the current SMP are recommended.

1 SITE OVERVIEW

1.1 Location and Features

The Tioga Castings site is located at Foundry Street, Owego, Tioga County, New York (Figure 2-1). The Site is approximately one-acre in total and includes the on-site landfill area (Figure 2-2). The Site is currently zoned industrial and is listed as a Class 4 site on the NYSDEC Registry of Inactive Hazardous Waste Sites. Remedial activities have been completed at the former foundry facility and the only remaining feature at the Site is the landfill.

1.2 Site History and Remediation

The Site was formerly owned by Tioga Castings between 1945 and 1988. The facility operated a cupola-type foundry for the production of gray iron castings. Operations at the facility included smelting of pig iron, scrap iron (including engine blocks), coke, limestone and the use of phenol-formaldehyde treated sand to cast the iron. The process produced solid wastes which included sand molds, bentonite, fly ash, cast iron grindings, and fine baghouse ash/cupola dust. These wastes were reportedly disposed of at an off-site landfill until March 1979. The facility then operated an on-site landfill for the disposal of its foundry wastes. The facility ceased operations in 1988 and left the waste materials in the landfill as well as many types of foundry materials including:

- Sand casts
- Various drums
- Multiple one-ton plastic lined bags of cupola dust

In July 1989, the facility had a fire which destroyed most of the foundry structure and remaining structures were determined to be unsafe. Two IRMs were carried out to address potential physical/chemical hazards:

- In fall of 1989, a perimeter fence was erected to limit access to the property and drums that were left on-site were removed from the site and disposed of properly.
- In August 1991, a temporary cover was placed over the landfill to minimize the potential for erosion (wind, surface water) of the landfill materials.

A ROD was signed in 1995 for the Site (NYSDEC 1995). The selected remedy included the following items:

- Consolidation of the on-site and off-site soil and waste piles that contained concentrations greater than the cleanup goals for the site in the on-site landfill
- Maintain deed restrictions to prevent Site development in areas of the site where contaminated material was present
- Placement of a low permeability cover over the on-site landfill
- Maintain a fence around the on-site landfill to limit site access

- Cleaning and filling an on-site septic tank with cement
- Operations and maintenance of the remedy
- Groundwater monitoring
- Site-specific cleanup goals for cadmium, chromium, and lead were established (Table 2-1).

Table 2-1

Site-Specific Cleanup Goals

Analyte	Soil	Groundwater
Cadmium	10 ppm	10 ppb
Chromium	50 ppm	50 ppb
Lead	250 ppm (0 to 12 feet) 500 PPM (greater than 12 feet)	25 ppb

As part of the selected remedy, the landfill closure was completed in 1997. Asbestos-containing materials in piles of debris and in a building structure were identified at the Site and removed in 2001.

In June 2007, a NYSDEC-approved Work Plan, developed by Malcolm Pirnie, Inc. (now Arcadis) was implemented with Site-specific O&M and groundwater monitoring procedures.

At the request of NYSDEC, an investigation was conducted in 2008 to evaluate if subsurface soil contained concentrations of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), or metals greater than the respective NYSDEC standards or the defined site-specific cleanup criteria. As part of the investigation, NYSDEC requested that three new groundwater monitoring wells be installed to provide additional information on groundwater quality. In addition, a soil vapor intrusion evaluation was performed in the vicinity of the former foundry slabs to evaluate if vapor intrusion was an exposure pathway to VOCs in sub-surface soil or groundwater.

In April 2009, NYSDEC collected groundwater samples from the monitoring well network for analysis of VOCs, SVOCs, and metals to provide information on groundwater quality and to support reclassification of the Site. In addition, in July 2009, surface soil samples were collected to evaluate the potential for surface soil to be an exposure route to site-related contaminants.

Based on the results of the investigations, the site was reclassified from Class 2 to Class 4 on the NYSDEC Registry of Inactive Hazardous Waste Sites.

In August 2011, the NYSDEC reduced the boundaries of the site, originally encompassing approximately seven acres, to only include the approximately one-acre landfill.

In September 2011, an inspection was performed to assess the site for potential damage caused by Tropical Storm Lee. Based on the inspection, the north and south sides of the landfill perimeter slopes presented evidence of soil failure and minor slumping. A Work Plan was submitted by Arcadis to repair the landfill slopes, and to inspect the liner cover system. NYSDEC approved the plan and repair and inspection of the landfill cap commenced in February 2013. During the inspection, portions of the high-

density polyethylene (HDPE) liner were exposed to assess for damage. No liner perforations were observed, however, in areas where soil failure occurred, the liner was found to contain folds and wrinkles. These areas were repaired by cutting out the excess liner material and flatting the folds. The liner was then repaired using an extrusion welder and the integrity of the repairs was then tested using a vacuum box. Liner repairs and cap restoration were completed in March 2013 (Arcadis, 2013).

In June 2012, the NYSDEC issued an Environmental Notice (EN) that restricts excavation or disturbance of the ECs; restricts interference or changes to ECs without prior written permission; limits property uses; and restricts groundwater usage.

Based on a review of historical groundwater data, six groundwater monitoring wells, generally located down-gradient of the landfill (Figure 2-2), were abandoned and replaced with one new down-gradient monitoring well, MW-9, between September and October of 2014.

Ruts in the topsoil of the Northeast corner created by mowing equipment were repaired by Arcadis on November 10, 2015. The liner underneath the ruts in the topsoil was not damaged by this equipment. The damaged slope was backfilled, and the landfill cover restored.

The SMP was prepared and accepted by NYSDEC in 2015 (Arcadis, 2015a). Since then, OM&M activities have been conducted according to this SMP.

Routine O&M and groundwater monitoring are currently performed in accordance with the SMP, which specifies that site-wide inspections will take place at least annually and after each severe weather event. Additionally, groundwater sampling is conducted every five quarters to provide seasonal groundwater quality information.

2 REMEDY PERFORMANCE, EFFECTIVENESS, AND PROTECTIVENESS

The remediation goals selected for this Site, according to the ROD (NYSDEC 1995) are as follows:

- Prevent direct contact exposure (dermal absorption, inhalation and incidental ingestion) with waste piles/soils that have concentrations above the clean-up goals.
- Prevent or reduce the transport of contamination off site via surface runoff from areas where the surface material is contaminated.
- Prevent or greatly reduce the transport of contamination off site via surface runoff from areas where surface material is contaminated.

The selected remedy for the Site was successfully incorporated following the guidance provided in each of the ROD documents (NYSDEC 1995).

The Tioga Casting Site landfill was constructed in 1997 in accordance with the ROD. The landfill was constructed by consolidating wastes and placing them in the existing on-site landfill. According the Tioga Castings Remediation Summary Report (NYSDEC, 1998), a “foundation layer” was placed over the consolidated landfill wastes. The remainder of the landfill cover system (from bottom to top) consists of a 60-mil HDPE liner, geo-composite drainage material, approximately two feet of compacted barrier protection soil, and six inches of topsoil. The landfill prevents direct contact exposure to remaining contamination at the site and reduces the potential for contamination to be transported off-site through runoff. In addition, the landfill has a perimeter fence with a locking gate to limit access to the site. Warning signs are also present on the perimeter fence and access gate indicating the area within the fence contains hazardous waste and that unauthorized entry is forbidden.

A SMP is in place and provides information regarding OM&M activities for the selected remedy. This includes an EN that restricts excavation or disturbance of the remedy. Therefore, only those who are actively performing work on the site, either in accordance the SMP or at the direction of the NYSDEC, would likely be exposed to site contaminants. In addition, groundwater use restrictions are in place to prevent use or ingestion of groundwater at the site.

Based on the current Site Management Plan, including inspections, groundwater monitoring, and the EN that is in place for the Site, it appears that the selected remedies are performing as intended.

3 OPERATION AND MAINTENACE

OM&M activities were performed by Arcadis in accordance with the SMP on a semi-annual basis since the last (2017) PRR cycle. The OM&M activities includes an inspection of the Engineering Controls that have been established at the Site including, the landfill cap and cover system (Figure 2-2), an inspection of the landfill perimeter fencing, and of the landfill access gate and lock. Post-Closure O&M Checklists were used to document the findings from each inspection between 2017 and 2019. The inspection forms are provided in Appendix A. In addition to the inspection forms, a photolog was kept during each visit. Photographs from the most recent inspection, July 2019, are included in Appendix B.

A summary of significant findings is provided below.

3.1 Landfill Cap

The landfill cap contains the former disposal area for the facility casting sands and other consolidated wastes from the site. The purpose of the cap is to prevent human and ecological exposure to contaminated materials and minimize surface water from entering the landfill.

A visual inspection of the landfill cap was performed during each visit to the Site to assess the landfill for burrowing rodents, erosion, woody vegetation, and settlement. Woody vegetation encroaches the swales and landfill cap every year. Beginning in Spring 2016, saplings and other shrubs are cut back annually to help reduce the potential for these plants to establish themselves on the landfill cap. Since the previous (2017) PRR Cycle, site inspections took place on the following dates:

- April 26, 2017
- August 28, 2017
- May 31, 2018
- October 18, 2018
- July 12, 2019

There have been some instances of brush encroaching on the cap and drainage ditches; however, mowing and brush cutting have proven to be an effective method of control. In general, the condition of the landfill cap has been found to be acceptable between 2017 and 2019.

3.2 Landfill Security

Security for the landfill consists of a perimeter fence with an entry gate and locks to limit access to the landfill and prevent tampering with the cap.

The landfill perimeter fence, entry gate, and locks were observed for proper operation and signs of deterioration. No issues were observed with the integrity of these components. In addition, the Foundry Street entry gate warning sign was in place and in acceptable condition.

4 GROUNDWATER MONITORING PROGRAM

Groundwater monitoring wells are sampled by Arcadis in accordance with the SMP once every five quarters. The sampling is conducted to provide information on groundwater quality, monitor potential contaminant migration in the groundwater at the site, and assess hydrogeologic site conditions, including groundwater flow direction.

Based on the results of historic groundwater data, and at the direction of NYSDEC, six groundwater monitoring wells (MW-1R, MW-2, MW-3, MW-5, MW-7, and MW-8) generally located down-gradient of the landfill (Figure 2-2), were abandoned and replaced with one new down-gradient monitoring well (MW-9). The wells were abandoned between September 30 and October 1, 2016. Monitoring well MW-9 was installed between September 29 and 30, 2016 to a total depth of 21 feet below ground surface. The location of the well was surveyed by Arcadis on November 10, 2014 (Arcadis, 2015b).

Since the last (2017) PRR cycle, groundwater sampling was performed on the following dates:

- August 8, 2017
- October 18, 2018

The groundwater sampling logs for these events can be found in Appendix C.

4.1 Groundwater Monitoring Well Inspection

During each sampling event, the integrity of each well was inspected and noted. Each monitoring well had no visible damage and was reported to be in acceptable condition.

4.2 Water Level Survey

Prior to collecting groundwater samples, water levels are measured to the nearest hundredth of a foot using an electronic water level probe.

Table 4-1 summarizes the groundwater elevations measured during each new sampling event and recent past events. A potentiometric surface map for the October 2018 event was created based on the groundwater elevations and is presented on Figure 4-1. As shown on Figure 4-1, the general direction of groundwater flow near the landfill is toward the southeast.

4.3 Groundwater Sampling

Groundwater samples are collected from four groundwater monitoring wells (MW-3D, MW-4, MW-6, and MW-9) using low-flow groundwater purging and sampling procedures.

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

Groundwater samples are submitted to Test America – Buffalo by chain-of-custody procedures and analyzed for Target Analyte List (TAL) metals by United States Environmental Protection Agency

(USEPA) Method 6010C, and dissolved metals and mercury via USEPA Methods 6010C and 7470A, respectively. In addition, at the request of NYSDEC, groundwater samples in 2017 were also analyzed for Perfluorinated Alkyl Substances (PFAS) by USEPA Method 537 Modified, and 1,4-Dioxane by USEPA Method 8260C SIM.

4.4 Groundwater Sampling Results

Groundwater sample results from the 2017 and 2018 site visits are summarized in Table 4-2 and Table 4-3 along with historical analytical results from these wells.

Table 4-2 shows that during the August 28, 2017 sampling event, iron concentrations in three monitoring wells, MW-3D (1,210 µg/l), MW-6 (404 µg/l), and MW-9 (2,700 µg/l) all exceeded the NYSDEC Class GA Standard of 300 µg/l. Historical data shows that iron concentrations have been elevated. MW-4 did not have iron concentrations above this limit.

Results from the 2017 and 2018 monitoring events indicate that sodium levels in MW-6 remain greater than the NYSDEC Class GA Standard of 20,000 micrograms per liter (µg/l). Sodium concentrations in MW-6 were 26,600 µg/l (August 28, 2017) and 29,500 µg/l (October 18, 2018), respectively. Sodium concentrations in the other three monitoring wells were less than the respective NYSDEC Class GA Standard.

No other metals were detected at concentrations greater than the applicable NYSDEC Class GA standards.

At the request of NYSDEC, groundwater samples were also analyzed for PFAS and 1,4-dioxane in 2017. As shown in Table 4-3, PFAS was detected in groundwater sampled from MW-3D, MW-4, and MW-6. However, the concentrations of perfluorooctanesulfonic acid (PFOS) in these samples were less than the 2017 USEPA Health Advisory of 70 nanograms per liter (ng/L). Table 4-3 shows that 1,4-dioxane was not detected in any of the groundwater samples during the 2017 sampling event.

5 OVERALL PRR CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The landfill cap and the site security measures are currently in suitable condition and, with continued maintenance, are operating as intended.

The groundwater samples collected from the groundwater monitoring wells did indicate sodium and iron are present at concentrations greater than the NYSDEC Class GA Standards. In addition, PFOS was detected at concentrations lower than the USEPA Health Advisory Limit at the time of sampling. However, the site related contaminants of concern listed in Table 2-1 (cadmium, chromium, and lead) were not detected in any of the groundwater samples above the applicable NYSDEC Class GA Standards.

Since the landfill contains consolidated wastes from the former foundry, continued monitoring on a once-every-five-quarters basis is recommended to assess groundwater quality over time.

5.2 Recommendations

No changes to the SMP are recommended at this time. ICs/ECs are effective at preventing human contact with residual contamination. No changes to the PRR submittal frequency are recommended.

6 SUMMARY AND CERTIFICATION

OM&M activities were conducted in accordance with the SMP between 2017 and 2019, with groundwater monitoring samples collected during the August 28, 2017 and October 18, 2018 visits. The landfill cap is functioning as designed and the overall landfill condition, including the perimeter fencing, is acceptable. The landfill cap and fenced perimeter were not in need of any repairs since the last (2017) PRR cycle.

Sodium and iron are the only metals detected in groundwater at concentrations greater than the applicable NYSDEC Class GA Standards.

Based on the remediation objectives specified in the ROD, the landfill is performing as intended and minimizing the potential for off-site migration of, and exposure to, the remaining contamination in the landfill.

The completed NYSDEC IC/EC certification is provided as Appendix D.

7 REFERENCES

NYSDEC 1995. Record of Decision, Tioga Castings Site, Oswego, Tioga County. Site Number 7-54-012. March 1995.

NYSDEC 1998, Remediation Summary Report, Tioga Castings Site, Village of Owego, Tioga County, New York, Site No. 7-54-012, New York State Department of Environmental Conservation.

Arcadis 2013. Tioga Castings Site Quarterly Report, Second Quarter 2013, NYSDEC Site Number 7-54-012, July 2013.

Arcadis 2015a. Site Management Plan, Tioga Castings Site, Oswego, Tioga County, NY. Site Number 7-54-012. January 2015.

Arcadis 2015b. Tioga Castings Site Quarterly Report, First Quarter 2015, NYSDEC Site Number 7-54-012, March 2015.

TABLES

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

Well	Measuring Point Elevation (feet)	2/5/2015		5/16/2016		8/28/2017		10/18/2018	
		DTW (feet)	Elevation (feet)	DTW (feet)	Elevation (feet)	DTW (feet)	Elevation (feet)	DTW (feet)	Elevation (feet)
MW-3D	812.42 (2)	18.36	794.06	17.18	795.24	18.08	794.34	15.51	796.91
MW-4	806.33 (1)	11.70	794.63	10.86	795.47	11.49	794.84	9.13	797.20
MW-6	815.53 (3)	21.51	794.02	20.03	795.50	21.21	794.32	18.29	797.24
MW-9	809.97 (4)	16.37	793.60	15.17	794.80	16.23	793.74	13.30	796.67

(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
(4) - From Malcolm Pirnie, Inc. level survey performed 11/10/2014

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	MW-3D 2/5/2015 ug/L	MW-3D 5/16/2016 ug/L	MW-3D 8/28/2017 ug/L	MW-3D 10/18/2018 ug/L
Aluminum		668	39.8 U	11.7 J	250.0 U	200.0 U	310	200 U	200 U	678	60 U
Antimony	3	6.7 U	6.8 U	8.0 U	15.0 U	20.0 U	20.0 U	20 U	20 U	20 U	6.8 U
Arsenic	25	3.0 U	5.6 U	4.2 U	15.0 U	10.0 U	10.0 U	15 U	15 U	15 U	5.6 U
Barium	1000	39.2 B	45.3 BE	56.7	43.6	51.0	46.0	39	40	54.3 J	56
Beryllium	3*	0.5 U	0.2 U	0.7 U	5.0 U	2.0 U	2.0 U	2 U	2 U	2 U	0.3 U
Cadmium	5 [10]	0.3 U	0.3 U	0.5 U	5.0 U	1.0 U	1.0 U	2 U	2 U	4 U	0.5 U
Calcium		42300	50000	54000	48600	55200	45800	44400	43400 B	49200	49,000
Chromium	50 [50]	3.8 B	0.9 U	1.1 U	5.0 U	1.6 J B	4.0 U	4 U	4 U	10 U	1 U
Cobalt		3.8 U	0.6 U	5.8 U	5.0 U	4.0 U	4.0 U	4 U	4 U	50 U	0.63 U
Copper	200	56.6	1.3 U	2.3 J	10.0 U	10.0 U	10.0 U	10 U	10 U	25 U	1.6 U
Iron	300	**558**	19.3 U	52.9	24.4 J	26.0 J	**390**	50 U	46 BJ	**1210**	19 U
Lead	25 [25]	1.4 U	3.0 U	4.6 J	15.0 U	5.0 U	5.0 U	10 U	10 U	10 U	3 U
Magnesium		7490	9120	9680	9120	10000	8800	8800	8700	9110	8,900
Manganese	300	40.3 B	0.9 BE	2.2 J	1.2 J	2.4 J B	21.0	0.8 J	1.8 J	71.3	0.62 JB
Mercury	0.7	NA	0.1 U	0.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.12 U
Nickel	100	3.9 B	1.3 U	4.2 U	5.0 U	10.0 U	10.0 U	10 U	10 U	40 U	1.3 U
Potassium		1550 B	1610 BE	1490	1260	1500	1400	1200	1300	1510 J	1,700
Selenium	10	11.4 U	8.7 U	4.8 U	38.0 U	15.0 U	15.0 U	25 U	25 U	20 U	8.7 U
Silver	50	2.2 U	1.2 U	1.5 U	5.0 U	3.0 U	3.0 U	6 U	10 U	10 U	1.7 U
Sodium	20000	17300	16900	17400	15600	18400	15700	15400	15200	15900	19,900
Thallium	0.5*	3.0 U	10.2 U	2.4 U	15.0 U	20.0 U	20.0 U	20 U	20 U	20 U	10 U
Vanadium		4.7 U	1.1 U	6.1 U	5.0 U	5.0 U	5.0 U	5 U	5 U	50 U	1.5 U
Zinc	2000*	13.5 U	1.5 U	14.5 J	25.0 U	1.9 J	3.6 J	1.9 J	10 U	30 U	2.5 JB

Notes:
* - NYSDEC Guidance Value.
1 - Duplicate sample from MW-4
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	MW-4 2/5/2015 ug/L	MW-4 5/16/2016 ug/L	MW-4 8/28/2017 ug/L	DUP[1] 8/28/2017 ug/L	MW-4 10/18/2018 ug/L	DUP 10/18/2018 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	200 U	150 J	139 J	200 U	60 U	60 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	20 U	20 U	20 U	20 U	6.8 U	6.8 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	15 U	15 U	15 U	15 U	5.6 U	5.6 U
Barium	1000	40.0 B	38.3 B	60.9 B	42.6 BE	50.3	40.8	48.0	43.0	40	60	48.4 J	47.6 J	53 U	55
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	2.0 U	2 U	2 U	2 U	0.3 U	0.3 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	2.0 U	1 J	4 U	4 U	0.5 U	0.5 U
Calcium		42700 E	42400	40500	48000	47900	43100	50900	46000	42300	42000 B	47300	47400	48,800	50,300
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	1.1 JB	4 U	10 U	10 U	1 U	1 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	4.0 U	4 U	50 U	50 U	6.3 U	0.63 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	10 U	3.9 J	25 U	25 U	1.6 U	1.6 U
Iron	300	47.6 B	34 B	**667**	22.2 BE	33.4 J	57.3 J	50.0 U	34.0 J	70	**380 B**	185	150 U	19 U	22 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	10 U	10 U	10 U	10 U	3 U	3 U
Magnesium		8190 E	7830	7080	8820	8390	8140	9400	8800	8700	8500	8790	8790	8,600	8,900
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	2.3 J	7.4	6.3 J	15 U	0.65 JB	0.71 JB
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	0.2 U	0.2 U	0.2 U	0.2 U	0.12 U	0.12 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	10 U	1.9 J	40 U	40 U	1.3 U	1.3 U
Potassium		1020 BE	1860 B	1190 B	1130 BE	1230	1330	1300	1100	1100	23300	1260 J	1190 J	1,400	1,500
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	25 U	25 U	20 U	20 U	8.7 U	8.7 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	6.0 U	6 U	10 U	10 U	1.7 U	1.7 U
Sodium	20000	12000 E	12800	15200	16100	15000	13900	17400	15700	14600	**25700**	15500	15600	16,200	16,500
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	20 U	20 U	20 U	20 U	10 U	10 U
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	5.0 U	5 U	50 U	50 U	1.5 U	1.5 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	2.3 J	3 J	30 U	30 U	2 JB	3.5 JB

Notes:
* - NYSDEC Guidance Value.
1 - Duplicate sample from MW-4
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-6 2/6/2015 ug/L	MW-6 5/16/2016 ug/L	MW-6 8/28/2017 ug/L	MW-6 10/18/2018 ug/L	MW-9 2/5/2015 ug/L	MW-9 5/16/2016 ug/L	MW-9 8/28/2017 ug/L	MW-9 10/18/2018 ug/L
Aluminum		49.5 J	520.0	310.0	360	200 U	240	60 U	3000	810	1600	60 U
Antimony	3	15.0 U	20.0 U	20.0 U	20 U	20 U	20 U	6.8 U	20 U	20 U	20 U	6.8 U
Arsenic	25	15.0 U	10.0 U	10.0 U	15 U	15 U	15 U	5.6 U	15 U	15 U	15 U	5.6 U
Barium	1000	53.1	61.0	62.0	70	54	73.6 J	63	110	86	110 J	93
Beryllium	3*	5.0 U	2.0 U	2.0 U	2.0 U	2 U	2 U	0.3 U	2.0 U	2.0 U	2.0 U	0.3 U
Cadmium	5 [10]	5.0 U	1.0 U	1.0 U	2.0 U	2 U	4 U	0.5 U	2.0 U	2.0 U	4.0 U	0.5 U
Calcium		54200	73500	54200	78700	48600 B	68900	56,300	70600	74800 B	85300	89,600
Chromium	50 [50]	5.0 U	2.7 J B	4.0 U	4.0 U	4 U	10 U	1 U	3.8 JB	1.6 J	10.0 U	1 U
Cobalt		5.0 U	4.0 U	4.0 U	4.0 U	4 U	50 U	0.63 U	4.0 U	4.0 U	50.0 U	0.63 U
Copper	200	10.0 U	10.0 U	10.0 U	10 U	10 U	25 U	1.6 U	5.1 J	2.2 J	25.0 U	1.6 U
Iron	300	98.8 J	**670.0**	**330.0**	**350**	120 B	**404**	19 U	**2500**	**1100 B**	**2700**	44 J
Lead	25 [25]	15.0 U	5.0 U	5.0 U	10 U	10 U	10 U	3 U	10 J	3 J	10 U	3 U
Magnesium		9280	11300	10100	13200	9500	11700	9,400	12100	11500	12500	12,000
Manganese	300	7.5 J	36.0 B	15.0	20	2.8 J	24.1	0.4 U	140	55	115	1.9 JB
Mercury	0.7	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.12 U	0.2 U	0.2 U	0.2 U	0.12 U
Nickel	100	5.0 U	10.0 U	10.0 U	10 U	10.0 U	40.0 U	1.3 U	2.5 J	1.9 J	40.0 U	1.3 U
Potassium		2090.0	2300	2000	2400	2000	2310 J	2,600	4800	5700	4940 J	4,600
Selenium	10	38.0 U	15.0 U	15.0 U	25 U	25 U	20 U	8.7 U	25 U	25 U	20 U	8.7 U
Silver	50	5 U	3.0 U	3.0 U	6.0 U	6 U	10 U	1.7 U	6.0 U	6.0 U	10.0 U	1.7 U
Sodium	20000	**21900**	**26900**	**22400**	**22100**	19900	**26600**	**29,500**	8000	7100	7510	6,100
Thallium	0.5*	15.0 U	20.0 U	20.0 U	20 U	20 U	20 U	10 U	20.0 U	20.0 U	20.0 U	10 U
Vanadium		5 U	5.0 U	5.0 U	5.0 U	5 U	50 U	1.5 U	4.5 J	1.9 J	2.7 J	1.5 U
Zinc	2000*	25.0 U	4.6 J	2.8 J	3.2 J	10 U	30 U	1.6 JB	13	4 J	30 U	3.2 JB

Notes:
* - NYSDEC Guidance Value.
1 - Duplicate sample from MW-4
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 4-3
Summary of Groundwater Sample Results - PFAS and 1,4-Dioxane
Tioga Castings Site
Owego, New York
NYSDEC Site Number 7-54-012

Well Date	NYSDEC Health Advisory Limit	MW-3D 8/28/2017	MW-4 8/28/2017	DUP[1] 8/28/2017	MW-6 8/28/2017	MW-9 8/28/2017
Perfluorobutanesulfonic acid (PFBS) (ng/L)	70	2.00 U	1.44 J	1.49 J	2.91	2.00 U
Perfluorohexanesulfonic acid (PFHxS) (ng/L)	70	4.16	4.09	4.26	17.70	2.00 U
Perfluoroheptanoic acid (PFHpA) (ng/L)	70	2.00 U	2.00 U	2.00	2.00 U	2.00 U
Perfluorooctanoic acid (PFOA) (ng/L)	70	2.00 U	2.00 U	2.00	2.00 U	2.00 U
Perfluorooctanesulfonic acid (PFOS) (ng/L)	70	1.81 J	2.00 U	1.31 J	9.32	2.00 U
Perfluorononanoic acid (PFNA) (ng/L)	70	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Total PFAS (ng/L)	70	5.97	5.53	7.06	29.93	2.00 U
1,4-Dioxane (ug/L)		0.4 U	0.40 U	0.40 U	0.40 U	0.40 U

Notes:

1 - Duplicate sample from MW-4

U - Analyte not detected.

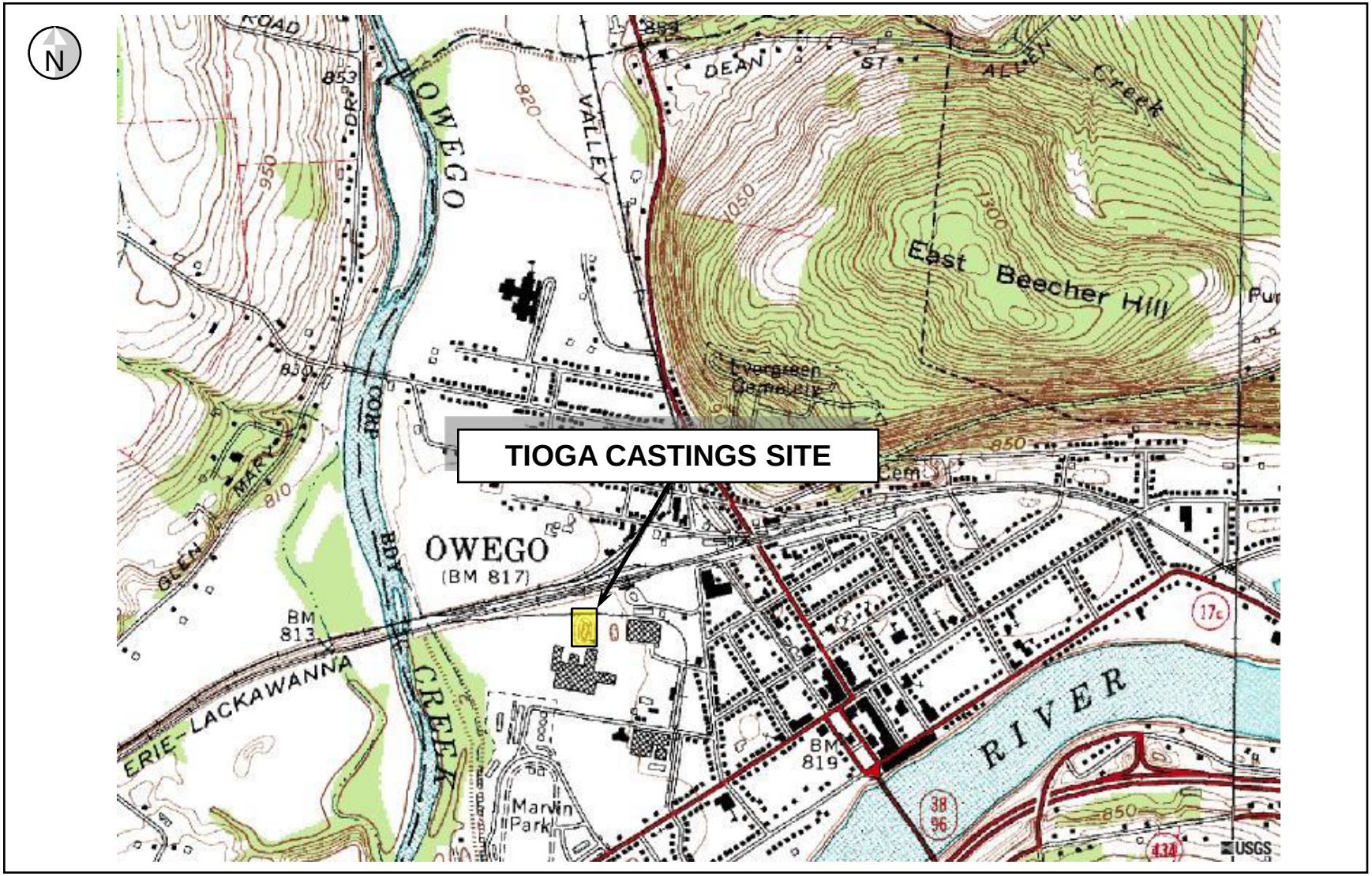
J - Estimated value

FIGURES

ARCADIS Design & Consultancy for natural and built assets

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).

Legend

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

0 60 120 240 360 480 Feet

N

Note: Site feature boundaries are approximate.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SITE NUMBER 754012

Tioga Casting Facility, Owego, New York

SITE FEATURES

ARCADIS Design & Consultancy for natural and built assets

FIGURE **2-2**

G:\GIS\MOD\00266403.0000\Site Map.mxd
G:\PROJECT\00266403.0000\Reports\4th Qtr 2014-drilling\Figure 2-2.pdf

Legend

- Monitoring Well
- Abandoned Well
- Former Casting Facility
- On-Site Landfill/Site Boundary
- Approximate Parcel Boundary
- Groundwater Potentiometric Contour
- **794.63** Feet Above Mean Sea Level

0 60 120 240 360 480 Feet

N

Note: Site feature boundaries are approximate.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SITE NUMBER 754012

Tioga Casting Facility, Owego, New York

POTENTIOMETRIC MAP
October 18, 2018

ARCADIS

FIGURE
4-1

G:\GIS\MXD\00266403.0000\PotMap3rdQtr2017.mxd
G:\PROJECT\00266403.0000\Reports\2018\Q4\Figures\Figure 4-1.pdf

APPENDIX A

O&M Checklists

TIOGA CASTINGS SITE LANDFILL

Post-Closure Operation and Maintenance Checklist

Inspected by: Lance D. Whalen

Date: 4-26-17 Time: 11:30

Weather Conditions: Sunny 70°F

LANDFILL COVER SYSTEM

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

DRAINAGE DITCHES

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

Comments: Small amount of brush in rock area. I cut and removed all that I could.

Continued

FENCING

Gates and Locks	X	OK	____	OTHER
Posts	X	OK	____	OTHER
Top Tension Wire	X	OK	____	OTHER
Barbed Wire	X	OK	____	OTHER

Comments: _____

_____

MONITORING WELLS

Capped and Locked	X	YES	____	NO
Casing Damage	____	YES	X	NO

Comments: _____

_____

INSPECTOR'S SIGNATURE Lance D. Whalen DATE 4-26-17

TIOGA CASTINGS SITE LANDFILL

Post-Closure Operation and Maintenance Checklist

Inspected by: J. MULLINS / L. WHALEN

Date: 8/28/17 Time: 1200

Weather Conditions: SUNNY @ 66°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,		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

Warning Signs	✓	OK	____	OTHER
Gates and Locks	✓	OK	____	OTHER
Posts	✓	OK	____	OTHER
Top Tension Wire	✓	OK	____	OTHER
Barbed Wire	✓	OK	____	OTHER

Comments: _____

_____

MONITORING WELLS

Capped and Locked	✓	YES	____	NO
Casing Damage	____	YES	✓	NO

Comments: _____

_____

_____

INSPECTOR'S SIGNATURE _____ DATE 8/28/17

TIOGA CASTINGS SITE LANDFILL

Post-Closure Operation and Maintenance Checklist

Inspected by: Jasmine Mullins

Date: 5/31/2018 Time: 1415

Weather Conditions: Cloudy @ 77°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,		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: Brush present in all drainage ditches.

Continued

FENCING

Gates and Locks	✓	OK	____	OTHER
Posts	✓	OK	____	OTHER
Top Tension Wire	✓	OK	____	OTHER
Barbed Wire	✓	OK	____	OTHER

Comments: Two portions of bottom fence lifted/open.

MONITORING WELLS

Capped and Locked	✓	YES	____	NO
Casing Damage	____	YES	✓	NO

Comments: _____

INSPECTOR'S SIGNATURE _____ DATE 5/31/18

TIOGA CASTINGS SITE LANDFILL

Post-Closure Operation and Maintenance Checklist

Inspected by: JASMINE MULLINS

Date: 10/18/18 Time: 1420

Weather Conditions: SUNNY @ 40°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,		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: Dead brush roots identified in drainage ditches.

Continued

FENCING

Gates and Locks	✓ OK	____ OTHER
Posts	✓ OK	____ OTHER
Top Tension Wire	✓ OK	____ OTHER
Barbed Wire	✓ OK	____ OTHER

Comments: _____

_____

MONITORING WELLS

Capped and Locked	✓ YES	____ NO
Casing Damage	____ YES	✓ NO

Comments: _____

_____

INSPECTOR'S SIGNATURE Amanda McClains DATE 10/18/18

TIOGA CASTINGS SITE LANDFILL

Post-Closure Operation and Maintenance Checklist

Inspected by: L. Whalen

Date: 7-12-19 Time: 1330

Weather Conditions: Sunny 84°

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,		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: ALL fences are clear of brush and grass / Wells are clear.

Continued

FENCING

Gates and Locks	✓	OK	____	OTHER
Posts	✓	OK	____	OTHER
Top Tension Wire	✓	OK	____	OTHER
Barbed Wire	✓	OK	____	OTHER

Comments: ALL 'clear / no issues

MONITORING WELLS

Capped and Locked	✓	YES	____	NO
Casing Damage	____	YES	✓	NO

Comments: _____

INSPECTOR'S SIGNATURE Lan D. Whal DATE 7-12-19

APPENDIX B

Site Photograph Log

Appendix B - Project Photographs

Tioga Castings Site
Owego, New York
Site Number 7-54-012

Photo: 1

Date:
July 12, 2019

Description:
Center of Landfill Cap – Facing Northeast

Photo: 2

Date:
July 12, 2019

Description:
Center of Landfill Cap – Facing Northwest

Appendix B - Project Photographs

Tioga Castings Site
Owego, New York
Site Number 7-54-012

Photo: 3

Date:
July 12, 2019

Description:
Center of Landfill Cap – Facing Southeast

Photo: 4

Date:
July 12, 2019

Description:
Center of Landfill Cap – Facing Southwest

Appendix B - Project Photographs

Tioga Castings Site
Owego, New York
Site Number 7-54-012

Photo: 5

Date:
July 12, 2019

Description:
East Side of Landfill – Facing South

Photo: 6

Date:
July 12, 2019

Description:
North Side of Landfill – Facing West

Appendix B - Project Photographs

Tioga Castings Site
Owego, New York
Site Number 7-54-012

Photo: 7

Date:
July 12, 2019

Description:
West Side of Landfill – Facing South

Photo: 8

Date:
July 12, 2019

Description:
South Side of Landfill – Facing East

Appendix B - Project Photographs

Tioga Castings Site
Owego, New York
Site Number 7-54-012

Photo: 9

Date:
July 12, 2019

Description:
MW-3D

Photo: 10

Date:
July 12, 2019

Description:
MW-6

Appendix B - Project Photographs

Tioga Castings Site
Owego, New York
Site Number 7-54-012

Photo: 11

Date:
July 12, 2019

Description:
MW-9

APPENDIX C

Groundwater Sampling Logs

WELL NUMBER: **MW-3D** DATE: 8/28/2017

PROJECT NAME: Tioga Castings
PROJECT NUMBER: 00266403.0000
SAMPLERS: J. Mullins

A: Total Casing and Screen Length: 25.13'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 18.08'

D: Volume of Water in Casing: 1.12 gallons

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 x (-) = _____ gal.

PARAMETER	ACCUMULATED VOLUME PURGED											
Time	1407	1412	1417	1422								
Gallons	0.00	0.25	0.50	0.75								
Depth to Water (ft)	18.08	18.08	18.08	18.08								
pH	7.41	7.17	7.14	7.14								
Conductivity (mS/cm)	0.310	0.314	0.313	0.313								
Turbidity (NTU)	18.6	16.8	15.3	15.4								
Dissolved Oxygen (mg/l)	3.83	2.99	2.94	2.95								
Temperature (^{o}C)	25.06	23.94	23.93	23.93								
Redox (mV)	149	163	163	163								

Notes: Sampled at 1425, collected MS/MSD

WELL NUMBER: **MW-4** DATE: 8/28/2017

PROJECT NAME: Tioga Castings
PROJECT NUMBER: 00266403.0000
SAMPLERS: J. Mullins

A: Total Casing and Screen Length: 16.08'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 11.49'

D: Volume of Water in Casing: 0.73 gallons

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 x (-) = _____ gal.

PARAMETER	ACCUMULATED VOLUME PURGED											
Time	1240	1245	1250	1255	1300							
Gallons	0.00	0.25	0.50	0.75	1.00							
Depth to Water (ft)	11.49	11.49	11.50	11.50	11.50							
pH	7.07	7.04	7.04	7.04	7.05							
Conductivity (mS/cm)	0.363	0.360	0.361	0.363	0.362							
Turbidity (NTU)	8.11	8.68	8.69	8.71	8.73							
Dissolved Oxygen (mg/l)	6.79	4.71	4.48	4.45	4.43							
Temperature (^{o}C)	13.98	14.34	14.39	14.39	14.39							
Redox (mV)	134	149.0	156	158	159							

Notes: Sampled at 1305, collected DUP-120170828

WELL NUMBER: **MW-6** DATE: 8/28/2017

PROJECT NAME: Tioga Castings
PROJECT NUMBER: 00266403.0000
SAMPLERS: J. Mullins

A: Total Casing and Screen Length: 27.28'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 21.21'

D: Volume of Water in Casing: 0.97 gallons

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	1625	1630	1635	1640	1645	1650						
Gallons	0.0	0.4	0.8	1.2	1.6	2.0						
Depth to Water (ft)	21.21	21.21	21.21	21.21	21.21	21.21						
pH	7.51	7.04	6.89	6.91	6.93	6.91						
Conductivity (mS/cm)	0.418	0.461	0.488	0.503	0.509	0.509						
Turbidity (NTU)	39.7	38.0	28.8	19.9	16.6	16.6						
Dissolved Oxygen (mg/l)	5.45	4.99	4.82	4.78	4.76	4.76						
Temperature (^{o}C)	13.28	13.96	12.96	12.83	12.83	12.83						
Redox (mV)	165	184	193	195	196	198						

Notes: Sampled at 1655

WELL NUMBER: **MW-9** DATE: 8/28/2017

PROJECT NAME: Tioga Castings
PROJECT NUMBER: 00266403.0000
SAMPLERS: J. Mullins

A: Total Casing and Screen Length: 23.36'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 16.23'

D: Volume of Water in Casing: 1.14 gallons

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 x (-) = _____ gal.

PARAMETER	ACCUMULATED VOLUME PURGED											
Time	1525	1530	1535	1540								
Gallons	0.00	0.50	0.85	1.15								
Depth to Water (ft)	16.23	16.23	16.23	16.23								
pH	6.98	6.85	6.84	6.84								
Conductivity (mS/cm)	0.448	0.447	0.456	0.454								
Turbidity (NTU)	20.6	15.5	14.7	14.7								
Dissolved Oxygen (mg/l)	4.75	4.15	4.14	4.14								
Temperature (^{o}C)	19.12	18.99	18.95	18.95								
Redox (mV)	171	179	183	184								

Notes: Sampled at 1550

WELL NUMBER: **MW-3D** DATE: 10/18/2018

PROJECT NAME: Tioga Castings
PROJECT NUMBER: 00266403.0000
SAMPLERS: J. Mullins

A: Total Casing and Screen Length: 25.13'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 15.51

D: Volume of Water in Casing: 1.54 gallons

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	1200	1205	1210	1215	1220	1225	1230					
Gallons	0.00	0.25	0.50	0.75	1.00	1.25	1.50					
Depth to Water (ft)	15.52	15.52	15.52	15.52	15.52	15.52	15.53					
pH	6.94	6.51	6.51	6.52	6.53	6.54	6.54					
Conductivity (mS/cm)	0.463	0.466	0.468	0.468	0.469	0.469	0.468					
Turbidity (NTU)	2.39	2.01	1.85	1.62	1.40	1.35	1.33					
Dissolved Oxygen (mg/l)	6.47	5.03	5.02	5.04	5.02	5.00	4.99					
Temperature (^{o}C)	10.89	11.17	11.25	11.3	11.33	11.34	11.34					
Redox (mV)	171	181	181	181	180	180	180					

Notes: Sample collected at 1230.

WELL NUMBER: **MW-4** DATE: 10/18/2018

PROJECT NAME: Tioga Castings
PROJECT NUMBER: 00266403.0000
SAMPLERS: J. Mullins

A: Total Casing and Screen Length: 16.08'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 9.13

D: Volume of Water in Casing: 1.11 gallons

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 x (-) = _____ gal.

PARAMETER	ACCUMULATED VOLUME PURGED											
Time	1104	1109	1114	1119	1124	1129	1134					
Gallons	0.00	0.25	0.50	0.75	1.00	1.25	1.50					
Depth to Water (ft)	9.14	9.14	9.14	9.15	9.15	9.15	9.16					
pH	6.97	6.51	6.51	6.51	6.51	6.52	6.52					
Conductivity (mS/cm)	0.434	0.420	0.418	0.418	0.419	0.420	0.420					
Turbidity (NTU)	4.97	3.21	2.59	1.13	1.00	1.00	1.00					
Dissolved Oxygen (mg/l)	6.52	5.43	5.25	5.26	5.23	5.22	5.21					
Temperature (^{o}C)	12.23	13.37	13.56	13.58	13.64	13.67	13.67					
Redox (mV)	157	172	174	176	179	180	181					

Notes: Sample collected at 1335 and DUP-1-20181018 collected here.

WELL NUMBER: **MW-6** DATE: 10/18/2018

PROJECT NAME: Tioga Castings
PROJECT NUMBER: 00266403.0000
SAMPLERS: J. Mullins

A: Total Casing and Screen Length: 27.28'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 18.29

D: Volume of Water in Casing: 0.97 gallons

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 x (-) = _____ gal.

PARAMETER	ACCUMULATED VOLUME PURGED											
Time	1008	1013	1018	1023	1028	1033	1038					
Gallons	0.00	0.25	0.50	0.75	1.00	1.25	1.50					
Depth to Water (ft)	18.31	18.31	18.31	18.31	18.31	18.31	18.31					
pH	5.91	6.37	6.41	6.44	6.45	6.45	6.45					
Conductivity (mS/cm)	0.558	0.535	0.529	0.524	0.523	0.524	0.524					
Turbidity (NTU)	2.08	1.54	1.03	0.92	0.91	0.90	0.90					
Dissolved Oxygen (mg/l)	4.94	4.54	4.46	4.34	4.32	4.31	4.30					
Temperature (^{o}C)	14.03	13.97	14.03	14.08	14.09	14.08	14.08					
Redox (mV)	191	175	173	172	173	173	173					

Notes: Sample collected at 1040.

WELL NUMBER: **MW-9** DATE: 10/18/2018

PROJECT NAME: Tioga Castings
PROJECT NUMBER: 00266403.0000
SAMPLERS: J. Mullins

A: Total Casing and Screen Length: 23.36'

B: Casing Internal Diameter: 2"

C: Water Level Below Top of Casing: 13.25

D: Volume of Water in Casing: 1.61 gallons

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	1330	1335	1340	1345	1350	1355	1400					
Gallons	0.00	0.25	0.50	0.75	1.00	1.25	1.50					
Depth to Water (ft)	13.26	13.26	13.26	13.26	13.27	13.27	13.27					
pH	6.60	6.58	6.58	6.58	6.57	6.58	6.58					
Conductivity (mS/cm)	0.583	0.578	0.575	0.572	0.571	0.57	0.57					
Turbidity (NTU)	7.82	5.15	3.92	2.11	1.98	1.94	1.92					
Dissolved Oxygen (mg/l)	3.40	1.80	1.76	1.74	1.72	1.70	1.70					
Temperature (^{o}C)	12.09	12.67	13.15	13.60	13.6	13.64	13.63					
Redox (mV)	177	170	165	160	159	158	157					

Notes: Sample collected at 1400.

APPENDIX D

IC/EC Certification Form

Enclosure 1
Engineering Controls - Standby Consultant/Contractor Certification Form

Site Details **Box 1**

Site No. **754012**

Site Name Tioga Casting Facilities

Site Address: Foundry Street Zip Code: 13827
City/Town: Owego
County: Tioga
Site Acreage: 1.0

Reporting Period: December 30, 2016 to December 30, 2019

	YES	NO
1. Is the information above correct?	☑	☐
If NO, include handwritten above or on a separate sheet.		
2. To your knowledge has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	☑
3. To your knowledge has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?	☐	☑
4. To your knowledge have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	☑
If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5. To your knowledge is the site currently undergoing development?	☐	☑

Box 2

	YES	NO
6. Is the current site use consistent with the use(s) listed below? Commercial and Industrial	☑	☐
7. Are all ICs/ECs in place and functioning as designed?	☑	☐

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and contact the DEC PM regarding the development of a Corrective Measures Work Plan to address these issues.

Signature of Standby Consultant/Contractor Date

SITE NO. 754012 **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
128.07-2-7	John Sweet III	Ground Water Use Restriction Soil Management Plan Landuse Restriction O&M Plan IC/EC Plan Monitoring Plan Site Management Plan

Institutional Controls include: An Environmental Notice which includes restrictions on land use and groundwater use, and compliance with a site management plan that details the 0peration, maintenanc monitoring and reporting that is required at the site.

Box 4

Description of Engineering Controls

Parcel	Engineering Control
128.07-2-7	Cover System Fencing/Access Control

As per the Record of Decision,signed March 20, 1995, the remedy required consolidation of contaminated sc into a landfill at the western edge of the property. The landfill was properly closed and capped with a syntheti liner. Then the landfill was encompassed with a perimeter fence.

Engineering Controls include: Perimeter fence, cap, monitoring well network.

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification, including data and material prepared by previous contractors for the current certifying period, if any;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and compete.

YES	NO
☑	☐

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) nothing has occurred that would constitute a failure to comply with the Site Management Plan, or equivalent if no Site Management Plan exists.

YES	NO
☑	☐

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and contact the DEC PM regarding the development of a Corrective Measures Work Plan to address these issues.

Signature of Standby Consultant/Contractor

Date

Box 6

IC/EC CERTIFICATIONS

Professional Engineer Signature

I certify that all information in Boxes 2 through 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Daniel J. Loewenstein at Arcadis
print name

855 Route 146, Suite 210

Clifton Park, NY 12065,
(print business address)

am certifying as a Professional Engineer.

Signature of Professional Engineer

Stamp
(Required for PE)

Date 2/12/2020

Arcadis CE, Inc.

855 Route 146

Suite 210

Clifton Park, New York 12065

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