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TECHNICAL MEMORANDUM

FROM:	Ben Young	**LOCATION:**	EA Science and Technology
TO:	Brian Sadowski	**LOCATION:**	NYSDEC – Buffalo, NY
CC:	Michael Hinton	**LOCATION:**	NSYDEC – Buffalo, NY

RE: Contract/Work Assignment (WA) No: D007624-28
Remedial System Optimization/Site Management for Patton's Busy Bee Disposal Site

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EA Engineering, P.C., and its affiliate EA Science and Technology (EA) were tasked by the New York State Department of Environmental Conservation (NYSDEC) under WA No. D007624-28 to perform a Remedial System Optimization (RSO) evaluation for the Patton's Busy Bee Disposal site in Allegany County. The WA scope of work included conducting a site visit, performing a historic file review, surveying pertinent site features, and preparation of a RSO Memo that would identify potential alternatives for long-term leachate management. Each of the alternatives evaluated would include a conceptual layout, regulatory requirements, and any major design features needed for implementation. At the request of the NYSDEC, EA has prepared this technical memorandum to serve as a summary of the RSO evaluation.

1. PROJECT BACKGROUND

1.1 SITE DESCRIPTION

Patton's Busy Bee Disposal Site is currently a Class 4 site on the New York State (NYS) Registry of Inactive Hazardous Waste Disposal Sites (Site No. 902014). The site is located on Clark Road, one mile east of Alfred Station in the Town of Alfred, Allegany County. There is an adjacent landfill (Henry Landfill), located north of Patton's Busy Bee Disposal Site in the Town of Hartsville, Steuben County. The Busy Bee Disposal Site is located on top of a hill, and covers approximately eight acres. The Henry Landfill is located on the northeast side of the same hill and covers approximately five acres. Towner Living Trust owns a 23.2 acre parcel that contains the Henry Landfill and Busy Bee Disposal Site. A site location map is provided as Figure 1.

1.2 SITE HISTORY

1.2.1 Operational/Disposal History

In 1980, LaVerne Patton received a permit from NYSDEC to operate Busy Bee as a sanitary landfill, accepting municipal and industrial waste that was deposited into three unlined trenches. The three unlined trenches were approximately 12 feet (ft) deep, up to 600 ft long, and up to

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45 ft wide.[1] Patton's Busy Bee accepted waste from 1980 to 1988. From 1980 to 1986, the disposal site reportedly received municipal, non-hazardous industrial waste, and sewage sludge from wastewater treatment plants. From February to August 1981, SKF industries reported disposing of 77 tons of corrosive alkaline metal cleaning solution at Busy Bee. It was reported that trenches were covered daily with a clayey-silt soil found at a borrow source at the site. Mr. Patton began constructing a "remedial trench" in 1987 along the southern and eastern sides of the unlined disposal trenches at Busy Bee (Figure 2). The remedial trench was reportedly lined with clay and a leachate collection system to intercept leachate from the unlined waste trenches. Leachate collected within the remedial trench was directed to four leachate collection tanks buried adjacent to unlined waste trenches. The remedial trench also provided the landfill with additional volume and was filled with primarily construction and demolition debris and automobile shredder waste. Disposal activities continued above and beyond the limits of each of the trenches to form the present topography.

Busy Bee Disposal Site was capped in two stages. During the Summer and Fall of 1987, the western half of the landfill was capped and a vegetative cover established. The eastern half was capped during the Summer and Fall of 1989. Final capping of the landfill was completed in 1991. It was reported that the cap material consists of 2-4 ft of low permeability material with five gas vents installed through the cap into waste material.

1.2.2 Remedial History

The NYSDEC issued two Consent Orders with Mr. Patton to close Busy Bee Landfill in 1986 and 1987. In 1988, Patton's Busy Bee Disposal Site was listed on the NYS Registry of Inactive Hazardous Waste Disposal Sites as a Class 2a site. Two years later, the NYSDEC conducted a Preliminary Site Assessment (PSA) to evaluate conditions at the site and obtain information to reclassify the site. Volatile organic compounds (VOCs) were found at high levels in monitoring wells down gradient of the landfill during the PSA. The site was reclassified in 1991 to a Class 2 site, which identifies a site that presents a significant threat to public health or the environment. It was assigned a priority ranking of I, due to the threat to private water supplies located downgradient of the site.

Between 1991 and 1993, the NYSDEC pursued Potentially Responsible Parties without success to implement a remedial program. In 1993, the NYSDEC issued a WA under a State Superfund Standby Contract with URS Consultants (URS) to perform a Remedial Investigation (RI) and Feasibility Study (FS). The RI was conducted from April 1994 through August 1994. Results of the RI showed that VOC groundwater contamination decreased significantly laterally and vertically from Busy Bee Landfill.

The Record of Decision (ROD) issued in October 1996 recommended remedial actions for the landfill and associated groundwater contamination which included continued maintenance of the

[1] URS Consultants, Inc. 1995, Remedial Investigation at the Patton's Busy Bee Disposal Site. November.

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leachate collection system, leachate removal, and groundwater monitoring. The site was eventually reclassified to Class 4 in 1997. Since the ROD, site management activities have included operations and maintenance (O&M) of the landfill cover system and infrastructure (i.e., monitoring wells, collection tanks, etc.) and long term groundwater monitoring.

1.2.3 Historic Investigations

The PSA conducted by URS in 1990 found groundwater contamination in both the shallow and deep monitoring wells located along the western and southern borders of the site[2]. The detected contaminants were VOCs including trichloroethene (TCE) and trans-1,2-dichloroethene at maximum concentrations of 110,000 and 59,000 µg/L, respectively.

Results of the RI and previous investigations indicate that contaminants, which were present in all solid and aqueous media sampled at the site, include VOCs, semi-volatile organic compounds (SVOCs), and metals.[3] Groundwater sampling found high concentrations of VOCs, low concentrations of SVOCs, and varying concentrations of metals. Pesticides and polychlorinated biphenyls (PCBs) were detected in two samples which were obtained from waste at the site. The RI concluded that pesticides and PCBs did not appear to migrate, as they were not detected in other site media sampled during the RI.

Soil gas screening conducted during the RI found the two highest concentration samples along southeast of site with VOC concentrations of 17,829 parts per billion (ppb) and 17,068 ppb. Chlorinated hydrocarbons were detected in 28 samples, vinyl chloride was detected in 24 samples up to 16,696 ppb, and benzene, toluene, ethylbenzene and total xylenes was detected at 10 locations.

Soil gas with companion soil samples were collected at four locations along the southern portion of the site. VOCs were detected at all four locations, but only tetrachloroethylene was detected in one companion subsurface soil sample.

Surficial soils sampling during the RI found VOCs at 9 of the 19 sample locations, but concentrations did not exceed stringent cleanup goals (SCGs). SVOCs were detected in 15 of 16 soil samples, most frequently found polycyclic aromatic hydrocarbons and phthalates. Metals were found elevated concentrations relative to SCGs. Highest concentrations were aluminum, arsenic, barium, beryllium, calcium, cobalt, iron, magnesium, manganese, nickel, and thallium. Additionally, higher metal concentrations occurred where surface water was present.

A soil boring collected as part of the RI through the waste disposal area found VOCs exceeding SCGs including acetone (1,300 ppb), 2-butanone (1,100 ppb), benzene (85 ppb), toluene (1,700 ppb), and xylene (5,100 ppb). Soil boring samples also contained SVOCs: 10,700 ppb total polycyclic aromatic hydrocarbons, 1,054,400 ppb total phthalates, and 6,700 ppb of

[2] URS Consultants, Inc. 1990. Preliminary Site Assessment, Patton's Busy Bee Disposal Site.

[3] URS Consultants, Inc. 1995, Remedial Investigation at the Patton's Busy Bee Disposal Site. November.

4-methylphenol. Pesticides were detected at high concentrations (380 ppb endrin aldehyde). Three PCBs detected for a total PCB concentration of 21,900 ppb. All 23 target analyte list (TAL) metals were detected in the soil boring sample. Elevated concentrations of barium, (2,900 ppm), cadmium (48.7 ppm), chromium (163 ppm), copper (1,070 ppm), iron (131,000 ppm), lead (3,190 ppm), nickel (437 ppm), silver (6 ppm), sodium (4,090 ppm), and zinc (6,210 ppm) were observed. Such high concentrations of VOCs, SVOCs, pesticides, PCBs, and metals in the soil samples collected from the waste mass suggest that Busy Bee contains a large source of these contaminants to surface water, groundwater, and soil.

Groundwater samples collected from onsite monitoring wells in October 2007 as part of the biennial monitoring, detected low levels of VOCs in 8 of 13 wells. The following VOCs were detected below NYSDEC Ambient Water Quality Standards (AWQS): Acetone, Chlorobenzene, 1,3-dichlorobenzene, chloroform, 2-butanone, and *cis*-1,2-dichloropropane. Trichloroethene and *cis*-1,2-dichloroethene exceeded NYSDEC AWQS with maximum concentrations of 9.1 µg/L and 12 µg/L, respectively.

2. CURRENT CONDITIONS

2.1 TOPOGRAPHY

Topography surrounding the site drops off steeply, particularly to the west. Surface runoff from the landfill drains in a radial pattern, eventually discharging to Canacadea Creek to the west or Crosby Creek to the east. Both streams then discharge to the Canisteo River. One small pond is located in the former borrow pit east of the landfill.

2.2 GEOLOGY & HYDROGEOLOGY

The site is located in the Alleghany Plateau of the Appalachian Upland Physiographic Province. The plateau has been eroded and dissected by streams and glaciers producing the present landscape of hills and valleys. Bedrock in the vicinity of the site is the Upper Devonian-age Caisteo Shale Member of the Machias Formations. The formation consists of thin-bedded shales with interbedded fine-grained sandstone that reportedly dips approximately 2 degrees to the southwest.

Bedrock at the site consists of nearly horizontal alternating layers of shale and sandstone. Most of the groundwater is within the sandstone layers; however, there are fractures within the shale that allow vertical groundwater migration. Overburden at the site consists of gravelly, clayey silt. Previous engineering reports found hydraulic conductivities within the overburden and weathered bedrock to be low, about 10^{-4} centimeters per second or less permeable[4]. Groundwater flow within the bedrock is directed along bedding plane fractures and higher angle fractures. Groundwater migrating horizontally within the sandstone units discharges as seeps or

[4] JEB Consultants. 1986. Patton's Busy Bee Disposal Service Liner Certification Report.

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springs on the slopes surrounding the site. Mean hydraulic conductivity at the site was 1.44×10^{-3} cm/sec, indicating bedrock at the site is relatively permeable (where fractured), and that groundwater movement occurs as fracture flow. Groundwater recharge occurs by infiltration through overburden soil (including the landfill cover system and waste).

2.3 REMAINING CONTAMINATION

Contaminants found onsite include VOCs, SVOCs, metals, pesticides, and PCBs. Previous sampling and investigations determined that contaminants were present in surficial soil, subsurface soil, groundwater, and surface water. The most prevalent of which is VOC, SVOC, and metals contamination in groundwater.

2.4 SELECTED REMEDY/SITE MANAGEMENT ACTIVITIES

The response action in the ROD called for institutional actions for Busy Bee Landfill and associated groundwater. On-going remedial actions include: 1) continued maintenance of the Busy Bee Landfill leachate collection system, 2) leachate removal, 3) transportation of leachate to an offsite disposal facility, 4) maintenance of the landfill cap, roads, and 5) long-term groundwater monitoring.

Select residential wells were historically monitored annually; however, due to consistent non-detection of site-related contaminants, this program ceased in 2006. It was concluded that continued management of the leachate collection system should minimize contaminant migration to groundwater. In addition, with routine cap maintenance, contaminants in groundwater should naturally attenuate. Under the NYS Superfund Program, the NYSDEC is implementing the site management requirements outlined in the ROD. Current site management activities include site and landfill cap inspections, mowing, leachate removal, road maintenance, and biennial sampling of groundwater monitoring wells. All criteria of site management are being performed by NYSDEC staff or contractors.

A NYSDEC Region 9 Solid and Hazardous Waste staff member visits the site five to six times per year, and inspects the four leachate tanks and logs leachate levels. During periods of high leachate generation (spring and early summer) the tanks may be checked more frequently. Conversely, during the winter months, accessibility to the tanks is restricted due to weather conditions, and therefore, less frequent monitoring can be performed. Leachate removal has been performed by a NYSDEC Emergency Spill Remediation contractor approximately every 2-3 months from 1997 to 2006. From 2006 to 2008, leachate removal occurred biannually. Presently, leachate is removed about four to five times per year dependent upon site access.

2.5 REMEDIAL SYSTEM/LEACHATE COLLECTION SYSTEM

The remedial trench and leachate collection, and conveyance system was installed in 1987. The remedial trench was constructed, in part, to intercept and collect leachate migrating to the south and east from the three unlined trenches. It is significantly wider and several ft deeper than the

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unlined disposal trenches. The remedial trench was reportedly constructed with a 2-ft thick liner consisting of compacted low permeability material (approximately 1 x 10^{-8} cm/sec), and perforated leachate collection pipe laid on top of the liner. This trench was then reportedly filled with construction and debris, and automobile shredder waste. Leachate enters the lined trench by percolating through the unlined disposal trench walls of the group of three unlined trenches (Figure 2). Leachate generated at the Busy Bee Disposal site is directed via collection system drain pipes, constructed within the remedial trench, to metal underground storage tanks located northwest and northeast of the fill area (Figure 2). Leachate from the western half of the remedial trench reportedly drains northwest to a 2,000- and 4,000-gallon tanks. Leachate from the eastern half of the trench reportedly drains northeast to two tanks of 15,000- and 18,000-gallon capacity.

Leachate is directed into two pairs of collection tanks located to the east and northwest of the landfill (BB-T1-North, BB-T1-South, BB-T2-North, and BB-T2-South). These tanks have been gauged and emptied regularly by a NYSDEC contractor since the Spring of 1994. Leachate removed from the site is disposed of at an off-site treatment facility.

2.6 REMEDIAL SYSTEM COST EVALUATION

The average annual cost of leachate removal is approximately $25,000. This cost includes four-five trips per year with about ten loads of leachate removed per trip over the course of two to three days. The average annual cost also includes the price of some small miscellaneous repair items. However, it does not include time or travel costs for the NYSDEC. An NYSDEC representative is usually onsite for leachate removal meaning (four to five trips per year), approximately two to three days per trip, four hours driving (to and from site in Buffalo) each day, and eight hours onsite per trip. Additionally, the $25,000 leachate removal cost does not include groundwater monitoring activities, which occur every two years or biannual mowing.

To estimate costs associated with the current remedial system, it was assumed that leachate was removed five times per year over the course of three days. This would imply a NYSDEC staff member would be traveling to site at a minimum five times a year, three days per event. Each work day is assumed to involve eight hours onsite, with round trip travel of four hours per day. Four hours of reporting is also assumed per event. With an assumed labor rate of $88 per hour, the current remedial system costs NYSDEC $17,600 in labor. Including vehicle costs, the price rises to approximately $18,660. Added to the $25,000 subcontractor cost, five leachate removal events per year costing approximately $43,739.

The current remedial action also involves regular sampling and monitoring of leachate and groundwater. Leachate tanks are gauged about four times per year to monitor levels in each collection tank. One leachate samples is collected annually and the 13 onsite monitoring wells are sampled biennially. Leachate and groundwater samples are both analyzed for TAL metals and VOCs. In addition, groundwater samples are also analyzed for SVOCS and organochloropesticides/PCBs. Pricing from NYSDEC Standby Laboratory Contractors was used

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to estimate analytical costs, and it was assumed that monitoring well sampling would take two 8-hour days of sampling, four hours of travel time, four hours of preparation, and four hours for reporting. With a $50 expenditure allowance in field supplies (paperwork, gloves, field book, etc.), the cost of each groundwater sampling event is approximately $8,000. The annual cost of leachate monitoring is approximately $2,600 and includes four 4-hour trips to and from the site, one hour of work onsite, and four hours reporting and lab analysis of one sample.

If leachate removal continued for the next 30 years, the total cost for just the leachate removal, monitoring and site maintenance (mowing) is approximately $842,300. This value assumes an annual discount rate of 5 percent, and does not include tank replacement, or additional repair costs.

2.7 DATA TRENDS

2.7.1 Leachate

Leachate samples are submitted annually for chemical analyses. Results of leachate testing were included in the 2000-2007 annual reports and included in the historical data package provided by NYSDEC. The most recent results from 2013 and 2014 were also included in the historical data package. Between 2000 and 2007, samples were collected annually in October. In May 2013, and November 2014 leachate samples was collected. Leachate data collected from historical documents is presented in Table 1.

VOC concentrations exceeded NYSDEC AWQS standards on three occasions between 2000-2007. In 2000, concentrations of *cis*-1,3-dichloroethene (57 µg/L) and vinyl chloride (26 µg/L) exceeded AWQS standards of 5 µg/L and 0.3 µg/L, respectively. In 2005, TCE exceeded the AWQS standard of 5 µg/L with a concentration of 68 µg/L. Vinyl chloride also reported a concentration exceeding the standard with a concentration of 3 µg/L. Most recently in 2014, *cis*-1,3-dichloroethene, TCE and vinyl chloride reported concentrations of 77 µg/L, 75 µg/L, and 3.7 µg/L, respectively.

SVOCs were inconsistently detected in leachate samples. The sample collected on 30 May 2013, reported the largest number of detections, and the only known sample with SVOC concentrations exceeding AWQS standards. The following SVOCs were detected above standards in the 2013 leachate sample: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene.

Metals were detected in every leachate sample, and most samples had at least one metal exceeding AWQS standards, with the exception of the 2005 leachate sample. Eight metals (aluminum, barium, calcium, lead, magnesium, manganese, nickel, and sodium) were detected in the 2005 sample, but all concentrations were below their respective AWQS standards. Iron, manganese, and sodium reported concentrations exceeding AWQS standards (300 µg/L, 300, µg/L, and 20,000 µg/L, respectively) in each of the samples shown in Table 1, with the exception of the 2005 sample. Iron concentrations ranged from 2.8 µg/L to 406,000 µg/L, and manganese ranged from 2.7 µg/L to 11,300 µg/L.

Organochloropesticides have only been detected in samples from 2004, 2013, and 2014. Concentrations of endosulfan II (beta), dieldrin, and endosulfan II exceeded their respective AWQS standards in 2004, 2013, and 2014, respectively.

As mentioned, detections and exceedances of VOCs, SVOCs, pesticides, and metals in leachate are not consistent, nor do the results indicate a decreasing trend. Based on the varying detection and range of concentrations varying widely from year to year, the Busy Bee Disposal site could be a continuing source of groundwater contamination.

2.7.2 Groundwater

Groundwater samples are collected from monitoring wells surrounding Busy Bee Disposal site, and analytical results were available from the RI and for the period of 2000 to 2007. Groundwater data collected from historical documents has been collated and presented in Table 2. This data was compared to the leachate data in Table 3 to determine if any correlations existed, and if there were differences between wells to the south and east of the remedial trench (capture wells) and wells to the north and west (non-capture wells).

The Exhibit 1 table summarizes the detections and exceedances in groundwater samples collected between 2000 and 2008. A detection was determined to be an exceedance if the concentration of the compound was greater than or equal to the NYSDEC AWQS standards for Class GA water. Each compound listed in this table was detected every year from 2000 to 2007. NYSDEC AWQS exceedances are listed in bold text, while detections are listed in italicized text.

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EXHIBIT 1 HISTORICAL DETECTIONS IN GROUNDWATER

Well ID	Location	VOCs	Metals
MW-101D	North side between Henry and Busy Bee Landfill	**Benzene, chlorobenzene**	**Iron, magnesium, manganese, sodium**
MW-101I	North side between Henry and Busy Bee Landfill	**Acetone**	**Iron, manganese, magnesium, sodium**
MW-102D	South side of Busy Bee Landfill	**Acetone**	**Iron, sodium**
MW-103D	South-west side of Busy Bee Landfill	**DCE, TCE**	**Iron, sodium**
MW-103I	South-west side of Busy Bee Landfill	**DCE, TCE**	**Iron, sodium**
MW-104D	West side of Busy Bee Landfill	*DCE, TCE*	**Magnesium, manganese, sodium**
MW-104I	West side of Busy Bee Landfill	**DCE, TCE,** *Chloroform*	**Iron, sodium**
MW-107IR	Northeast side of Busy Bee, south-east of Henry Landfill	Non-detect	**Iron, manganese, sodium**
MW-107SR	Northeast side of Busy Bee, south-east of Henry Landfill	Non-detect	**Iron, manganese, magnesium, sodium**
MW-108D	South-east side of Busy Bee Landfill	Non-detect	**Iron, magnesium, sodium**
MW-108I	South-east side of Busy Bee Landfill	Non-detect	**Iron, sodium**
MW-109	South of Busy Bee Landfill	**Acetone**	**Iron, sodium**
MW-113	North of Busy Bee and Henry's Landfill	Non-detect	**Iron, manganese, magnesium, sodium**

Wells on the north, west, and south-west sides of Busy Bee Landfill had exceedances of VOCs, while monitoring wells on the north-east and east sides did not. The "remedial" collection trench collects leachate from the east and south sides of the landfill, but not from the north and west sides.

As previously mentioned, groundwater flow occurs horizontally between the sandstone units onsite and vertically through fracture flow. During the RI, it was determined that horizontal flow in upper sandstone units went in a south west direction. Groundwater flow also flows to the west/southwest in middle sandstone. In the lower unit, however, groundwater flows to the north west.

Evaluating the spatial variations in VOC and metal detection could suggest that not all of the leachate is being captured in the collection and conveyance system. Some leachate might be migrating to the north and west (in the direction of groundwater flow), which might be why wells MW-101D, MW-101I, MW-102D, MW-103D, MW-103I, MW-104D, and MW-104I had detections and exceedances of VOCs.

3. REMEDIAL SYSTEM OPTIMIZATION

3.1 DATA GAPS

There are several areas where knowledge of the site is incomplete, the first of which is limited survey data and elevations of the leachate collection system components.

In regards to the current remedial system and processes, data gaps were identified as follows:

- There are no construction drawings of the unlined trenches or "remedial" trenches with the leachate collection and conveyance system.
- Some information is known about the system through previous investigations; however, the elevation, dimensions, and detailed schematic of the perforated piping in the lined trench, leachate conveyance lines, and leachate collection tanks are not known.
- Similarly, the condition of the system components (i.e., perforated and conveyance piping, tanks, etc.) is unknown.
- There is no consistent log of leachate volumes or results of sampling. Annual results from 2009-2012 are missing.
- Additionally, these partial records do not indicate if the tanks reach capacity or overflow, which has reportedly occurred at the site. As a result, the actual volume of leachate is unknown, as is the quality and volume of water in the landfill.
- There are partial records of chemical testing of the leachate and groundwater from 2000 to 2008 and 2013 to 2014 for VOCs, SVOCs, metals, and organochloropesticides.
- Site background conditions are unknown.
- It is also unclear what effects an overflow had or may have on surface water/groundwater quality in the event leachate was/is discharged into the environment.
- Since the leachate collection trenches only border the south and east sides of the three original disposal trenches, it is unclear if the current system captures all or only a portion of the leachate.
- A detailed waste profile of the material disposed of at Busy Bee Landfill is also unknown.

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In addition to the alternatives described in Section 4, a data gap investigation is a possible next step in maintaining the current remedial action or implementing a new system.

3.2 STATEMENT OF PROBLEM/OBJECTIVES

The objective of this RSO evaluation is to identify potential remedial alternatives that could be implemented to more effectively manage and treat leachate at Busy Bee Disposal Site. The alternatives developed are based on available data with the goal of reducing the overall remedial life-cycle costs (LCC).

4. ALTERNATIVES EVALUATION

The seven preliminary remedial options described in Table 4 were initially developed to achieve a reduction of annual and LCC associated with leachate management and removal. In order to evaluate a larger set of options, EA considered both passive and active RSO alternatives. Active systems would require some sort of electrical component, and therefore would require the installation of a power source at the site. A preliminary ranking of costs (i.e., high, moderate, and low) was included with each alternative described in Table 4.

The remedial options were initially evaluated for implementability, reasonableness, cost, and regulatory acceptability. Discussions with the NYSDEC eliminated active systems since power at the site was not an acceptable option. The passive options were further evaluated using the historical data review and recently collected survey data. The results identified four remaining alternatives, including the current remedial action, which are discussed in this section and presented in Table 5.

4.1 SURVEYING

EA contracted Popli Design Group to perform a limited topographic survey of the site. EA identified major site features including the location and elevation of BB-T1 tanks, BB-T2 tanks, cleanouts in the leachate collection/conveyance system, monitoring well locations, location of overhead power lines, wood shed location, Borrow Pond, engineered swale, and location of the gravel drive into and around the property.

Figure 6 shows the results of the topographic survey. The survey revealed that ground surface at BB-T2 is approximately 8 ft higher than ground surface BB-T1. This survey data was used to assess the feasibility and implementability of the list of RSO alternatives for the site.

4.2 LEACHATE COLLECTION & MANAGEMENT ALTERNATIVES

The RSO evaluation included three passive leachate management alternatives along with the existing action as described in this section and summarized in Table 5. It was assumed that any change to existing remedial action operations (RA[O]) would require an Explanation of Significant Difference or amendment to the ROD. Each of the alternatives also includes the

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assumption that biennial groundwater monitoring would continue until the remedy has met the remedial action objectives identified in the ROD and/or amended ROD. Additionally, the passive alternatives would each require some level of treated effluent discharge and associated permitting.

4.2.1 Alternative 1: Maintain Current Remedial System (No Action)

This alternative keeps the current RA(O) in place. However, it was assumed that leachate tanks would be removed and replaced, and leachate levels would continue to be checked by NYSDEC personnel. Leachate will be removed by truck and disposed of at an offsite treatment facility. The no action alternative is being used as a basis for comparison for each of the RSO alternatives evaluated.

Costs associated with Alternative 1 are based upon reported pricing from the NYSDEC, and the assumptions stated in Section 2.6. Groundwater samples will be analyzed for VOCs and TAL metals, the cost of which was estimated from NYSDEC's list of standby laboratories. Additional costs associated with this Alternative include travel and field time, as well as any reimbursement. Annual reporting requirements are estimated at 10 hours per year assuming an $88/hour labor rate.

4.2.2 Alternative 2: Passive Treatment using Borrow Pond

This alternative is aimed at reducing VOC, SVOC, and metals concentrations in leachate to meet requirements for surface discharge to the environment by passively treating leachate onsite. The leachate lines would be combined and directed to one treatment area. Leachate from the west tanks (BB-T2) could be gravity fed to the east tanks (BB-T1) using a trenched in, 4-inch poly vinyl chloride (PVC) pipe. The east tanks will have a spill over and piping that will daylight leachate into a channel constructed along the slope between BB-T1 and the borrow pond. A geotextile liner will be installed along the channel to prevent leachate from infiltrating and possibly impacting shallow groundwater. Stone will be spread on top of the liner to aerate leachate and volatize VOCs. The length and dimension of the open channel would be determined based upon bench-scale pilot testing results. The borrow pond would act as an intermediate settling basin to help precipitate insoluble organics and reduce total suspended solids, before discharge to the surface or subsurface. This alternative currently assumes treated effluent will be discharged the existing drainage swale that runs adjacent to the access road toward Clark Road.

It was assumed that a treatability and/or pilot test would be conducted to show proof of concept. Once proof of concept was achieved, and Explanation of Significant Difference or ROD amendment could proceed. In the conceptual design, the piping between the leachate storage tanks and wetland would be a 4-inch PVC pipe that would be placed at 4 ft below grade (below the frost line). Approximately 800 feet of 4-inch PVC piping would be needed with two man holes for pipe repair and cleanout. The stone channel built between tank BB-T1 and the borrow pit pond is estimated at 75 ft in length, and lined with a combination of geotextiles and smaller

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stone/gravel. For the cost estimation, it was also assumed that the borrow pond would be minimally excavated and regraded. Due to possible accumulation of sediment and solids in the borrow pond, it was also assumed that dredging and disposal of these solids would occur every five years. However, dredging and disposal frequency will be dependent upon the results of pilot testing. Dredged material was assumed to have a density of 120 lbs/ft^3. Additional treatment options could be added to the sequence (i.e., activated carbon vessel) based on the results of the treatability testing.

Permitting, monitoring, and reporting requirements would include the current monitoring/reporting schedule, and any additional monitoring requirements as a result of discharging leachate onsite. For costing, it was assumed that state pollutant discharge elimination system (SPDES) monitoring would occur monthly for the first three years and quarterly thereafter. Samples would be analyzed for VOCs, SVOCs, metals, pesticides, and PCBs. Figure 3 shows the proposed layout for this alternative.

4.2.3 Alternative 3: Passive Treatment with Constructed Wetland

Alternative 3 incorporates several of the design elements and assumptions of Alternative 2, with the exception that Borrow Pond would be altered to create a constructed wetland. The constructed wetland would be used as a settling and treatment basin for leachate. Wetland plants will provide uptake for contaminants and slow flow through the pond to allow solids to settle out.

In addition to the piping and channel construction described in Alternative 2, the borrow pond would be excavated and regraded. Compost would be added to the floor of the wetland area to grow native plants and vegetation. One plant will be planted for every one square ft. It was assumed that dredging and disposal of accumulated solids, along with wetland replanting, will also occur every five years. Treated effluence would either discharge to the surface or subsurface, and additional treatment options could be added to the sequence based on the results of the treatability testing.

Alternative 3 would also have the same permitting, sampling, and monitoring requirements as described in Alternative 2. Figure 4 shows the proposed layout for this alternative.

4.2.4 Alternative 4: Passive Treatment with Two Constructed Wetlands

Since the existing grades will not allow the leachate collected in the east tanks to flow to the west tanks without significant earthwork, separate passive treatment systems could be constructed for each set of leachate tanks.

Leachate collected in BB-T1 tanks would daylight on the eastern slope of the landfill and run down an open channel to a constructed wetland as described in Alternative 3. Grasses and other plant species would be planted to uptake VOCs and metals before the treated leachate was discharged into the engineered swale running along the eastern edge of the property.

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On the western side of the landfill, leachate from BB-T2 would be released into an open channel on the north-west side of the property, into the woods. The area would be cleared of all trees and brush so a treatment wetland could be constructed in the north-west corner of the property. A wetland area equivalent to the volume of the two BB-T2 tanks would be excavated to treat the leachate. Vegetation would also be planted to provide uptake. Treated leachate could be discharged to the surface or subsurface. In developing costs for this alternative, it was assumed effluent would be discharged into the woods.

Permitting, monitoring, and reporting requirements would include the requirements described in Alternatives 2 and 3. With two effluent discharge points, however, the sampling and analysis costs of monitoring the treated effluent would double. If the effluent is discharged to the surface, SPDES permitting and monitoring will be required. As mentioned in Alternative 2, it was assumed SPDES monitoring would occur monthly in years 1-3 and quarterly thereafter for two outfall locations. Figure 5 shows the proposed layout for this alternative.

4.2.5 Closing Data Gaps

In order to implement the aforementioned alternatives, additional work will need to be completed to close the data gaps associated with this site. First, the leachate collection and conveyance system needs to be fully investigated and delineated. The effectiveness of the remedial trench should also be evaluated to determine if it is capturing all of the leachate. For Alternatives 2-4, a treatability/pilot study will need to be conducted to evaluate the efficacy of the proposed treatment options and for a basis of design. The costs associated with closing these data gaps have not been included in the cost breakdown with each alternative.

4.3 ESTIMATED COSTS OF RSO ALTERNATIVES

Costing of the RSO alternatives described in the above section was completed using RS Means and engineering estimates. As previously mentioned, each alternative is proposed with the replacement of all four leachate collection tanks. The following table summarizes the costs associated with each alternative.

EXHIBIT 2 ALTERNATIVES COSTING SUMMARY

Alternative	Capital Cost	Annual Long-term Monitoring	Total Lifetime (30 years/5%)
1	$ 74,000	$ 57,610	$ 960,000
2	$ 147,000	$ 25,090	$ 934,000
3	$ 187,000	$ 25,090	$ 1,055,000
4	$ 191,000	$ 32,770	$ 1,360,000

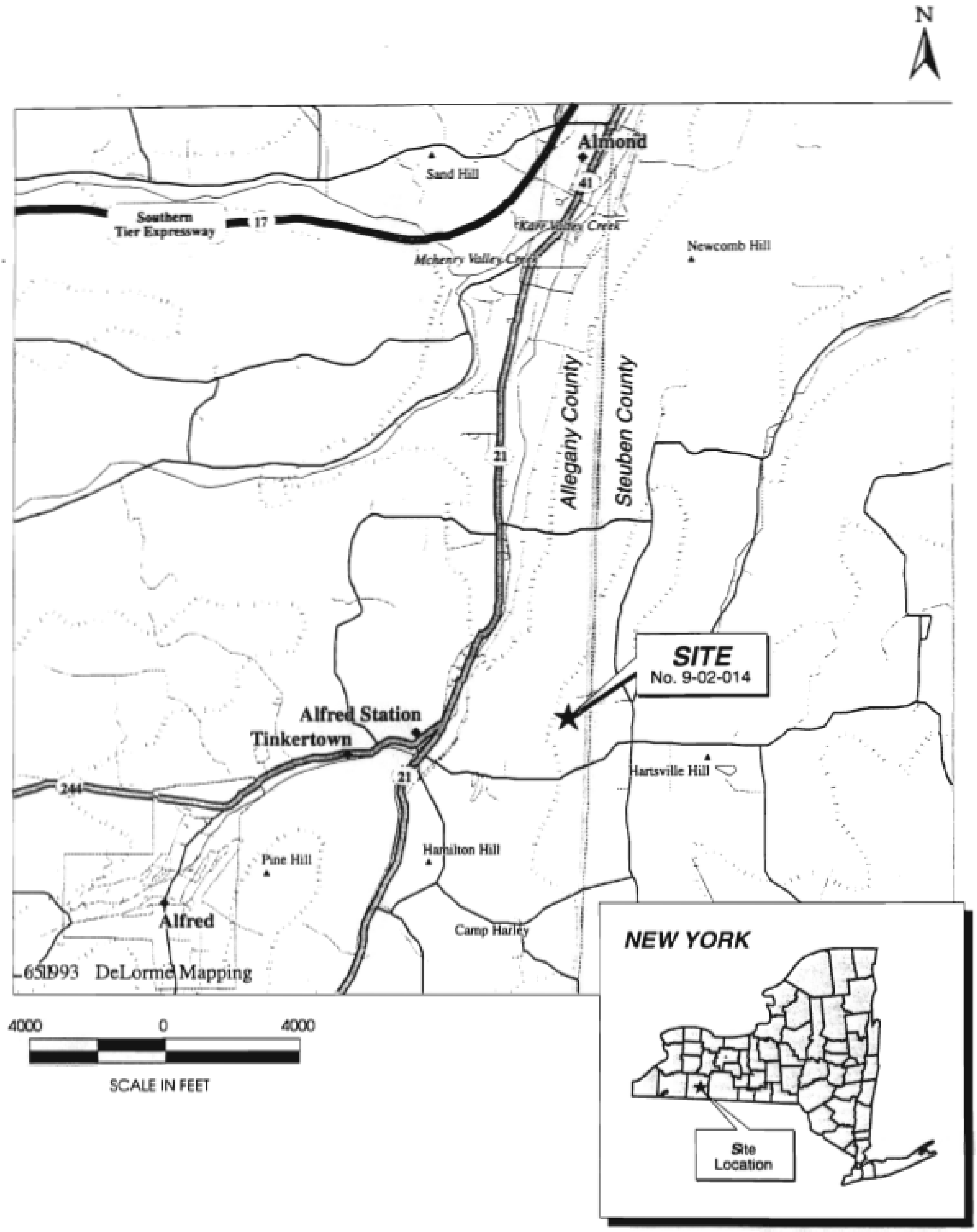
A detailed accounting of costs is presented in Table 6.

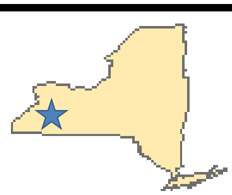
5. SUMMARY

There are currently many data gaps associated with operating the current remedial action at Busy Bee Disposal site as well as it being labor intensive. The alternatives presented above have the potential to mitigate these drawbacks and provide a better solution for the human health and the environment. Replacing the leachate storage tanks will reduce any leaks due to aging infrastructure. Eliminating the need to periodically remove leachate from the storage tanks by allowing leachate to also be held in a pond or wetland for treatment will reduce the risks of overflow.

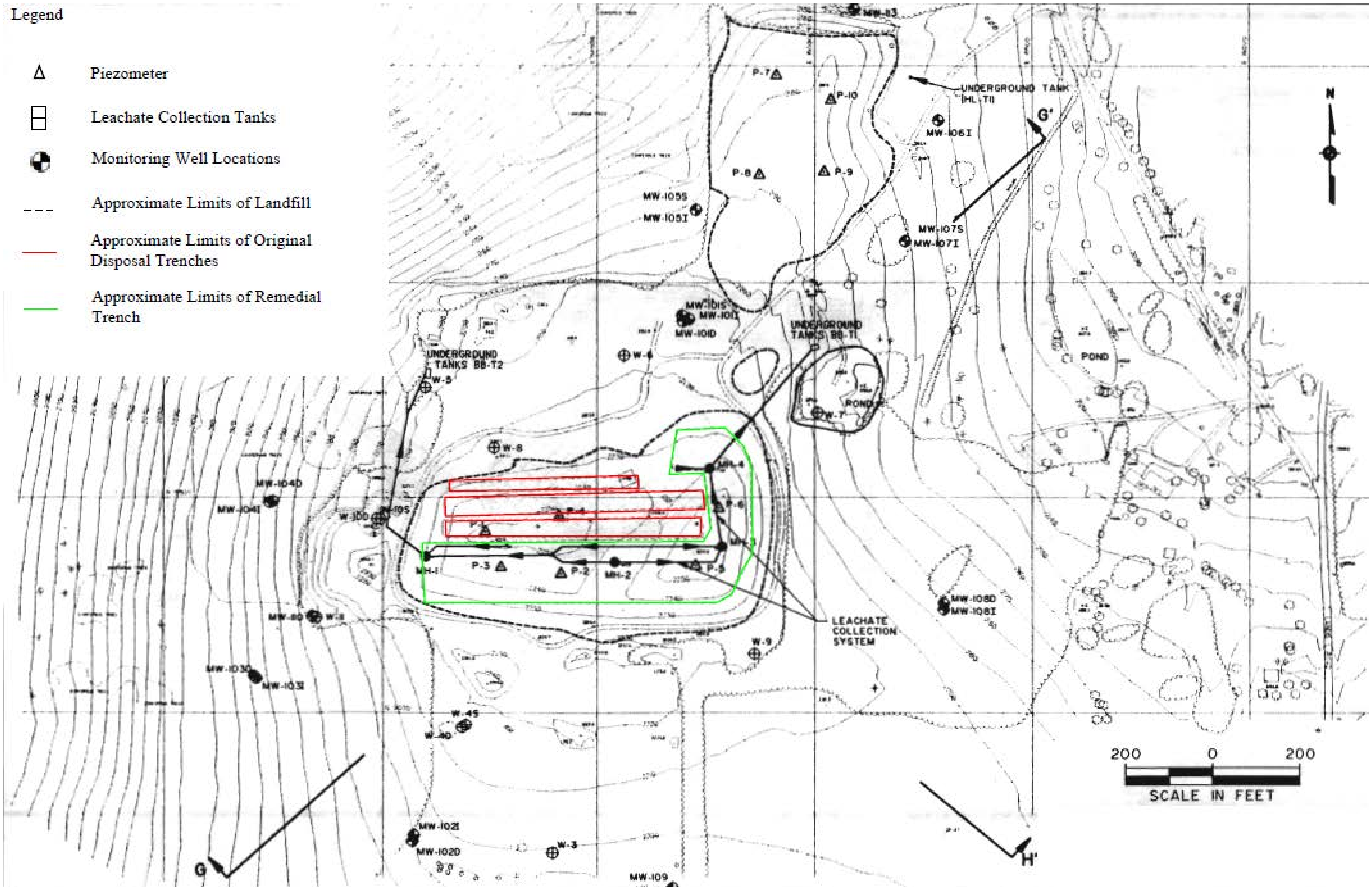
Due to the time and monetary cost of leachate removal (about $25,000 annually), the NYSDEC sought to explore alternatives to the current remedial action. The alternatives and cost evaluation showed that it is possible to reduce the annual long-term monitoring costs by establishing a passive treatment system.

The proposed alternatives for passive treatment systems, however, will require higher upfront capital costs, regular monitoring, and periodic maintenance. The maintenance costs associated with a wetland or storage pond area can be quite high, nearing $200,000, but are offset with reduced monitoring needs and long-term monitoring costs in the future. As mentioned, it was assumed that SPDES sampling would occur monthly in years 1-3 of operation of a passive treatment system and quarterly thereafter. Over time, monitoring requirements could decrease further, reducing the annual operating costs of Alternatives 2-4. Additionally, the maintenance (dredging/disposal) of a wetland or storage area could occur less frequently than every five years based on results of pilot testing.





Busy Bee Landfill Remedial System Optimization Alfred Station, NY			Figure 1 Site Location		EA® NEW YORK STATE OF OPPORTUNITY Department of Environmental Conservation		
Project Mgr. BY	Designed By EGC	Created By EGC	Checked By BY	Scale As Shown	Date February 2016	Project No. 1490728	File No.. G:\Projects\State&Local\ GIS



Busy Bee Landfill Remedial System Optimization Alfred Station, NY			Figure 2 Site Layout			File No.. G:\Projects\State&Local\ GIS
Project Mgr. BY	Designed By EGC	Created By EGC	Checked By BY	Scale As Shown	Date February 2016	Project No. 1490728

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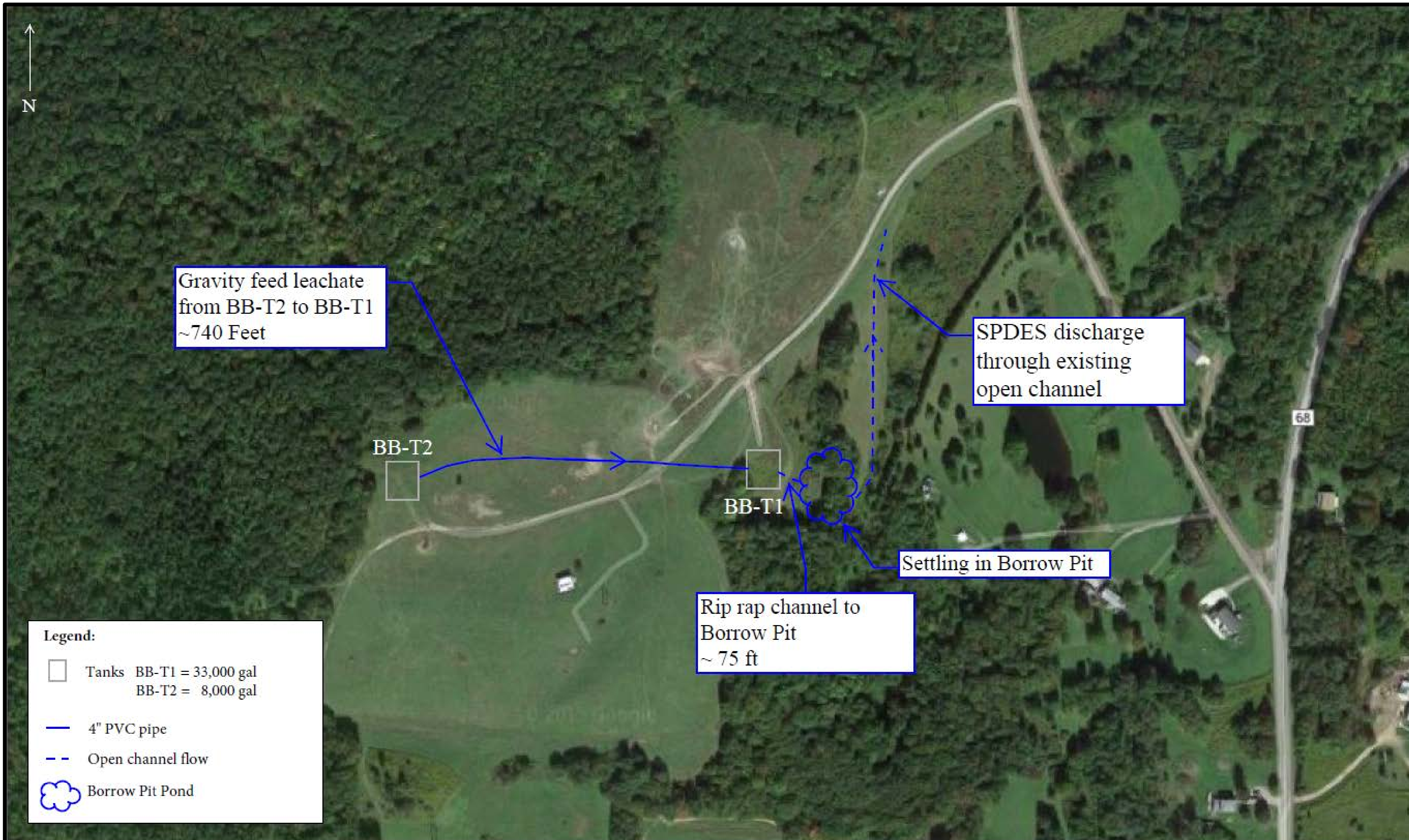
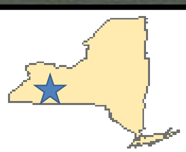
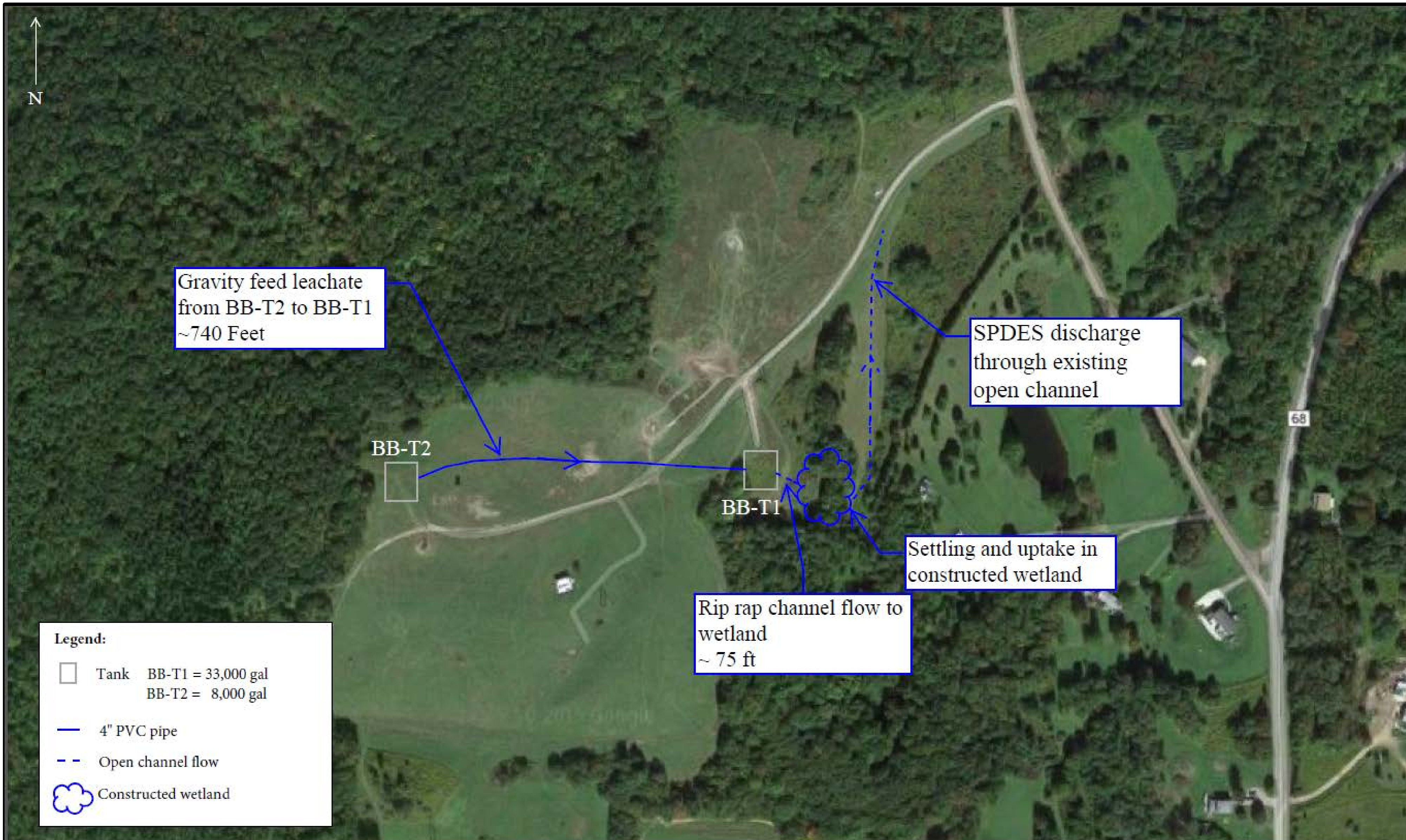


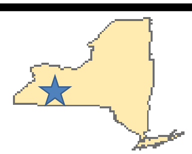


Busy Bee Landfill Remedial System Optimization Alfred Station, NY		Figure 3 Alternative 2: Passive Treatment With Borrow Pond			0 50 100 200 Feet		EA® NEW YORK STATE OF OPPORTUNITY Department of Environmental Conservation
Project Mgr. BY	Designed By EGC	Created By EGC	Checked By BY	Scale As Shown	Date February 2016	Project No. 1490728	File No.. G:\Projects\State&Local\ GIS



Busy Bee Landfill Remedial System Optimization Alfred Station, NY		Figure 4 Alternative 3: Passive Treatment With Constructed Wetland			0 50 100 200 Feet	
Project Mgr. BY	Designed By EGC	Created By EGC	Checked By BY	Scale As Shown	Date February 2016	Project No. 1490728	File No.. G:\Projects\State&Local\ GIS

EA® NEW YORK STATE OF OPPORTUNITY Department of Environmental Conservation



Busy Bee Landfill Remedial System Optimization Alfred Station, NY			Figure 5 Alternative 4: Passive Treatment In Separate Constructed Wetlands			0 50 100 200 Feet	
Project Mgr. BY	Designed By EGC	Created By EGC	Checked By BY	Scale As Shown	Date February 2016	Project No. 1490728	File No.. G:\Projects\State&Local\ GIS

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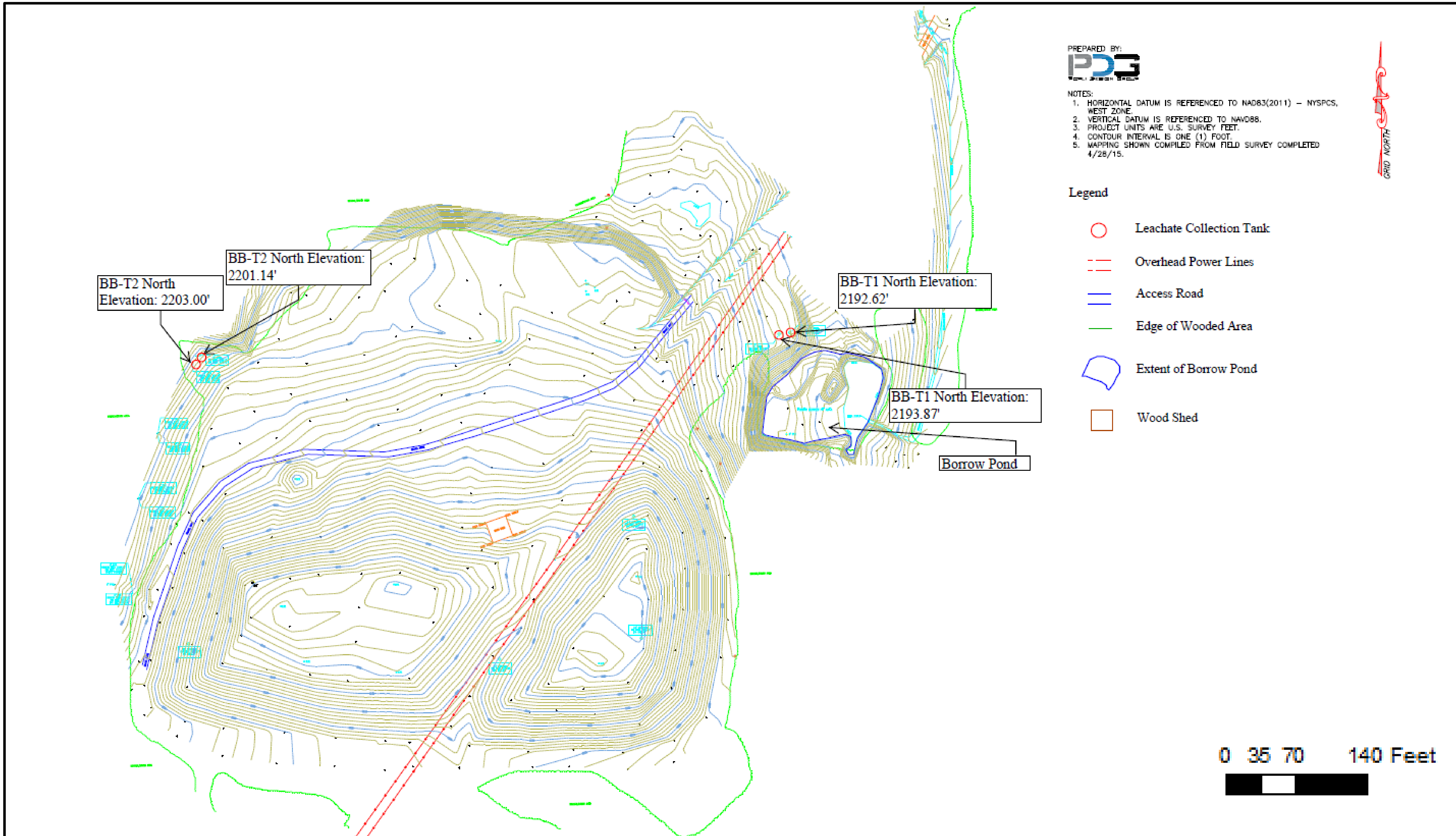

Busy Bee Landfill Remedial System Optimization Alfred Station, NY			Figure 6 Site Survey			File No.. G:\Projects\State&Local\ GIS
Project Mgr. BY	Designed By EGC	Created By EGC	Checked By BY	Scale As Shown	Date February 2016	Project No. 1490728

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

TABLE 1 HISTORICAL LEACHATE DATA

			19-Oct-00		17-Oct-01		9-Oct-02		8-Oct-03		20-Oct-04		26-Oct-05		18-Oct-07		30-May-13		12-Sep-14	
Analyte	**AWQS Standard**	**Units**	**BB-T2-S**		**BB-T2-S**		**BB-T1-S**		**BB-T2-S**		**BB-T1-S**		**BB-T2-S**		**BB-T2-S**		**BB-T1-S**		**BB-T2-S**	
Method: 8260C - Volatile Organic Compounds																				
1,1,1-Trichloroethane	5	µg/L	1		ND		ND		ND		ND		3.8		ND		ND		ND	
1,1-Dichloroethane	5	µg/L	2.5		ND		ND		ND		ND		1.1		ND		ND		1.5	
1,1-Dichloroethene	5	µg/L	0.21		ND		ND		ND		ND		ND		ND		ND		0.56	J
1,1-Dichloropropene	5	µg/L	0.64		ND		ND		ND		ND		ND		ND		ND		ND	
1,4-Dichlorobenzene	3	µg/L	0.54		ND		ND		ND		ND		ND		ND		ND		ND	
Acetone	50	µg/L			22	J	16	J	4	J	ND		2.6	J	ND		ND		ND	
cis-1,2-Dichloroethane	5	µg/L	ND		ND		ND		ND		ND		16		ND		ND		ND	
cis-1,3-dichloroethene	5	µg/L	**57**		ND		ND		ND		ND		ND		ND		ND		**77**	
Dichlorodifluoromethane	5	µg/L	3.1		ND		ND		ND		ND		ND		ND		ND		ND	
Methylene chloride	5	µg/L	ND		ND		ND		ND		ND		ND		6.8	B	ND		ND	
trans-1,2-Dichloroethene	5	µg/L	3.9		ND		ND		ND		ND		ND		ND		ND		ND	
Trichloroethene	5	µg/L	ND		ND		ND		ND		ND		**68**		ND		ND		**75**	
Vinyl Chloride	0.3*	µg/L	**26**		ND		ND		ND		ND		**3**		ND		ND		**3.7**	
Method: 8270D - Semivolatile Organic Compounds																				
Benzaldehyde	-	µg/L	-		0.7	J	ND		0.5	J	ND		NS		NS		0.38	J	0.43	J
1,4-Dichlorobenzene	3	µg/L	-		1	J	ND		0.6	J	ND		ND		ND		ND		ND	
bis(2-Ethylhexyl)phthalate	5	µg/L	-		1	J	3	BJ	0.6	J	ND		ND		ND		2	J	ND	
Diethylphthalate	-	µg/L	-		1	J	ND		0.6	J	ND		ND		ND		0.83	J	ND	
di-n-Octylphthalate	-	µg/L	-		0.4	J	0.7	J	ND		ND		ND		ND		1.6	JB	ND	
4-Methylphenol	5	µg/L	-		0.3	J	ND		ND		ND		ND		ND		ND		0.38	J
Acetophenone	-	µg/L	-		ND		1	J	ND		ND		NS		NS		ND			
Butylbenzylphthalate	-	µg/L	-		ND		0.4	J	ND		ND		ND		ND		1.6	JB	ND	
di-n-Butylphthalate	*50*	µg/L	-		ND		1	J	0.8	J	ND		ND		ND		1.3	JB	ND	
Naphthalene	10	µg/L	-		ND		ND		0.4	J	ND		ND		ND		ND		ND	
2,4-Dimethylphenol	*50*	µg/L	-		ND		ND		0.4	J	ND		ND		ND		ND		ND	
2,4-Dinitrotoluene	5	µg/L	-		ND		ND		ND		ND		ND		ND		0.65	J	ND	
4-Bromophenyl phenyl ether	-	µg/L	-		ND		ND		ND		ND		ND		ND		0.45	J	ND	
4-Chlorophenyl phenyl ether	-	µg/L	-		ND		ND		ND		ND		ND		ND		0.36	J	ND	
Benzo(a)anthracene	*0.002*	µg/L	-		ND		ND		ND		ND		ND		ND		**1.4**	JB	ND	
Benzo(a)pyrene	ND	µg/L	-		ND		ND		ND		ND		ND		ND		**0.92**	J	ND	
Benzo(b)fluoranthene	*0.002*	µg/L	-		ND		ND		ND		ND		ND		ND		**1.6**	JB	ND	
Benzo(g,h,i)perylene	-	µg/L	-		ND		ND		ND		ND		ND		ND		0.45	J	ND	
Benzo(k)fluoranthene	*0.002*	µg/L	-		ND		ND		ND		ND		ND		ND		**1.8**	J	ND	
Carbazole	-	µg/L	-		ND		ND		ND		ND		ND		ND		0.54	J	ND	
Chrysene	*0.002*	µg/L	-		ND		ND		ND		ND		ND		ND		**0.57**	J	ND	
Dimethyl phthalate	*50*	µg/L	-		ND		ND		ND		ND		ND		ND		0.42	J	ND	
Fluoranthene	*50*	µg/L	-		ND		ND		ND		ND		ND		ND		0.44	J	ND	
Indeno(1,2,3-cd)pyrene	*0.002*	µg/L	-		ND		ND		ND		ND		ND		ND		**0.47**	J	ND	
N-Nitrosodiphenylamine	*50*	µg/L	-		ND		ND		ND		ND		ND		ND		0.64	J	ND	
Phenanthrene	*50*	µg/L	-		ND		ND		ND		ND		ND		ND		0.49	J	ND	
Pyrene	*50*	µg/L	-		ND		ND		ND		ND		ND		ND		0.79	J	ND	

TABLE 1 HISTORICAL LEACHATE DATA

			19-Oct-00		17-Oct-01		9-Oct-02		8-Oct-03		20-Oct-04		26-Oct-05		18-Oct-07		30-May-13		12-Sep-14	
Analyte	**AWQS Standard**	**Units**	**BB-T2-S**		**BB-T2-S**		**BB-T1-S**		**BB-T2-S**		**BB-T1-S**		**BB-T2-S**		**BB-T2-S**		**BB-T1-S**		**BB-T2-S**	
Method: 6010C - Metals																				
Aluminum	100	µg/L	35.7	B	**1,270**		ND		**386**		37.6	B	0.82		**28,400**		0.065	J	ND	
Antimony	3	µg/L	ND		ND		**5.4**	B	ND		ND		ND		ND		ND		ND	
Arsenic	25	µg/L	ND		14.6		7.5	B	19.4		2.8	B	ND		**180**		ND		ND	
Barium	1,000	µg/L	452	E	**1,000**		737		597		420		0.11		**1,600**		0.14		190	
Beryllium	*3*	µg/L	ND		ND		0.21	B	0.35	B	ND		ND		2.4		ND		ND	
Cadmium	5	µg/L	ND		ND		0.3	B	ND		ND		ND		**18**		ND		ND	
Calcium	-	µg/L	160,000	E	223,000		91,900	E	165,000		488,00		37.9		225,000		25.7		59,800	
Chromium	50	µg/L	1.9	B	2.9	B	32.4		1.3	B	23.8		ND		42		6.5		ND	
Cobalt	5	µg/L	4.8	B	**13.2**	B	**5.9**	B	**5.6**	B	3.6	B	ND		**47**		1.2	J	4.7	
Copper	200	µg/L	2.1	B	8.1	B	6.4	B	3.6	B	6.1	B	ND		80		10		ND	
Iron	300	µg/L	**8,890**		**42,100**		**6,710**		**33,200**	N	**7,570**		2.8		**406,000**		**2,200**		**1,400**	B
Lead	25	µg/L	2.8	B	ND		8.3		3.9		8.1		ND		**100**		ND		ND	
Magnesium	35,000	µg/L	**87,900**	E	**203,000**		**51,300**		**79,300**		25,000		10.2		**128,000**		9,400		24,800	
Manganese	300	µg/L	**3,720**	E	**1,780**		**2,410**		**5,270**		**1,200**		2.7		**11,300**		**340**		**3,300**	
Nickel	100	µg/L	16.5	B	35.7	B	**199**		14.5	B	**129**		7.4		91		41		ND	
Potassium	-	µg/L	80,700		174,000		50,800	B E	46,800		28,300	B	ND		149,000		9,100		18,100	
Selenium	10	µg/L	ND		ND		ND		5.3	B	ND		ND		ND		ND		ND	
Sodium	20,000	µg/L	**396,000**		**1,114,000**		**938,000**		**273,000**		**685,000**		27		**732,000**		**189,000**		**100,000**	
Thallium	*0.5*	µg/L	ND		ND		ND		**4.6**	B	ND		ND		ND		ND		ND	
Vanadium	14	µg/L	ND		2.2	B	4.1	B	1.8	B	3	B	ND		**46**		ND		ND	
Zinc	*2,000*	µg/L	18	B	51.6		35.6		18.5	B	12.4	B	ND		**6,400**		10		12	
Mercury	1	µg/L	ND		ND		0.195	B	ND		ND		ND		ND		ND		ND	
Method: 8081B - Organochlorine Pesticides																				
4,4'-DDD		µg/L	-		-		-		-		0.024	J	-		-		0.019	J B		
4,4'-DDE		µg/L	-		-		-		-				-		-		0.012	J	0.016	J
4,4'-DDT		µg/L	-		-		-		-				-		-				0.031	J
Aldrin	ND	µg/L	-		-		-		-				-		-		0	J		
alpha-BHC		µg/L	-		-		-		-				-		-		0.016	J		
alpha-Chlordane	0.05	µg/L	-		-		-		-				-		-		0.035	J		
beta-BHC		µg/L	-		-		-		-				-		-		0.025	J		
delta-BHC		µg/L	-		-		-		-		0.095		-		-		0	J B	0.013	J B
Dieldrin	0.004	µg/L	-		-		-		-				-		-		**0.011**	J		
Endosulfan I	0.009	µg/L	-		-		-		-				-		-		0	J		
Endosulfan II	0.009	µg/L	-		-		-		-				-		-				**0.026**	J
Endosulfan II (Beta)	0.009	µg/L	-		-		-		-		**0.033**	J	-		-					
Endrin	ND	µg/L	-		-		-		-		0.065	J	-		-					
gamma-BHC (Lindane)		µg/L	-		-		-		-				-		-		0.017	J B	0.013	J B
gamma-Chlordane	0.05	µg/L	-		-		-		-				-		-		0.027	J B	0.011	J B
Heptachlor	0.04	µg/L	-		-		-		-		0.039	J	-		-		0.009	J		

(a) Results reported in micrograms per liter (µg/L)
(b) Sample results compared to NYSDEC Ambient Water Quality Standards, if no standard was available, used guidance values in *italics*

Notes:

B = The analyte was detected below contract required detection limit
E = The result value was estimated du to interference
J = Estimated value, concentration below laboratory reporting limit
ND = Not detected
Bold values indicate that the analyte was detected above the NYSDEC Ambient Water Quality Standards.

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-101D

	Standards	1-Jul-94	1-Sep-94	1-Jun-95	19-Oct-00		17-Oct-01		9-Oct-02		8-Oct-03		20-Oct-04		26-Oct-05		4-Oct-06		18-Oct-07	
VOCs (µg/L)																				
Chlorobenzene	5	**6**	**7**	4	**6.6**		3	J	4	J	**6**		**6**	J	NS		**6.3**		0.73	J
Dichlorodifluoromethane	5	ND	ND	ND	**13**		ND		ND		ND		ND		NS		ND		ND	
1,4-Dichlorobenzene	3	ND	ND	ND	0.9		ND		ND		0.9	J	ND		NS		1.1		ND	
Acetone	*50*	ND	ND	14	ND		3	J	ND		ND		ND		NS		ND		3.8	J
2-Butanone	0.4	ND	ND	ND	ND		**1**	J	ND		ND		ND		NS		ND		ND	
Benzene	1	**1**	**1**	ND	ND		**1**	J	**1**	J	**1**		ND		NS		**1.2**		ND	
Toluene	5	3	ND	ND	ND		ND		ND		ND		ND		NS		ND		ND	
1,3-Dichlorobenzene	3	ND	ND	ND	ND		ND		ND		ND		ND		NS		ND		0.41	J
Metals (µg/L)																				
Aluminum		6480	631	2390	43.6	B	213		32.5	U	129	B	18.4	U	NS		200	U	NS	
Antimony	3		1.4		5	U	3	U	**5.4**	U	**4.1**	U	5	U	NS		20	U	NS	
Arsenic	25	13.8	9	9.1	11.9		9.6	B	4	B	11.5		4.9	B	NS		10	U	NS	
Barium	1000	549	537	665	623	E	523		611		675		676		NS		750		NS	
Beryllium	3		0.57	0.83	0.5	U	1	U	0.2	U	0.21	B	0.19	U	NS		2	U	NS	
Cadmium	5		1.2	0.93	0.6	U	1.1	BN	3.33	B	0.53	B	0.34	U	NS		1	U	NS	
Calcium		133000	138000	141000	135000	E	12200		124000	E	128000		120000		NS		129000		NS	
Chromium	50	10.2	0.97	3	2	B	1	U	0.6	U	0.9	U	1	B	NS		4	U	NS	
Cobalt		10.1	6.4	9.1	5.4	B	5	B	4.8	B	4	U	3.4	B	NS		4	U	NS	
Copper	200	11.8	3.5	5.6	1.7	B	14.9	B	6.3	B	6.6	B	3.8	B	NS		10	U	NS	
Iron	300	**13700**	2330	5410	**1270**		**891**		270		**809**	N	**443**		NS		**810**		NS	
Lead	25	13.7	1.7	4.4	2.6	U	2	U	7.3		13.1		4.9		NS		5	U	NS	
Magnesium	*35000*	**80900**	**82900**	**88200**	**82000**	E	**69300**		**78700**		**77800**		**72500**		NS		**79100**		NS	
Manganese	300	**7190**	**7560**	**9020**	**7200**	E	**4290**		**5900**		**5970**		**6980**		NS		**7400**		NS	
Mercury	0.7				0.15	U	0.072	U	0.115	B	0.055	U	0.087	U	NS		0.2	U	NS	
Nickel	100	20	14.9	15.8	9.1	B	9.8	B	9	B	8.9	B	7.2	B	NS		10	U	NS	
Potassium		109000	13000	10800	11900		12400		11400	E	11300		10100		NS		11400		NS	
Selenium	10		3.9	2	7.3		5	U	4	U	4.4	B	5	U	NS		15	U	NS	
Silver	50		1.2		1.5	U	2	U	0.5	U	0.7	U	0.9	U	NS		3	U	NS	
Sodium	2000	**57100**	**65500**	**63800**	**57900**		**51200**		**49000**		**44900**		**42700**		NS		**45500**		NS	
Thallium	*0.5*		3.3	5.2	5	U	4	U	3.9	U	3.8	U	5.1	U	NS		20	U	NS	
Vanadium		4.4	1.1	3.1	1	U	1	U	0.7	U	0.91	B	0.58	U	NS		5		NS	
Zinc	*2000*	75.9	20.6	43.5	8	B	16.3	B	4.5	B	4.7	B	1.9	B	NS		10		NS	

(a) Results reported in micrograms per liter (µg/L)
(b) Sample results compared to NYSDEC Ambient Water Quality Standards, if no standard was available, used guidance values in *italics*
Notes:

U = The analyte was analyzed for, but was not detected above the detection limit
B = The analyte was detected below contract required detection limit
E = The result value was estimated du to interference
N = Spike sample recovery not within quality control limits
ND = Not detected
NS = Not sampled
Bold values indicate that the analyte was detected above the NYSDEC Ambient Water Quality Standards.

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-101I																							
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
VOCs (µg/L)																							
Acetone	*50*	ND		ND		ND		ND		2	J	1		ND		ND		NS		ND		2.1	J
Metals (µg/L)																							
Aluminum		434		6170		357		8500		61300		NS		21200		8730		2.22		23900		51400	
Antimony	3	ND		1.7		ND		5	U	3	U	NS		**4.1**	U	5	U	20	U	20	U	20	U
Arsenic	25	2.2		9.1		3.3		6.9	B	**54.5**		NS		22.2		5.5	B	12		16		**35**	
Barium	1000	386		396		272		175	BE	694		NS		273		173		290		290		490	
Beryllium	3	ND		0.63		ND		0.57	B	**4.3**	B	NS		1.5	B	0.19	U	2	U	2	U	**3.7**	
Cadmium	5	ND		ND		ND		0.6	U	1	UN	NS		0.3	U	0.42	B	2.7		1		2.1	
Calcium		124000		150000		103000		81300	E	88600		NS		82300		81100		92300		89400		101000	
Chromium	50	ND		6.9		ND		9	B	74.3		NS		23.2		7.5	B	27		27		58	
Cobalt		ND		7.9		2.3		6.9	B	69.2		NS		21.7		6.8	B	17		20		45	
Copper	200	3.7		8.3		ND		13.8	B	175		NS		38		14.7		90		38		75	
Iron	300	**835**		**10100**		**1110**		**9190**		**131000**		NS		**41500**	N	**12300**		**34800**		**39700**		**91300**	
Lead	25	1.3		3.6		ND		4.9		**48.1**		NS		14.3		4.7		18		15		**34**	
Magnesium	*35000*	**65400**		**73700**		**47700**		**35400**	E	**55200**		NS		**41800**		**36200**		**44200**		**45600**		**56100**	
Manganese	300	**30700**		**2570**		**1100**		**564**	E	**2850**		NS		**920**		**486**		**790**		**750**		**1600**	
Mercury	0.7	ND		ND		ND		0.15	U	0.072	U	NS		0.055	U	0.087	U	0.2	U	0.2	U	0.2	U
Nickel	100	5.2		18		2.5		9.6	B	**136**		NS		42.3		11.8	B	40		40		88	
Potassium		5530		9100		5310		7810		17500		NS		10600		7720		13000		12800		20700	
Selenium	10	ND		2.3		ND		5	U	9.7		NS		4.1	B	5	U	15	U	15	U	15	U
Silver	50	ND		0.28		ND		1.5	U	2	U	NS		0.7	U	0.69	U	3	U	3	U	3	U
Sodium	20000	14100		14400		10100		**6700**		**7400**		NS		**6590**		**5880**		**7200**		**6600**		**6700**	
Thallium	*0.5*	ND		*3.3*		ND		5	U	4	U	NS		**5**	B	5.1	U	20	U	20	U	20	U
Vanadium		ND		9.1		ND		13.5	B	78.2		NS		26.8	B	12.1	B	31		31		69	
Zinc	*2000*	*29.6*		53.1		4.6		47.4		364		NS		100		27.9		160		99		210	

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-102D																							
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
VOCs (µg/L)																							
Acetone	*50*	ND		ND		ND		ND		ND		3	J	ND		ND		ND		ND		ND	J
Metals (µg/L)																							
Aluminum		350		394		211		292		118		32.5	U	358		104	B	980		200	U	450	
Antimony	3	ND		1.7		ND		**5**	B	3	U	5.4	U	4.1	U	5	U	20	U	20	U	20	U
Arsenic	25	1.5		ND		84.7		3.4	U	4	U	4	U	3.8	B	2.6	U	10	U	10	U	10	U
Barium	1000	75.6		83.8		ND		81	BE	86.7	B	88.1	B	95.1		72.5	B	98		84		88	
Beryllium	3	ND		0.1		ND		0.5	U	1	U	0.2	U	0.18	B	0.19	U	2	U	2	U	2	U
Cadmium	5	ND		0.6		ND		4.5	B	1.7	BN	1.8	B	3.5	B	**7.5**		**6.8**		1.2		3.8	
Calcium		44200		43400		46000		43200	E	47000		43000	E	45900		41400		47800		45400		45300	
Chromium	50	ND		ND		ND		1.2	U	1	U	0.6	U	0.9	U	0.65	U	10		4	U	4	U
Cobalt		ND		ND		ND		1	U	1	U	0.5	U	0.7	U	0.86	U	4	U	4	U	4	U
Copper	200	4		2.6		ND		5.8	B	1.1	B	2.4	B	5	B	3.2	B	4	U	10	U	16	
Iron	300	**475**		**468**		277		249		72.1		150		**614**	N	121		**2000**		110		**640**	
Lead	25	ND		ND		ND		2.6	U	2	U	2.3	U	1.6	U	1.3	U	5	U	5	U	5	U
Magnesium	*35000*	15500		15300		16700		14500	E	15100		14200		15500		14000		15700		16100		14900	
Manganese	300	13.3		20.9		10.4		8.9	BE	2.8	B	**7**	B	15.6		4.3	U	45		4.8		13	
Mercury	0.7	ND		ND		ND		0.15	U	0.072	U	0.11	B	0.055	U	0.087	U	0.2	U	0.2	U	0.5	U
Nickel	100	ND		1.1		ND		1.5	U	1.5	U	1	U	2.2	B	2	B	10	U	10	U	10	U
Potassium		2690		2540		1970		2620	B	2330	B	2680	BE	3010	B	2700	B	3100		2900		3600	
Selenium	10	ND		ND		ND		5	U	5	U	4	B	5.5	B	5	U	15	U	**15**	U	15	U
Silver	50	ND		ND		ND		1.5	U	2	U	0.5	U	0.7	U	0.69	U	3	U	3	U	3	U
Sodium	2000	4660		4060		3820		**3960**	B	**3780**	B	**3970**	B	**4410**	B	**3360**		**4000**		**4100**		**3700**	
Thallium	*0.5*	ND		1.9		ND		5	U	4	U	3.9	U	3.8	U	5.1	U	20	U	20	U	20	U
Vanadium		ND		ND		ND		1	U	1	U	0.7	U	0.8	U	0.58	U	5	U	5	U	5	U
Zinc	*2000*	55.5		15.7		3.4		12.6	B	2	U	9.8	B	7.9	B	2.6	B	20	U	10	U	10	U

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-103D																							
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
VOCs (µg/L)																							
cis-1,2-dichloroethene	5	**9**		**15**		**13**		**20**		**8**	J	**14**		NA		**6**	J	3.7		**5.4**		4.5	
Trichloroethene	5	2		4		4		**6.6**		4	J	**5**	J	NA		4	J	2.2		**5.9**		**9.1**	
Metals (µg/L)																							
Aluminum		366		1210		137		2470		293		32.5	U	151	B	37.1	B	1700		200	U	1500	
Antimony	3	ND		ND		ND		5	U	3	U	5.4	U	4.1	U	5	U	20	U	20	U	20	U
Arsenic	25	ND		2.4		ND		3.4	U	4	U	4	U	5.2	B	2.6	U	10	U	10	U	10	U
Barium	1000	46.3		77.3		68.7		72.8	BE	59.1	B	67.9	B	6.9		59.9	B	42		57		70	
Beryllium	3	ND		0.5		ND		0.5	U	1	U	0.2	U	0.1	U	0.19	U	2	U	2	U	2	U
Cadmium	5	ND		2.5		ND		2.5	B	1.7	BN	0.44	B	0.3	U	0.34	U	1.1		1	U	2.3	
Calcium		42700		42200		305000		20900	E	25400		23100	E	24100		29200		13200		23200		20500	
Chromium	50	ND		1.4		ND		1.8	B	1	U	0.6	U	0.9	U	0.65	U	4.1		4	U	4	U
Cobalt		ND		1.2		ND		1.5	B	1	U	0.5	U	0.7	U	0.86	U	4	U	4	U	4	U
Copper	200	ND		3.6		ND		4	B	1	U	0.82	B	1.7	U	1.3	U	10		10	U	10	
Iron	300	**595**		**1430**		144		**2600**		**368**		**400**		191	B	36.8	B	**1800**		86		**1900**	
Lead	25	ND		1.8		ND		4.5		2	U	2.3	U	1.6	U	1.3	U	5	U	5	U	5	U
Magnesium	*35000*	17300		17500		13100		7550	E	9080		8540		8790		11300		5000		9000		7800	
Manganese	300	22.3		75		8.8		94.9	E	19.4		26.6		5.4		3.2	B	45		5.5		56	
Mercury	0.7	ND		ND		ND		0.15	U	0.072	U	0.078	B	0.055	U	0.087	U	0.2	U	0.2	U	0.2	U
Nickel	100	ND		5.8		ND		2.8	B	1.5	U	1	U	1.5	B	1.2	U	10	U	10	U	10	U
Potassium		3380		2890		1450		2590	B	1970	B	1930	BE	1980	B	1820	B	3.6		2400		2300	
Selenium	10	ND		ND		ND		5	U	5	U	4	U	2.8	U	5	U	15	U	15	U	15	U
Silver	50	ND		0.33		ND		1.5	U	2	U	0.67	B	0.7	U	0.69	U	3	U	3	U	3	U
Sodium	2000	9960		7810		4190		**4140**	B	**4160**	B	**3930**	B	**4260**	B	**3620**	B	**2800**		**3900**		**3300**	
Thallium	*0.5*	ND		ND		ND		5	U	4	U	3.9	U	3.8	U	5.1	U	20	U	20	U	20	U
Vanadium		ND		2		ND		3.8	B	1	U	0.7	U	0.8	B	0.58	U	5	U	5	U	5	U
Zinc	*2000*	8.8		34.9		6.9		13.2	B	2.6	B	4.1	U	6.9	B	0.81	U	20	U	10	U	10	U

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-103I																							
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
VOCs (µg/L)																							
cis-1,2-dichloroethene	5	**16**		**40**		**24**		**28**		**15**		**12**		NA		**8**	J	ND		**6.4**		**12**	
Trichloroethene	5	5		**10**		**9**		**9.2**		**7**	J	**4**	J	NA		**6**	J	ND		**7.5**		**5.7**	
Metals (µg/L)																							
Aluminum		5240		2820		896		780		620		1890		646		323		2000		200	U	20800	
Antimony	3	ND		ND		ND		5	U	3	U	5.4	U	4.1	U	5	U	20	U	20	U	20	U
Arsenic	25	3.7		4.6		ND		**304**		4.2	B	4.1	B	3.3	U	2.6	U	10	U	10	U	25	
Barium	1000	180		129		81.1		59.6	BE	65.1	B	98.9	B	71.9	B	83.2	B	43		55		320	
Beryllium	3	1		0.37		0.3		5	U	1	U	0.2	U	0.1	U	0.19	U	2	U	2	U	2	U
Cadmium	5	1.6		0.37		ND		2	B	2.4	BN	0.3	U	3.3	B	0.36	B	1	U	1	U	1.5	
Calcium		42200		36800		27800		19400	E	22300		25600	E	23200		30000		5400		2280		20800	
Chromium	50	ND		2.9		ND		1.2	U	1	U	0.6	U	0.9	U	0.65	U	10		4	U	22	
Cobalt		5.6		2		ND		1	U	1	B	0.96	B	0.7	U	0.86	U	4	U	4	U	18	
Copper	200	9.2		4.1		2.1		1.3	B	6.1	B	1.9	B	1.8	B	1.7	B	4	U	10	U	19	
Iron	300	**10000**		**4380**		**1270**		**869**		**817**		**2920**		**1030**	N	**258**		**2300**		140		**24500**	
Lead	25	ND		2.2		ND		4.7		2	U	2.3	U	1.6	U	1.3	U	5	U	5	U	16	
Magnesium	*35000*	19100		14100		10800		5970	E	6710		8250		7820		11300		1600		8300		10700	
Manganese	300	267		102		51.6		37.1	E	28.2		61		28.9		27		68		13		1200	
Mercury	0.7	ND		ND		ND		0.15	U	0.072	U	0.122	B	0.055	U	0.087	U	0.2	U	0.2	U	0.2	U
Nickel	100	8.8		6.2		ND		1.5	U	1.8	B	2	B	2.7	B	1.2	U	10	U	10	U	32	
Potassium		3940		2840		1540		1910	B	2040	B	2820	BE	2150	B	1850	B	2000		1700		8900	
Selenium	10	ND		1.5		ND		5	U	5	U	4	U	2.8	U	5	U	15	U	15	U	15	U
Silver	50	ND		0.24		ND		1.5	U	2	U	0.5	U	0.7	U	0.69	U	3	U	3	U	3	U
Sodium	2000	5350		4890		4360		**4290**	B	**4490**	B	**3910**	B	**4320**	B	**3580**	B	1300		**4000**		**3800**	
Thallium	*0.5*	ND		ND		ND		5	U	4	U	3.9	U	3.8	U	5.1	U	20	U	20	U	20	U
Vanadium		6.2		3.9		ND		1.1	B	1	U	2.8	B	1.1	B	0.58	U	5	U	5	U	27	
Zinc	*2000*	36.7		24.5		38.3		9.8	B	8.3	B	8.6	B	3.6	B	2.4	B	20	U	10	U	66	

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-104D																							
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
VOCs (µg/L)																							
cis-1,2-dichloroethene	5	ND		2		ND		ND		NS		1	J	2		2	J	NS		ND		NS	
Trichloroethene	5	ND		ND		ND		ND		NS		ND		0.5	J	ND		NS		ND		NS	
Metals (µg/L)																							
Aluminum		16300		2910		102		35300		NS		32.5	U	187	B	114	B	NS		200	U	NS	
Antimony	3	ND		ND		ND		**8**	B	NS		5.4	U	4.1	U	5	U	NS		20	U	NS	
Arsenic	25	7.8		3.4		ND		**32.7**		NS		4	U	3.3	U	2.6	U	NS		10	U	NS	
Barium	1000	235		96.1		57		334	E	NS		76.9	B	67.8	B	49.4	B	NS		50		NS	
Beryllium	3	1.7		0.4		ND		2.3	B	NS		0.2	U	0.13	B	0.19	U	NS		2	U	NS	
Cadmium	5	1.8		2.3		0.93		0.6	U	NS		0.3	U	0.77	B	1.3	B	NS		2.2		NS	
Calcium		48600		53300		47900		53900	E	NS		51300	E	52800		46600		NS		49900		NS	
Chromium	50	16.7		3.1		ND		41.1		NS		0.6	U	0.9	U	0.65	U	NS		4	U	NS	
Cobalt		11.5		2.2		ND		36.8	B	NS		0.5	U	0.7	U	0.86	U	NS		4	U	NS	
Copper	200	24.5		5.5		1.4		57.1		NS		2.9	B	5.7	B	5.3	B	NS		4	U	NS	
Iron	300	**34600**		**5360**		161		**62000**		NS		146		175	N	147		NS		88		NS	
Lead	25	13.2		3.4		ND		59.7		NS		2.3	U	1.6	U	1.3	U	NS		5	U	NS	
Magnesium	*35000*	30400		29000		26500		**38900**	E	NS		**31100**		**25300**		**21800**		NS		**25000**		NS	
Manganese	300	**592**		70.6		3.7		**1090**	E	NS		4.4	B	3.7	B	8.8	B	NS		3.2		NS	
Mercury	0.7	ND		ND		ND		0.15	U	NS		0.065	U	0.055	U	0.087	U	NS		0.2	U	NS	
Nickel	100	29.7		6.1		ND		57.7		NS		1	U	1.3	B	1.2	U	NS		10	U	NS	
Potassium		7110		4010		2430		14000		NS		3640	BE	3300	B	2610	B	NS		3000		NS	
Selenium	10	ND		ND		ND		9.1		NS		4	U	3.3	B	5	U	NS		15	U	NS	
Silver	50	ND		ND		ND		1.5	U	NS		0.5	U	0.7	U	0.69	U	NS		3	U	NS	
Sodium	2000	5970		4520		5470		**5480**		NS		**4950**	B	**5300**		**4510**	B	NS		**5300**		NS	
Thallium	*0.5*	ND		ND		ND		5	U	NS		3.9	U	3.8	U	5.1	U	NS		20	U	NS	
Vanadium		25.5		3.7		ND		47.6	B	NS		0.7	U	0.8	U	0.58	U	NS		5	U	NS	
Zinc	*2000*	91.4		31.8		6		145		NS		5.5	B	2	B	1.6	B	NS		18		NS	

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-104I

	Standards	1-Jul-94		1-Sep-94		1-Jun-95		19-Oct-00		17-Oct-01		9-Oct-02		8-Oct-03		20-Oct-04		26-Oct-05		4-Oct-06		18-Oct-07	
VOCs (µg/L)																							
cis-1,2-dichloroethene	5	34		44		36		**15**		**10**		**15**		2		**10**		2.9		2.2		2.2	
Trichloroethene	5	10		13		7		**5**		3	J	4	J	4		**7**	J	3.4		3.6		**5.2**	
Toluene	5	**10**		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
Chloroform	7	ND		ND		ND		ND		ND		ND		1		ND		1.3		1.1		0.55	J
Metals (µg/L)																							
Aluminum		1330		1250		1480		3960		572		2610		1620		133	B	900		330		6200	
Antimony	3	ND		ND		ND		5	U	3	U	5.4	U	4.1	U	5	U	20	U	20	U	20	U
Arsenic	25	ND		2.5		ND		3.4	U	4	U	11.2		6.3	B	2.6	U	10	U	10	U	10	U
Barium	1000	119		107		84.5		109	BE	65.9	B	112	B	51.2		60.7	B	36		26		130	
Beryllium	3	ND		0.3		ND		0.5	U	1	U	0.27	B	0.19	B	0.19	U	2	U	2	U	2	U
Cadmium	5	ND		1.5		1		0.6	U	1.4	BN	0.3	B	0.59	B	0.37	B	1.9		1.4		2.7	
Calcium		49000		48800		50400		35300	E	46400		48100	E	9530		23700		9400		7500		29000	
Chromium	50	ND		2.1		1.6		3.8	B	1	U	1	B	1.6	B	0.65	U	4	U	4	U	16	
Cobalt		ND		ND		ND		2.3	B	1	U	2.9	B	1.7	B	0.86	U	4	U	4	U	4	U
Copper	200	7.9		3.1		2.8		6.7	B	6.2	B	4.2	B	2.9	B	1.5	B	10	U	10	U	10	U
Iron	300	**2620**		**1860**		**1550**		**3790**		**812**		**4990**		**2820**	N	136		**1200**		**410**		**7700**	
Lead	25	1		12		ND		6.7		2	U	2.3	U	1.6	U	1.3	U	5	U	5	U	5.9	
Magnesium	*35000*	13100		12600		14300		8910	E	12400		12200		3040	B	5470		2600		2400		8200	
Manganese	300	63.2		29.9		24.4		98.6	E	15.3		114		54		7.8	B	27		12		150	
Mercury	0.7	ND		ND		ND		0.15	U	0.072	U	0.065	U	0.055	U	0.087	U	0.2	U	0.2	U	0.2	U
Nickel	100	ND		3.9		ND		4.2	B	1.6	B	5.1	B	4.4	U	1.2	U	10	U	10	U	10	U
Potassium		2700		2430		1920		3260	B	2220		3000	BE	1860		1370	B	1400		1000		3900	
Selenium	10	ND		ND		ND		5	U	5	U	4	U	2.8	U	5	U	15	U	15	U	15	U
Silver	50	ND		0.23		ND		1.5	U	2	U	0.5	U	0.7	U	0.69	U	3	U	3	U	3	U
Sodium	2000	10700		9230		9050		**8690**		**7070**		**7610**		**7690**		**6940**		**6400**		**6500**		**6700**	
Thallium	*0.5*	ND		2		ND		5	U	4	U	**5.7**	B	3.8	U	5.1	U	20	U	20	U	20	U
Vanadium		ND		1.6		1.8		6.6	B	1.1	B	4.4	B	2.2	B	0.58	U	5	U	5	U	9.2	
Zinc	*2000*	84.3		23.5		57.6		71.1		9.9	B	16.7	B	8.5	B	1.6	B	20		10	U	19	

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-107IR																							
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
Metals (µg/L)																							
Aluminum		486		376000		745		41900		16400		135000		20500		2430		28400		8700		NS	
Antimony	3	ND		**25.4**				**5.8**	B	3	U	**15**	B	4.1	U	5	U	20	U	20	U	NS	
Arsenic	25	ND		**530**		3.3		**34.2**		**95.3**		**78.5**		17.2		4.1	B	16		10	U	NS	
Barium	1000	168		**5040**		270		410	E	**1450**		**1240**		265		241		320		160		NS	
Beryllium	3	ND		**25**				2.8	B	**7.8**		**6.2**		1.2	B	0.19	U	2	U	2	U	NS	
Cadmium	5	ND				0.73		0.6	U	1	UN	0.3	U	0.3	U	0.66	B	4.5		1	U	NS	
Calcium		30800		288000		33700		54100	E	101000		84800	E	59400		62100		68200		61900		NS	
Chromium	50	ND		**637**		1.4		45.7		**279**		**215**		32.4		2.7	B	42		13		NS	
Cobalt		ND		476		5.6		26.4	B	153		128		17.5	B	16.7	B	23		7.1		NS	
Copper	200	3.8		**663**		6.6		48.2		**219**		160		19.9	B	17.8	B	81		10	U	NS	
Iron	300	**886**		**10800000**		**1890**		**64000**		**344000**		**284000**		**37600**	N	**6000**		**45600**		**12800**		NS	
Lead	25	1		**406**		4		20.3		144		146		28.6		34.4		52		14		NS	
Magnesium	*35000*	10900		**200000**		14100		1800	E	**84400**		**72800**		21400		16700		25800		19800		NS	
Manganese	300	**371**		**26600**		**923**		**1270**	E	**4570**		**3700**		**533**		**840**		**790**		**310**		NS	
Mercury	0.7	ND		0.12				0.15	U	0.072	U	0.242	B	0.055	U	0.087	U	0.2	U	0.2	U	NS	
Nickel	100	ND		1010		4.6		52.2		**360**		**300**		41.4		10.1	B	54		15		NS	
Potassium		2410		43400		2430		14200		30400		22600	B	9170		3870	B	12200		6100		NS	
Selenium	10	ND		**49.8**				5	U	**17.6**		6		4.3	B	5	U	15	U	15	U	NS	
Silver	50	ND						1.5	U	2	U	0.5	B	0.7	U	0.69	U	3	U	3	U	NS	
Sodium	2000	4360		**25700**		5770		**5430**		**11900**		**8430**		**7310**		**6260**		**7800**		**7200**		NS	
Thallium	*0.5*	ND		**63**		2.8		5	U	**5**	B	3.9	U	**4.6**	B	5.1	U	20	U	20	U	NS	
Vanadium		ND		446				60.1		187		156		26.5		4.6	B	38		12		NS	
Zinc	*2000*	34		**2290**		31.8		142		777		631		83.9		17.6	B	290		33		NS	

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-107SR																							
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
VOCs (µg/L)																							
Acetone	50	NS		31		ND		ND		4	J	ND		ND		ND		ND		ND		6.8	
Carbon disulfide	50	NS		1		ND		ND		ND		ND		ND		ND		ND		ND		ND	
2-Butanone	50	NS		5		ND		ND		ND		ND		ND		ND		ND		ND		1.8	J
4-Methyl-2-pentanone	50	NS		2		ND		ND		ND		ND		ND		2	J	ND		ND		ND	
Metals (µg/L)																							
Aluminum		NS		185000		1510		41900		116000		58900		881		113	B	200	U	1400		640020	
Antimony	3	NS		**3.7**		ND		**5.8**	B	3	U	**8.6**	B	4.1	U	5	U	20	U	20	U	20	U
Arsenic	25	NS		**376**		16.1		**34.2**		**110**		**36.5**		3.3	U	2.6	U	10	U	10	U	10	U
Barium	1000	NS		464		559		410	E	**1230**		408		38.9	B	41.3	B	40		43		150	
Beryllium	3	NS		**18.1**		2.3		2.8	B	**6.3**		2.8		0.14	B	0.19	U	2	U	2	U	2	U
Cadmium	5	NS		ND		1.6		0.6	U	1	UN	**11.9**		0.72	B	0.34	U	1	U	1.1		1.7	
Calcium		NS		351000		90100		54100	E	190000		274000	E	20500		33400		29000		20500		77000	
Chromium	50	NS		**208**		1.2		45.7		**133**		**71.9**		0.9	U	0.65	U	4	U	4	U	7.3	
Cobalt		NS		85.9		8.7		26.4	B	93.3		32.6	B	0.88	B	0.86	U	4	U	4	U	4	U
Copper	200	NS		163		21.7		48.2		**222**		97.7		2.9	B	2.3	B	10	U	10	U	10	U
Iron	300	NS		**229000**		**4430**		**64000**		**216000**		**76000**		**1220**	N	171		98		**1700**		**7400**	
Lead	25	NS		**318**		**47.8**		20.3		**80.5**		**42.2**		1.6	U	1.3	U	5	U	5	U	5	U
Magnesium	*35000*	*NS*		**64800**		14600		18000	E	**50900**		31100		5060		7590		7200		5800		14800	
Manganese	300	NS		**5440**		**1270**		**1270**	E	**6050**		**2340**		211		**681**		230		**560**		**370**	
Mercury	0.7	NS		0.61		ND		0.15	E	0.072	U	0.087	B	0.055	U	0.087	U	0.2	U	0.2	U	0.2	U
Nickel	100	NS		195		13.3		52.2		**187**		67.9		4.2	B	3.8	B	10	U	10	U	10	
Potassium		NS		57600		2380		14200		17400		7670	E	1530	B	1280	B	1300		1600		4400	
Selenium	10	NS		**69.2**		ND		5	U	**13.5**		4	U	2.8	U	5	U	15	U	15	U	15	U
Silver	50	NS		ND		ND		1.5	U	2	U	0.5	U	0.7	U	0.69	U	3	U	3	U	3	U
Sodium	2000	NS		**1490000**		10200		**5430**		**5690**		**5250**		**5660**		**8860**		10100		**9000**		**8600**	
Thallium	*0.5*	*NS*		**9.9**		ND		5	U	4	U	3.9	U	3.8	U	5.1	U	20	U	20	U	20	U
Vanadium		NS		243		8.8		60.1		144		75.8		1.4	B	0.71	B	5	U	5	U	9.8	
Zinc	*2000*	*NS*		**1880**		**346**		142		743		443		6.2	B	1.8	B	20	U	10	U	19	

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-108D																									
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**			
VOCs (µg/L)																									
Acetone	50	NS		NS		42		ND		ND		ND		ND		ND		ND		ND		6.8			
Metals (µg/L)																									
Aluminum		NS		NS		441		303		407	U	32.5	U	757		111	B	1000		600		1100			
Antimony	3	NS		NS		ND		5	U	3	U	5.4	U	4.1	U	5	U	20	U	20	U	20	U		
Arsenic	25	NS		NS		ND		3.4	U	4		4	U	6	B	2.6	U	10	U	10	U	10	U		
Barium	1000	NS		NS		48.3		102	BE	92.2		138	B	154	B	121	B	140		130		130			
Beryllium	3	NS		NS		ND		0.5	U	1	U	0.2	U	0.21	B	0.19	U	2	U	2	U	2	U		
Cadmium	5	NS		NS		ND		0.76	B	1	UN	0.3	U	0.68	B	0.79	B	4.9		1	U	1.2			
Calcium		NS		NS		13500		20900	E	17200		32000	E	32500		30200		40700		28300		31700			
Chromium	50	NS		NS		ND		1.2	U	1	U	0.6	U	1.5	B	0.65	U	13		4	U	4	U		
Cobalt		NS		NS		ND		1	U	1	U	0.5	U	0.98	B	0.86	U	4	U	4	U	4	U		
Copper	200	NS		NS		1.7		2.9	B	4.2	B	0.97	B	5.1	B	2.1	B	42		10	U	24			
Iron	300	NS		NS		**2440**		**915**		**1530**		**510**		**2780**	N	**660**		**4800**		**1900**		**1700**			
Lead	25	NS		NS		ND		2.6	U	2.4	B	2.3	U	1.6	U	1.3	U	6.8		5	U	5	U		
Magnesium	*35000*	*NS*		*NS*		5240		**12000**	E	**13300**		**14700**		**13200**		**12700**		18200		**12100**		13400			
Manganese	300	NS		NS		28.4		164	E	96.9		239		**336**		291		**380**		**300**		290			
Mercury	0.7	NS		NS		ND		0.15	U	0.072	U	0.065	U	0.055	U	0.087	U	0.2	U	0.2	U	0.2	U		
Nickel	100	NS		NS		ND		1.5	U	3.2	B	1	U	3	B	1.4	B	10	U	10	U	10	U		
Potassium		NS		NS		10100		2660	B	2950	B	2610	BE	2660	B	2200	B	5900		2500		4400			
Selenium	10	NS		NS		ND		5	U	5	U	4	U	2.8	U	5	U	15	U	15	U	15	U		
Silver	50	NS		NS		ND		1.5	U	2	U	0.58	B	0.7	U	0.69	U	3	U	3	U	3	U		
Sodium	2000	NS		NS		5690		**3910**	B	**4320**	B	**3760**	B	**4010**	B	**3400**	B	**4100**		**3800**		**3900**			
Thallium	*0.5*	*NS*		*NS*		ND		5	U	4	U	3.9	U	3.8	U	5.1	U	20	U	20	U	20	U		
Vanadium		NS		NS		ND		1	U	1	U	0.7	U	1.3	B	0.58	U	5	U	15	U	5	U		
Zinc	*2000*	*NS*		*NS*		18.4		15.8	B	17.8	B	7.3	B	10.1	B	6	B	42		25		10	U		

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-108I																							
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
VOCs (µg/L)																							
Acetone	50	NS		NS		11		ND		ND		ND		ND		ND		ND		ND		6.8	
Metals (µg/L)																							
Aluminum		NS		NS		2520		382		1290		2750		1470		462		2000		920		570	
Antimony	3	NS		NS		ND		5	U	3	U	**7.7**	B	4.1	U	5	U	20	U	20	U	20	U
Arsenic	25	NS		NS		3.2		3.4	U	5.3	B	4	U	4.7	B	2.6	U	10	U	10	U	10	U
Barium	1000	NS		NS		48.6		60.8	BE	75.7	B	89.7	B	104	B	69.4	B	81		68		68	
Beryllium	3	NS		NS		ND		0.5	U	1	U	0.32	B	0.21	B	0.19	U	2	U	2	U	2	U
Cadmium	5	NS		NS		ND		0.6	U	1	UN	0.4	B	1	B	0.49	B	1	U	1	U	1	U
Calcium		NS		NS		50100		33300	E	35100		37700	E	30200		29400		37600		38500		39100	
Chromium	50	NS		NS		6.9		1.2	U	3	B	3.2	B	2.2	B	0.65	U	4	U	4	U	4	U
Cobalt		NS		NS		ND		1	U	1.6	B	2.4	B	1.4	B	0.86	U	4	U	4	U	4	U
Copper	200	NS		NS		3.4		2.3	B	5.2	B	4	B	2.1	B	1.9	B	10	U	10	U	16	
Iron	300	NS		NS		**4140**		**408**		**2860**		**5280**		**2600**	N	**509**		**1900**		**1200**		**870**	
Lead	25	NS		NS		1.1		2.6	U	2	U	2.3	U	1.6	U	1.3	U	5	U	5	U	5	U
Magnesium	*35000*	NS		NS		11800		17600	E	17600		17800		12100		13900		19600		22600		22000	
Manganese	300	NS		NS		130		8.8	BE	60.4		88.1		51.7		13.7	B	34		27		18	
Mercury	0.7	NS		NS		ND		0.15	U	0.072	U	0.078	B	0.055	U	0.087	U	0.2	U	0.2	U	0.2	U
Nickel	100	NS		NS		2.7		1.5	U	5.9	B	5	B	3.8	B	1.2	U	10	U	10	U	10	U
Potassium		NS		NS		6050		3290	B	3840	B	4350	BE	3270	B	2830	B	4100		3600		5000	
Selenium	10	NS		NS		ND		5	U	5	U	4	U	2.8	U	5	U	15	U	15	U	15	U
Silver	50	NS		NS		ND		1.5	U	2	U	0.5	U	0.7	U	0.69	U	3	U	3	U	3	U
Sodium	2000	NS		NS		6830		**3300**	B	**3670**	B	**3430**	B	**3470**	B	**3150**	B	**3500**		**3600**		**3800**	
Thallium	*0.5*	NS		NS		ND		5	U	4	U	3.9	U	3.8	U	5.1	U	20	U	20	U	20	U
Vanadium		NS		NS		6.1		1	U	1.9	B	3.9	B	1.9	B	0.67	B	5	U	5	U	5	U
Zinc	*2000*	NS		NS		80.2		11.3	B	17.1	B	13.4	B	8.3	B	2.8	B	20	U	10	U	10	U

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-109																							
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
VOCs (µg/L)																							
Acetone	50	NS		NS		42		ND		ND		2	J	7		ND		ND		2.6	J	1.8	J
Metals (µg/L)																							
Aluminum		NS		NS		2040		119	B	151		32.5	U	205		18.4	U	1300		3200		670	
Antimony	3	NS		NS				5	U	3	U	5.4	U	4.1	U	5	U	20	U	20	U	20	U
Arsenic	25	NS		NS		7.2		3.4	U	4	U	4	U	3.9	B	2.6	U	10	U	10	U	10	U
Barium	1000	NS		NS		155		81.2	BE	65.6	B	150	B	107	B	86.2	B	180		220		140	
Beryllium	3	NS		NS		0.3		0.5	U	1	U	0.2	U	0.12	B	0.19	U	2	U	2	U	2	U
Cadmium	5	NS		NS				0.6	U	1	UN	0.3	U	1.3	B	0.34	U	1	U	2		1.7	
Calcium		NS		NS		102000		23900	E	19100		3400	E	27600		22100		31800		52900		28600	
Chromium	50	NS		NS		3.2		1.2	U	1	U	0.6	U	1.9	B	0.65	U	4.1		11		5	
Cobalt		NS		NS				1	U	1	U	0.76	B	1.8	B	0.86	U	4	U	4	U	4	U
Copper	200	NS		NS		4.4		3.2	B	1	U	2.6	B	14.4	N	6.3	B	10	U	130		44	
Iron	300	NS		NS		**3480**		**1110**		**2570**		**2920**		**2290**	U	**513**		**11900**		**23600**		**4700**	
Lead	25	NS		NS		2.9		2.6	U	2	U	2.3	U	1.6		1.3	U	5	U	5	U	5	U
Magnesium	*35000*	NS		NS		1490		9090	E	9340		12100		11700		10100		12900		13500		10200	
Manganese	300	NS		NS		115		98.5	E	82.9		271		167		146		**350**		**750**		210	
Mercury	0.7	NS		NS				0.15	U	0.072	U	0.08	B	0.055	U	0.087	U	0.2	U	0.2	U	0.2	U
Nickel	100	NS		NS		3.1		1.6	B	1.5	U	1	U	4.9	B	1.4	B	10	U	11		10	U
Potassium		NS		NS		8730		2560	B	2780	B	3180	BE	3200	B	2230	B	3200		8800		4800	
Selenium	10	NS		NS				5	U	5	U	4	U	2.8	U	5	U	15	U	15	U	15	U
Silver	50	NS		NS				0.15	U	2	U	0.54	B	0.7	U	0.69	U	3	U	3	U	3	U
Sodium	2000	NS		NS		16100		**3900**	B	**4120**	B	**3810**	B	**4070**	B	**3340**	B	3600		**4400**		3700	
Thallium	*0.5*	NS		NS				5	U	4	U	3.9	U	3.8	U	5.1	U	20	U	20	U	20	U
Vanadium		NS		NS		5.9		1	U	1	U	0.7	U	0.8	U	0.58	U	5	U	5	U	5	U
Zinc	*2000*	NS		NS		43.5		12.2	B	4.4	B	4.1	B	13.3	B	3.1	B	20	U	48		27	

TABLE 2 HISTORIC GROUNDWATER MONITORING RESULTS

MW-113																									
	Standards	**1-Jul-94**		**1-Sep-94**		**1-Jun-95**		**19-Oct-00**		**17-Oct-01**		**9-Oct-02**		**8-Oct-03**		**20-Oct-04**		**26-Oct-05**		**4-Oct-06**		**18-Oct-07**	
VOCs (µg/L)																									
Acetone	50	NS		NS		**160**		ND		2	J	ND		6		ND		10		ND		9.5	
Benzene	0.7	NS		NS		**1**		ND		ND		ND		ND		ND		ND		ND		ND	
2-Butanone	50	NS		NS		4		ND		ND		ND		ND		ND		ND		ND		2	J
1,2-Dichloropropane		NS		NS		ND		ND		ND		ND		ND		ND		ND		ND		0.48	J
Metals (µg/L)																									
Aluminum		NS		NS		5660		19400		3520		1700		13900		3280		27900		7700		NS	
Antimony	3	NS		NS		ND		5.2	B	3	U	**6.5**	B	**4.1**	U	5	U	20		20	U	NS	
Arsenic	25	NS		NS		10.3		17.3		8.4	U	29.5		23.6		4.4	B	30		10	U	NS	
Barium	1000	NS		NS		69.4		166	BE	56.3		214		151	B	77.5	B	250		79		NS	
Beryllium	3	NS		NS		0.5		1.2	B	1	U	0.95	B	0.87	B	0.19	U	2		2	U	NS	
Cadmium	5	NS		NS		ND		2.5	B	1	UN	0.3	U	0.3	U	0.34	U	2.1		1	U	NS	
Calcium		NS		NS		49600		67100	E	6200		61000	E	60200		55500		66600		55300		NS	
Chromium	50	NS		NS		6.5		28		3.4	B	26.9		17.6		2.7	B	49		11		NS	
Cobalt		NS		NS		4.1		19.2	B	7.4	B	17.8	B	14.7		8.7	B	23		7.5		NS	
Copper	200	NS		NS		9.2		109		14.9	B	45.4		28.9		14.5	B	100		12		NS	
Iron	300	NS		NS		**7470**		**43700**		**9140**		40800		**29000**	N	**6070**		49200		**13500**		NS	
Lead	25	NS		NS		8.3		31		8.1		25.3		15.9		11		30		8.6		NS	
Magnesium	*35000*	*NS*		*NS*		12000		**26600**	E	**25200**		**25300**		**26100**		**22500**		29200		**24700**		NS	
Manganese	300	NS		NS		202		**1210**	E	**325**		**910**		**702**		**499**		1400		**410**		NS	
Mercury	0.7	NS		NS		ND		0.15	U	0.072	U	0.187	B	0.055	U	0.087	U	0.2		0.2	U	NS	
Nickel	100	NS		NS		8.6		42.3		15	B	45.5		30.7	B	6.4	B	57		14		NS	
Potassium		NS		NS		11400		12900		7690		9110	E	7260		3900	B	12500		5400		NS	
Selenium	10	NS		NS		ND		5	U	5	U	4	B	2.8	U	5	U	15		15	U	NS	
Silver	50	NS		NS		ND		1.5	U	2	U	0.5	U	0.7	U	0.69	U	3		3	U	NS	
Sodium	2000	NS		NS		16300		**5550**		**5200**		**4660**	B	**4500**	B	**3880**	B	7300		**4400**		NS	
Thallium	*0.5*	*NS*		*NS*		ND		5	U	4	U	3.9	U	3.8	U	5.1	U	20		20	U	NS	
Vanadium		NS		NS		14.4		26.7	B	4.7	B	21.2	B	17.4	B	4.2	B	36		96		NS	
Zinc	*2000*	*NS*		*NS*		53.4		248		31.7		91		62		12.7	B	200		31		NS	

TABLE 3 COMPARISON OF LEACHATE AND GROUNDWATER VOC AND METAL RESULTS

2001																													
	Standards	**MW-101I**		**MW-101D**		**MW-102D**		**MW-103D**		**MW-103I**		**MW-104D**		**MW-104I**		**MW-107IR**		**MW-107SR**		**MW-108D**		**MW-108I**		**MW-109**		**MW-113**		**Leachate (BB-T2-S)**	
VOCs (µg/L)																													
Chlorobenzene	5	ND		3	J	ND		ND		ND		NS		ND		ND		ND		ND		ND		ND		ND		ND	
Dichlorodifluoromethane	5	ND		ND		ND		ND		ND		NS		ND		ND		ND		ND		ND		ND		ND		ND	
1,4-Dichlorobenzene	3	ND		ND		ND		ND		ND		NS		ND		ND		ND		ND		ND		ND		ND		ND	
Acetone	*50*	2	J	3	J	ND		ND		ND		NS		ND		ND		4	J	ND		ND		ND		2	J	22	J
2-Butanone	0.4	ND		**1**	J	ND		ND		ND		NS		ND		ND		ND		ND		ND		ND		ND		ND	
Benzene	1	ND		**1**	J	ND		ND		ND		NS		ND		ND		ND		ND		ND		ND		ND		ND	
1,3-Dichlorobenzene	3	ND		ND		ND		ND		ND		NS		ND		ND		ND		ND		ND		ND		ND		ND	
cis-1,2-dichloroethene	5	ND		ND		ND		**8**	J	**15**		NS		**10**		ND		ND		ND		ND		ND		ND		ND	
Trichloroethene	5	ND		ND		ND		4	J	**7**	J	NS		3	J	ND		ND		ND		ND		ND		ND		ND	
Metals (µg/L)																													
Aluminum		61300		213		118		293		620		NS		572		16400		116000		407	U	1290		151		3520		**1,270**	
Antimony	3	3	U	3	U	3	U	3	U	3	U	NS		3	U	3	U	3	U	3	U	3	U	3	U	3	U	ND	
Arsenic	25	**54.5**		9.6	B	4	U	4	U	4.2	B	NS		4	U	**95.3**		**110**		4		5.3	B	4	U	8.4	U	14.6	
Barium	1000	694		523		86.7	B	59.1	B	65.1	B	NS		65.9	B	**1450**		**1230**		92.2		75.7	B	65.6	B	56.3		**1,000**	
Beryllium	3	**4.3**	B	1	U	1	U	1	U	1	U	NS		1	U	**7.8**		**6.3**		1	U	1	U	1	U	1	U	ND	
Cadmium	5	1	UN	1.1	BN	1.7	BN	1.7	BN	2.4	BN	NS		1.4	BN	1	UN	1	UN	1	UN	1	UN	1	UN	1	UN	ND	
Calcium		88600		12200		47000		25400		22300		NS		46400		101000		190000		17200		35100		19100		6200		223,000	
Chromium	50	74.3		1	U	1	U	1	U	1	U	NS		1	U	**279**		**133**		1	U	3	B	1	U	3.4	B	2.9	B
Cobalt		69.2		5	B	1	U	1	U	1	B	NS		1	U	153		93.3		1	U	1.6	B	1	U	7.4	B	**13.2**	B
Copper	200	175		14.9	B	1.1	B	1	U	6.1	B	NS		6.2	B	**219**		**222**		4.2	B	5.2	B	1	U	14.9	B	8.1	B
Iron	300	**131000**		**891**		72.1		**368**		**817**		NS		**812**		**344000**		**216000**		**1530**		**2860**		**2570**		**9140**		**42,100**	
Lead	25	**48.1**		2	U	2	U	2	U	2	U	NS		2	U	144		**80.5**		2.4	B	2	U	2	U	8.1		ND	
Magnesium	*35000*	**55200**		**69300**		15100		9080		6710		NS		12400		**84400**		**50900**		**13300**		17600		9340		**25200**		**203,000**	
Manganese	300	**2850**		**4290**		2.8	B	19.4		28.2		NS		15.3		**4570**		**6050**		96.9		60.4		82.9		**325**		**1,780**	
Mercury	0.7	0.072	U	0.072	U	0.072	U	0.072	U	0.072	U	NS		0.072	U	0.072	U	0.072	U	0.072	U	0.072	U	0.072	U	0.072	U	ND	
Nickel	100	**136**		9.8	B	1.5	U	1.5	U	1.8	B	NS		1.6	B	**360**		**187**		3.2	B	5.9	B	1.5	U	15	B	35.7	B
Potassium		17500		12400		2330	B	1970	B	2040	B	NS		2220		30400		17400		2950	B	3840	B	2780	B	7690		174,000	
Selenium	10	9.7		5	U	5	U	5	U	5	U	NS		5	U	**17.6**		**13.5**		5	U	5	U	5	U	5	U	ND	
Silver	50	2	U	2	U	2	U	2	U	2	U	NS		2	U	2	U	2	U	2	U	2	U	2	U	2	U		
Sodium	2000	**7400**		**51200**		**3780**	B	**4160**	B	**4490**	B	NS		**7070**		**11900**		**5690**		**4320**	B	**3670**	B	**4120**	B	**5200**		**1,114,000**	
Thallium	*0.5*	4	U	4	U	4	U	4	U	4	U	NS		4	U	**5**	B	4	U	4	U	4	U	4	U	4	U	ND	
Vanadium		78.2		1	U	1	U	1	U	1	U	NS		1.1	B	187		144		1	U	1.9	B	1	U	4.7	B	2.2	B
Zinc	*2000*	364		16.3	B	2	U	2.6	B	8.3	B	NS		9.9	B	777		743		17.8	B	17.1	B	4.4	B	31.7		51.6	

(a) Results reported in micrograms per liter (µg/L)

(b) Sample results compared to NYSDEC Ambient Water Quality Standards, if no standard was available, used guidance values in *italics*

Notes:

U = The analyte was analyzed for, but was not detected above the detection limit
B = The analyte was detected below contract required detection limit
E = The result value was estimated du to interference
N = Spike sample recovery not within quality control limits
J = Estimated value, concentration below laboratory reporting limit
ND = Not detected
NS = Not sampled
Bold values indicate that the analyte was detected above the NYSDEC Ambient Water Quality Standards.

TABLE 3 COMPARISON OF LEACHATE AND GROUNDWATER VOC AND METAL RESULTS

2007																													
	Standards	**MW-101I**		**MW-101D**		**MW-102D**		**MW-103D**		**MW-103I**		**MW-104D**		**MW-104I**		**MW-107IR**		**MW-107SR**		**MW-108D**		**MW-108I**		**MW-109**		**MW-113**		**Leachate (BB-T2-S)**	
VOCs (µg/L)																													
Chlorobenzene	5	ND		0.73	J	ND		ND		ND		NS		ND		NS		ND		ND		ND		ND		ND		ND	
Dichlorodifluoromethane	5	ND		ND		ND		ND		ND		NS		ND		NS		ND		ND		ND		ND		ND		ND	
1,4-Dichlorobenzene	3	ND		ND		ND		ND		ND		NS		ND		NS		ND		ND		ND		ND		ND		ND	
Acetone	*50*	2.1	J	3.8	J	ND		ND		ND		NS		ND		NS		6.8		ND		ND		1.8	J	9.5		ND	
2-Butanone	0.4	ND		ND		ND		ND		ND		NS		ND		NS		1.8	J	ND		ND		ND		2	J	ND	
Benzene	1	ND		ND		ND		ND		ND		NS		ND		NS		ND		ND		ND		ND		ND		ND	
1,3-Dichlorobenzene	3	ND		0.41	J	ND		ND		ND		NS		ND		NS		ND		ND		ND		ND		ND		ND	
cis-1,2-dichloroethene	5	ND		ND		ND		4.5		**12**		NS		2.2		NS		ND		ND		ND		ND		ND		ND	
Trichloroethene	5	ND		ND		ND		**9.1**		**5.7**		NS		**5.2**		NS		ND		ND		ND		ND		ND		ND	
Chloroform	7	ND		ND		ND		ND		ND		NS		0.55	J	NS		ND		ND		ND		ND		ND		ND	
1,2-Dichloropropane		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		0.48	J	ND	
Methylene chloride		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		6.8	B
Metals (µg/L)																													
Aluminum		51400		NS		450		1500		20800		NS		6200		NS		640020		1100		570		670		NS		**28,400**	
Antimony	3	20	U	NS		20	U	20	U	20	U	NS		20	U	NS		20	U	20	U	20	U	20	U	NS		ND	
Arsenic	25	**35**		NS		10	U	10	U	25		NS		10	U	NS		10	U	10	U	10	U	10	U	NS		**180**	
Barium	1000	490		NS		88		70		320		NS		130		NS		150		130		68		140		NS		**1,600**	
Beryllium	3	**3.7**		NS		2	U	2	U	2	U	NS		2	U	NS		2	U	2	U	2	U	2	U	NS		2.4	
Cadmium	5	2.1		NS		3.8		2.3		1.5		NS		2.7		NS		1.7		1.2		1	U	1.7		NS		**18**	
Calcium		101000		NS		45300		20500		20800		NS		29000		NS		77000		31700		39100		28600		NS		225,000	
Chromium	50	58		NS		4	U	4	U	22		NS		16		NS		7.3		4	U	4	U	5		NS		42	
Cobalt		45		NS		4	U	4	U	18		NS		4	U	NS		4	U	4	U	4	U	4	U	NS		**47**	
Copper	200	75		NS		16		10		19		NS		10	U	NS		10	U	24		16		44		NS		80	
Iron	300	**91300**		NS		**640**		**1900**		**24500**		NS		**7700**		NS		**7400**		**1700**		**870**		**4700**		NS		**406,000**	
Lead	25	**34**		NS		5	U	5	U	16		NS		5.9		NS		5	U	5	U	5	U	5	U	NS		**100**	
Magnesium	*35000*	**56100**		NS		14900		7800		10700		NS		8200		NS		14800		13400		22000		10200		NS		**128,000**	
Manganese	300	**1600**		NS		13		56		1200		NS		150		NS		**370**		290		18		210		NS		**11,300**	
Mercury	0.7	0.2	U	NS		0.5	U	0.2	U	0.2	U	NS		0.2	U	NS		0.2	U	0.2	U	0.2	U	0.2	U	NS		ND	
Nickel	100	88		NS		10	U	10	U	32		NS		10	U	NS		10		10	U	10	U	10	U	NS		91	
Potassium		20700		NS		3600		2300		8900		NS		3900		NS		4400		4400		5000		4800		NS		149,000	
Selenium	10	15	U	NS		15	U	15	U	15	U	NS		15	U	NS		15	U	15	U	15	U	15	U	NS		ND	
Silver	50	3	U	NS		3	U	3	U	3	U	NS		3	U	NS		3	U	3	U	3	U	3	U	NS		ND	
Sodium	2000	**6700**		NS		**3700**		**3300**		**3800**		NS		**6700**		NS		**8600**		**3900**		**3800**		3700		NS		**189000**	
Thallium	*0.5*	20	U	NS		20	U	20	U	20	U	NS		20	U	NS		20	U	20	U	20	U	20	U	NS		ND	
Vanadium		69		NS		5	U	5	U	27		NS		9.2		NS		9.8		5	U	5	U	5	U	NS		ND	
Zinc	*2000*	210		NS		10	U	10	U	66		NS		19		NS		19		10	U	10	U	27		NS		12	

TABLE 4 INITIAL MATRIX OF PRELIMINARY REMEDIAL OPTIONS

	Key Components	Capital Costs	Annual Costs	Implementability	Concerns	Data Gaps	Survey Needs	Status
Passive Management Options								
Option 1 (Decommission System)	Treatability Study; ROD Amendment; Groundwater Monitoring; Reporting & Management	Minimal	Low	Easily implementable	• Possible accumulation of contaminants in surrounding soil, surface water, and groundwater • Community acceptance • Human health & environmental receptors • Development of leachate seeps and landfill cover/cap	• Rate of accumulation and/or sorption of metal/VOCs in soil • Unknown source longevity • Preferential flow paths • Rate of leachate generation (hydrogeo) • Lack of construction detail for leachate collection/conveyance system	Tanks, general topography	Eliminated due to potential impacts to groundwater and impacts on human health/environment
Option 2 (Maintain Existing System)	Leachate Removal; Groundwater Monitoring; Reporting & Management; Replace USTs	Low	Moderate	N/A	• Is current management of leachate capturing 100% of volume (collection system on two sides of landfill & potential seeps due to infrequent monitoring) • Long-term costs • Requires long-term management • Maintenance & upkeep of tanks and piping (age of system/schedule 40 PVC)	• Rate of accumulation and/or sorption of metal/VOCs in soil • Rate of leachate generation (hydrogeo) • Lack of construction detail and condition of leachate conveyance/collection system	Tanks, general topography	"No Action" alternative, kept to provide comparison. Added tank replacement to alternative
Option 3 (Passive Treatment w/ Borrow Pond)	Bench Scale Testing; Basis of Design; ROD Amendment; Permitting (SPDES); Design; Reporting & Management; Replace USTs	Moderate	Low	Easily implementable (with proof of concept and ability to meet treatment requirements)	• Rate of flow • Full leachate profile for SPDES • Human health and environmental receptors • Site security • Onsite versus offsite discharge locations? • Monitoring requirements? • Treatment effectiveness • Community acceptance	• Rate of accumulation and/or sorption of metal/VOCs in soil • Rate of leachate generation (hydrogeological) • Lack of construction detail and condition of leachate conveyance/collection system • Leachate characteristics	Tanks, borrow pond, drainage swale, general topography	Kept due to potential to reduce frequency of site visits; Added tank replacement to alternative

TABLE 4 INITIAL MATRIX OF PRELIMINARY REMEDIAL OPTIONS

	Key Components	Capital Costs	Annual Costs	Implementability	Concerns	Data Gaps	Survey Needs	Status
Option 4 (Passive Treatment w/ Constructed Wetland)	Bench Scale Testing; Basis of Design; ROD Amendment; Permitting (SPDES); Design; Wetland Construction; Reporting & Management; Replace USTs	Moderate	Low	Easily implementable (with proof of concept and ability to meet treatment requirements)	• Rate of flow • Full leachate profile for SPDES • Human health and environmental receptors • Site security • Onsite versus offsite discharge locations? • Monitoring requirements? • Treatment effectiveness • Community acceptance	• Rate of accumulation and/or sorption of metal/VOCs in soil • Rate of leachate generation (hydrogeological) • Lack of construction detail and condition of leachate conveyance/collection system • Leachate characteristics	Tanks, borrow pond, drainage swale, general topography	Kept due to potential to reduce frequency of site visits; Added tank replacement to alternative
Option 5 (Evaporation)	Bench Scale Testing/Modeling; Basis of Design; ROD Amendment; Design; Channel Construction; Reporting & Management	Moderate	Low	Easily implementable (with proof of concept); additional effort required to prove effectiveness	• Rate of flow • Full leachate profile • Human health and environmental receptors • Site security • Monitoring requirements • Treatment effectiveness • Community acceptance • Additional precipitation inputs • Existing stormwater flow paths	• Rate of accumulation and/or sorption of metal/VOCs in soil • Rate of leachate generation (hydrogeological) • Lack of construction detail and condition of leachate conveyance/collection system • Leachate characteristics	Tanks, general topography	Eliminated due to results of the survey and concerns over effectiveness of system due to rain/snow/runoff inputs
Electrically Powered Options								
Option 6 (Treatment at WWTP)	Analytical Testing; ROD Amendment; Design; Electrical Install; Reporting & Management	High	Low	Moderately difficult given electrical requirements & availability, and location of sewer	• Rate of flow • Full leachate profile • Monitoring requirements • Community acceptance • Availability of electrical power (if needed) • Distance to discharge location	• Rate of leachate generation (hydrogeo) • Lack of construction detail and condition of leachate conveyance/collection system • Leachate characteristics • Location of municipal sewer	Tanks, general topography	Eliminated due to location of nearest sewer system and power would not be an option per conversations with NYSDEC
Option 7 (Pump Leachate from BB-T1 to Constructed Wetland North of BB-T2)	Bench Scale Testing; Basis of Design; ROD Amendment; Permitting (SPDES); Design; Wetland Construction; Reporting & Management	High	Low	Moderately difficult given electrical requirements & availability, and construction of wetland	• Rate of flow • Full leachate profile for SPDES • Human health and environmental receptors • Site security • Onsite versus offsite discharge location • Monitoring requirements • Treatment effectiveness • Community acceptance • Availability of electric power	• Rate of accumulation and/or sorption of metal/VOCs in soil • Rate of leachate generation (hydrogeo) • Lack of construction detail and condition of leachate conveyance/collection system • Leachate characteristics	Tanks, general topography	Eliminated as installing power would not be an option per conversations with NYSDEC

TABLE 5 MATRIX OF ALTERNATIVES

	Key Components	Capital Costs	Annual Costs	Implementability	Concerns	Data Gaps	Survey Needs	Status
Passive Management Options								
Alternative 1 (Maintain Existing System)	Leachate Removal; Groundwater Monitoring; Reporting & Management; Replace USTs	None	Moderate	N/A	• Is current management of leachate capturing 100% of volume (collection system on two sides of landfill & potential seeps due to infrequent monitoring) • Indefinite costs • Imposes long-term management • Maintenance & upkeep of tanks and piping (age of system/schedule 40 PVC)	• Rate of accumulation and/or sorption of metal/VOCs in soil • Rate of leachate generation (hydrogeo) • Lack of construction detail for leachate conveyance/collection system	Tanks, general topography	"No Action" alternative, kept to provide comparison. Added tank replacement to alternative
Alternative 2 (Passive Treatment w/ Borrow Pond)	Bench Scale Testing; Basis of Design; ROD Amendment; Permitting (SPDES); Design; Reporting & Management; Replace USTs	Moderate	Low / High	Easily implementable (with proof of concept and ability to meet treatment requirements)	• Rate of flow • Full leachate profile for SPDES • Human health and environmental receptors • Site security • Onsite versus offsite discharge locations? • Monitoring requirements? • Treatment effectiveness • Community acceptance	• Rate of accumulation and/or sorption of metal/VOCs in soil • Rate of leachate generation (hydrogeological) • Lack of construction detail for leachate conveyance/collection system • Leachate characteristics	Tanks, borrow pond, drainage swale, general topography	Kept due to potential to reduce frequency of site visits; Added tank replacement to alternative
Alternative 3 (Passive Treatment w/ Constructed Wetland)	Bench Scale Testing; Basis of Design; ROD Amendment; Permitting (SPDES); Design; Wetland Construction; Reporting & Management; Replace USTs	Moderate	Low / High	Easily implementable (with proof of concept and ability to meet treatment requirements)	• Rate of flow • Full leachate profile for SPDES • Human health and environmental receptors • Site security • Onsite versus offsite discharge locations? • Monitoring requirements? • Treatment effectiveness • Community acceptance	• Rate of accumulation and/or sorption of metal/VOCs in soil • Rate of leachate generation (hydrogeological) • Lack of construction detail for leachate conveyance/collection system • Leachate characteristics	Tanks, borrow pond, drainage swale, general topography	Kept due to potential to reduce frequency of site visits; Added tank replacement to alternative
Alternative 4 (Passive Treatment w/ Constructed Wetlands for each Tank)	Bench Scale Testing; Basis of Design; ROD Amendment; Permitting (SPDES); Design; Wetland Construction; Reporting & Management; Replace USTs	Moderate	Low / High	Easily implementable (with proof of concept); additional effort required to prove effectiveness	• Rate of flow • Full leachate profile for SPDES • Human health and environmental receptors • Site security • Onsite versus offsite discharge locations? • Monitoring requirements? • Treatment effectiveness • Community acceptance	• Rate of accumulation and/or sorption of metal/VOCs in soil • Rate of leachate generation (hydrogeological) • Lack of construction detail for leachate conveyance/collection system • Leachate characteristics	Tanks, drainage swale, general topography	Added based upon survey results

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY	LOCATION	MEDIA	Estimated Cost to Implement	$960,000	
Alternative 1 Maintain Existing System	Busy Bee Landfill Alfred Station, NY	Leachate Groundwater	Construction Time:	1	months
			Operation Time:	-	months
			Post Remediation Monitoring	30	years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$74,000**
Leachate Tank (UST) Replacement		**1**			**$0**		**$11,425**		**$4,628**	**$59,053**	**$59,053**
Removal											
BB-T1 North (15,000 g	*02 65 10.30 0130*	1	tank	$ -	$ -	$ -	$1,193	$ -	$655	$1,849	$1,848.55
BB-T1 South (18,000 g	*02 65 10.30 0130*	1	tank	$ -	$ -	$ -	$1,193	$ -	$655	$1,849	$1,848.55
BB-T2 North (2,000 ga	*02 65 10.30 0110*	1	tank	$ -	$ -	$ -	$711	$ -	$116	$827	$827.02
BB-T2 North (4,000 ga	*02 65 10.30 0110*	1	tank	$ -	$ -	$ -	$711	$ -	$116	$827	$827.02
Replacement											
2,000 gal tank	*Engineer's Estimate*	1	tank	$3,000	$ -	$ -	$1,422	$ -	$232	$4,654	$4,654
4,000 gal tank	*Engineer's Estimate*	1	tank	$5,000	$ -	$ -	$1,422	$ -	$232	$6,654	$6,654
15,000 gal tank	*Engineer's Estimate*	1	tank	$15,000	$ -	$ -	$2,386	$ -	$1,311	$18,697	$18,697
20,000 gal tank	*Engineer's Estimate*	1	tank	$20,000	$ -	$ -	$2,386	$ -	$1,311	$23,697	$23,697
Mobilization and Demobilization											**$5,905**
10% of Total Costs of Site Work, Treatment										$59,053	$5,905.34
Contingency											**$8,858**
15% of Total Construction Activities										$59,053	$8,858.01
Professional/Technical Services											**$10,039**
5% Project Management										$59,053	$2,952.67
6% Remedial Design											$3,543.21
6% Construction Management											$3,543.21

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY	LOCATION	MEDIA	Estimated Cost to Implement	$960,000	
Alternative 1 Maintain Existing System	Busy Bee Landfill Alfred Station, NY	Leachate Groundwater	Construction Time:	1	months
			Operation Time:	-	months
			Post Remediation Monitoring	30	years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantities: Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
LONG TERM MONITORING										**ANNUAL LTM COST**	**$57,610**
										LIFETIME LTM (NPV)	**$885,600**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 20% of combined sampling event for on-site and off-site											**$6,042**
Site Monitoring											$3,554
Inspection of landfill cover	*Engineer's Estimate*	1	hr	$ -	$ -	$ 88.00	$ 88	$ -	$ -	$ 88	$88
Groundwater sampling for 1 event - Includes collection of field parameters		13	wells	$ -	$ -	$ 88.00	$ 1,408	$ 424	$ 424	$ 512	$1,832
Materials	*Engineer's Estimate*	1	event	$ 50.00	$ -	$ -	$ -	$ -	$ -		$50
Mobilization/Demobilization of Field Crew	*Engineer's Estimate*	1	event	$ -	$ -	$ 88.00	$ 704	$ -	$ -	$ 704	$704
Reporting		10	hrs	$ -	$ -	$ 88.00	$ 880	$ -	$ -	$ 88	$880
Groundwater Sampling Laboratory analysis											**$2,488**
Metals, plus 20% QA/QC	*Recent bid from Accutest*	13	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 83	$1,287
VOCs, plus 20% QA/QC	*Recent bid from Accutest*	13	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 77	$1,201
Annual Leachate Management											**$2,660**
Leachate Tank Gauging (4 trips/year; 1 hour onsite)		4	trips	$ -	$ -	$ 88.00	$ 1,760	$ -	$ -	$ 88	$1,760
Reporting		4	hrs	$ -	$ -	$ 88.00	$ 352	$ -	$ -	$ 88	$352
Metals, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 83	$99
VOCs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 77	$92
SVOCs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 165	$198
Pesticides / PCBs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 132	$158
Maintenance- Cap Maintenance											
Mowing brush, tractor with rotary mower, Medium density 2x per year	*32 01 90.19 1670*	55	msf	$ -	$ -	$ -	$ -	$ -	$ -	$ 74.80	**$4,089**
Leachate Disposal (includes 5 events/year)	*Engineer's Estimate*	1	annual	$ -	$ -	$88	$18,661	$ -	$ 25,000	$25,088	**$43,749**
Lifetime Long Term Monitoring (Net Present Value)											
30 Years of Bi-Annual Monitoring											
5% Discount Factor (per NYSDEC)											
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$960,000**

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY		LOCATION		MEDIA		Estimated Cost to Implement				$960,000	
Alternative 1 Maintain Existing System		Busy Bee Landfill Alfred Station, NY		Leachate Groundwater		Construction Time:				1	months
						Operation Time:				-	months
						Post Remediation Monitoring				30	years
		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost

Assumptions:

Working condition is Safety Level:		D/C	(Labor productivity:	82%	; Equipment productivit	100%	)		
Weighted Average of city cost index (Buffalo, NY)		101.4%	(not applicable for costs derived from vendor quotes).						
Costs are loaded with a profit factor		10%							
Inflation		3%	per year						Labor
Estimated number of groundwater samples		13	samples	1	times sampled	1.00	hrs/sample	$88	Cost per hr
				20%	added for QA/QC sample	1	worker sampling		
Characterization Cost	Table A (per CWM)	$593.48	per sample					2	days / sampling event
Analytical cost	TAL Metals	$75.00	per sample					4	hours prep
	VOCs	$62.00							
For each sampling event, assumed:		$50	for materials (gloves, notebooks, etc.)				Total Hours Mob	8	hrs
Typical Rental Rates - Includes G&A and 10% Profit							Total Hours Work	16	hrs
Mini-Rae Survey Mode PID		$96.08	per day		1.6 tons/cy				
Truck/SUV (1/2 ton or smaller)		$70.74	per day						
Horiba U-10 Water Quality Meter		$73.77	per day						
Submersible Pump		$42.16	per day		**Labor Costs for Leachate Disposal Event**				
2 in Pump Control Box		$72.27	per day		Labor Rate	$88	per hour		
Generator: 110 V		$57.24	per day		Travel Time	4	hours round trip		
Level D PPE		$11.91	per day		Days/Trip	3	days		
					Reporting	4	hrs		
Work day consists of:		8	hrs		Hours/Event	40	hours/event		
					Total Hours/Year	200	hours		
					Total Labor Cost/Year	$17,600	cost/year		
					Total Labor + Repoting + Truck	$18,661.10	cost/year		

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY	LOCATION	MEDIA	Estimated Cost to Implement	$934,000	
Alternative 2 **Treatment in Borrow Pit**	**Busy Bee Landfill** **Alfred Station, NY**	**Leachate** **Groundwater**	**Construction Time:**	1	months
			Operation Time:	-	months
			Post Remediation Monitoring	30	years

Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$147,000**
Leachate Tank (UST) Replacement		**1**			**$0**		**$11,425**		**$4,628**	**$53,702**	**$59,053**
Removal											
BB-T1 North (15,000 ;	*02 65 10.30 0130*	1	tank	$ -	$ -	$ -	$1,193	$ -	$655	$ -	$1,848.55
BB-T1 South (18,000 ;	*02 65 10.30 0130*	1	tank	$ -	$ -	$ -	$1,193	$ -	$655	$ -	$1,848.55
BB-T2 North (2,000 g;	*02 65 10.30 0110*	1	tank	$ -	$ -	$ -	$711	$ -	$116	$ -	$827.02
BB-T2 North (4,000 g;	*02 65 10.30 0110*	1	tank	$ -	$ -	$ -	$711	$ -	$116	$ -	$827.02
Replacement											
2,000 gal tank	*Engineer's Estimate*	1	tank	$3,000	$ -	$ -	$1,422	$ -	$232	$4,654	$4,654
4,000 gal tank	*Engineer's Estimate*	1	tank	$5,000	$ -	$ -	$1,422	$ -	$232	$6,654	$6,654
15,000 gal tank	*Engineer's Estimate*	1	tank	$15,000	$ -	$ -	$2,386	$ -	$1,311	$18,697	$18,697
20,000 gal tank	*Engineer's Estimate*	1	tank	$20,000	$ -	$ -	$2,386	$ -	$1,311	$23,697	$23,697
Permitting/Reporting/Site Preparation											**$69,465**
ROD Ammendment		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$15,000	$15,000
SPDES Permit Application		1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$12,000	$12,000
Utiliity Locator (based on recent bid)	*recent quote*	1	day	$ -	$ -	$ -	$ -	$ -	$ -	$2,465	$2,465
Work Plan Preparation	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$10,000	$10,000
Erosion and Sediment Control Plan	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$5,000	$5,000
Treatability Study	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$25,000	$25,000
Piping Between BB-T2 and BB-T1											**$91,284**
Excavation; trenching (4-6' deep); 3/4 CY bucket	*31 23 16.13 0110*	11,184	bcy	$ -	$ -	$3	$38,025.60	$3	$31,091.52	$6	$69,117.12
Public sanitary sewer piping, PVC, 4" diameter, 20' lengths	*33 31 13.25 2000*	800	lf	$1	$1,120	$4	$3,152	$ -	$ -	$5	$4,272
Backfill; 105 HP Dozer; Existing Stockpile	*31 23 23.14 3020*	13,980	lcy	$ -	$ -	$1	$9,087	$1	$8,807.40	$1	$17,894
Borrow Pond Construction											**$26,244**
Excavate for open channel; trenching (1-4' deep); 3/4 CY bucl	*31 23 16.13 0062 / Engineer's Estimate*	13	bcy	$ -	$ -	$8	$98	$6	$80	$14	$178.37
Stone; 3/4" to 1 1/2"	*03 05 13.25 1050 / Engineer's Estimate*	200	cy	$68	$13,620	$ -	$ -	$ -	$ -	$68	$13,620.00
Geotextile Fabric, non-woven, 120lb tensile strength	*31 32 19.16 1550 / Engineer's Estimate*	175	sy	$2	$391	$ 0.70	$ 122.33	$ -	$ -	$3	$513.77
Excavate/Dredge Pond	*31 23 16.13 0050 / Engineer's Estimate*	606	bcy	$ -	$ -	$ 13.50	$ 8,176.68	$ 6.20	$3,755.22	$20	$11,931.90
Mobilization and Demobilization											**$24,605**
10% of Total Costs of Site Work, Treatment										$246,046	$24,604.60
Contingency											**$36,907**
15% of Total Construction Activities										$246,046	$36,906.90
Professional/Technical Services											**$41,828**
5% Project Management										$246,046	$12,302.30
6% Remedial Design											$14,762.76
6% Construction Management											$14,762.76

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY	LOCATION	MEDIA	Estimated Cost to Implement	$934,000	
Alternative 2 **Treatment in Borrow Pit**	**Busy Bee Landfill** **Alfred Station, NY**	**Leachate** **Groundwater**	**Construction Time:**	1	months
			Operation Time:	-	months
			Post Remediation Monitoring	30	years

		Quantities		**Cost Breakdown (if available)**						**Combined Unit Costs**	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
LONG TERM MONITORING		**YEARS 1-3**						**ANNUAL LTM COST**			**$25,090**
		YEARS 3 + (No Pond Maint.)						**ANNUAL LTM COST**			**$15,740**
		YEARS 3 + (Incl. Pond Dredging)						**ANNUAL LTM COST**			**$197,220**
								LIFETIME LTM (NPV)			**$786,800**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 20% of combined sampling event for on-site and off-site											$5,778
Site Monitoring											**$3,290**
Inspection of landfill cover		1	hr	$ -	$ -	$ 88.00	$ 88	$ -	$ -	$ 88	$88
Groundwater sampling for 1 event - Includes collection of field parameters		13	well	$ -	$ -	$ 88.00	$ 1,144	$ 424	$ 424	$ 512	$1,568
Materials	*Engineer's Estimate*	1	event	$ 50.00	$ -	$ -	$ -	$ -	$ -	$ -	$50
Mobilization/Demobilization of Field Crew	*Engineer's Estimate*	1	event	$ -	$ -	$ 88.00	$ 704	$ -	$ -	$ 704	$704
Reporting		10	hr	$ 88.00	$ 880	$ -	$ -	$ -	$ -	$ -	$880
SPDES Monitoring, Years 1 - 3 (monthly)		12	events								**$7,449**
Outfall Sampling		1	event	$ -	$ -	$88	$ 374	$ 71	$ 71	$ 159	$445
Reporting (one report needed for each event)	*Engineer's Estimate*	1	report	$ -	$ -	$88	$ 176	$ -	$ -	$ 88	$176
SPDES Monitoring, Years 3+ (quarterly)		4	events								**$2,483**
Outfall Sampling		1	event	$ -	$ -	$88	$ 374	$ 71	$ 71	$ 159	$445
Reporting (one report needed for each event)	*Engineer's Estimate*	1	report	$ -	$ -	$88	$ 176	$ -	$ -	$ 88	$176
Groundwater Sampling Laboratory Analysis											**$2,488**
Metals, plus 20% QA/QC	*Recent bid from Accutest*	13	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 83	$1,287
VOCs, plus 20% QA/QC	*Recent bid from Accutest*	13	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 77	$1,201
SPDES Sampling Laboratory Analysis		1	event								**$548**
Metals, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 83	$99
VOCs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 77	$92
SVOCs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 165	$198
Pesticides / PCBs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 132	$158
Maintenance- Cap Maintenance											**$4,089**
Mowing brush, tractor with rotary mower, Medium density 2x per year	*32 01 90.19 1670*	55	msf	$ -	$ -	$ -	$ -	$ -	$ -	$ 74.80	$4,089
Maintenance- Pond Maintenance											**$181,480**
Excavate/Dredge Pond	*31 23 16.13 0050*	606	bcy	$ -	$ -	$ 6.75	$ 4,088.34	$ 3.10	$1,877.61	$10	$5,965.95
Confirmation Sampling (TCLP)	*Recent bid from Accutest*	2	samples	$ -	$ -	$ -	$ -	$ -	$ -	$ 539.00	$1,078
Transpotation & Disposal	*recent quote / Engineer's Estimate*	872	tons	$ -	$ -	$ -	$ -	$ 200.00	$ 174,436	$ 200.00	$174,436
Lifetime Long Term Monitoring (Net Present Value)											
30 Years of Bi-Annual Monitoring											
5% Discount Factor (per NYSDEC)											
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$934,000**

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY	LOCATION	MEDIA	Estimated Cost to Implement	$934,000	
Alternative 2 **Treatment in Borrow Pit**	**Busy Bee Landfill** **Alfred Station, NY**	**Leachate** **Groundwater**	**Construction Time:**	1	months
			Operation Time:	-	months
			Post Remediation Monitoring	30	years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost

Assumptions:

Working condition is Safety Level:		D/C	(Labor productivity:	82%	; Equipment productivity:	100%	)	
Weighted Average of city cost index (Buffalo, NY)		101.4%	(not applicable for costs derived from vendor quotes).					
Costs are loaded with a profit factor		10%						
Inflation		3%	per year					Labor
Estimated number of groundwater samples		13	samples	1	times sampled	1.00	hrs/sample	$88 Cost per hr
				20%	added for QA/QC samples	1	worker sampling	
Characterization Cost	Table A (per CWM)	$593.48	per sample					1 hrs / well sampling
Analytical cost	TAL Metals	$75.00	per sample					1 worker/gw sample
	VOCs	$62.00						
For each sampling event, assumed:		$50	for materials (gloves, notebooks, etc.)					

Typical Rental Rates - Includes G&A and 10% Profit

Mini-Rae Survey Mode PID	$96.08	per day	1.6 tons/cy		2 days / sampling event
Truck/SUV (1/2 ton or smaller)	$70.74	per day			4 hours prep
Horiba U-10 Water Quality Meter	$73.77	per day			
Submersible Pump	$42.16	per day		Total Hours Mob	8 hrs
2 in Pump Control Box	$72.27	per day		Total Hours Work	16 hrs
Generator: 110 V	$57.24	per day			
Level D PPE	$11.91	per day		**SPDES Monitoring**	

Work day consists of: 10 hrs

SPDES Monitoring		
Time to Site From Buffalo Office	2	hr
Mileage (Round Trip)	190	miles
Sampling Time	0.25	hr
Reporting	2	hr
Cost of One Event	$620.74	
(includes truck, and time cost)		

Volume Calculations

Trench / Piping				**Tank Volumes**	BB-T1 North	15,000	gals	**Pond Dredging**	
Length of trench between BB-T1 and BB-T2		800	ft		BB-T1 South	18,000	gals	Depth	2 ft
Depth of trench		6	ft		BB-T2 North	2,000	gals	Area	5451.12 sq ft
Width (of 3/8 CY bucket		2	ft		BB-T2 South	4,000	gals		
								Vol	605.7 bcy
VOLUME		11,184	bcy		Total	39,000		Density	120 lb/ft3
		13,980	lcy		FS 50%	60,000	gal		1.44 ton/cy
						8,021	cu ft	Total Tons	872.2
Open Channel	Length	75	ft	**Borrow Pit**	Area	5451.12	sq. ft		
	Depth	2	ft		Depth	1.47140955	ft	Sample Density	
		349.5	cu ft						1 sample/500 tons
		12.944432	bcy	Wetland Plant Density		2725.56	1 plant per 2 square feet		

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY	LOCATION	MEDIA	Estimated Cost to Implement	$1,055,000	
Alternative 3 **Treatment in Constructed Wetland**	**Busy Bee Landfill** **Alfred Station, NY**	**Leachate** **Groundwater**	**Construction Time:**	1	months
			Operation Time:	-	months
			Post Remediation Monitoring	30	years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$187,000**
Leachate Tank (UST) Replacement		**1**			**$0**		**$11,425**		**$4,628**	**$53,702**	**$59,053**
Removal											
BB-T1 North (15,000 g	*02 65 10.30 0130*	1	tank	$ -	$ -	$ -	$1,193	$ -	$655	$ -	$1,848.55
BB-T1 South (18,000 g	*02 65 10.30 0130*	1	tank	$ -	$ -	$ -	$1,193	$ -	$655	$ -	$1,848.55
BB-T2 North (2,000 ga	*02 65 10.30 0110*	1	tank	$ -	$ -	$ -	$711	$ -	$116	$ -	$827.02
BB-T2 North (4,000 ga	*02 65 10.30 0110*	1	tank	$ -	$ -	$ -	$711	$ -	$116	$ -	$827.02
Replacement											
2,000 gal tank	*Engineer's Estimate*	1	tank	$3,000	$ -	$ -	$1,422	$ -	$232	$4,654	$4,654
4,000 gal tank	*Engineer's Estimate*	1	tank	$5,000	$ -	$ -	$1,422	$ -	$232	$6,654	$6,654
15,000 gal tank	*Engineer's Estimate*	1	tank	$15,000	$ -	$ -	$2,386	$ -	$1,311	$18,697	$18,697
20,000 gal tank	*Engineer's Estimate*	1	tank	$20,000	$ -	$ -	$2,386	$ -	$1,311	$23,697	$23,697
Permitting/Reporting/Site Preparation											**$69,465**
ROD Ammendment	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$15,000	$15,000
SPDES Permit Application	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$12,000	$12,000
Utiliity Locator (based on recent bid)	*based on recent quote*	1	day	$ -	$ -	$ -	$ -	$ -	$ -	$2,465	$2,465
Work Plan Preparation	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$10,000	$10,000
Erosion and Sediment Control Plan	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$5,000	$5,000
Treatability Study	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$25,000	$25,000
Piping Between BB-T2 and BB-T1											**$91,284**
Excavation; trenching (4-6' deep); 3/4 CY bucket	*31 23 16.13 0110*	11,184	bcy	$ -	$ -	$3	$38,025.60	$3	$31,091.52	$6	$69,117.12
Public sanitary sewer piping, PVC, 4" diameter, 20' lengths	*33 31 13.25 2000*	800	LF	$1	$1,120	$4	$3,152	$ -	$ -	$5	$4,272
Backfill; 105 HP Dozer; Existing Stockpile	*31 23 23.14 3020*	13,980	lcy	$ -	$ -	$1	$9,087	$1	$8,807.40	$1	$17,894
Wetland Construction											**$58,389**
Excavation; trenching (1-4' deep); 3/4 CY bucket	*31 23 16.13 0062 / Engineer's Estimate*	13	bcy	$ -	$ -	$8	$98	$6	$80	$14	$178.37
Excavation of wetland area	*31 23 16.13 0050 / Engineer's Estimate*	606	bcy	$ -	$ -	$20	$12,265	$6	$3,755	$26	$16,020.24
Stone; 3/4" to 1 1/2"	*03 05 13.25 1050 / Engineer's Estimate*	200.00	cy	$68	$13,620	$ -	$ -	$ -	$ -	$68	$13,620.00
Geotextile Fabric, non-woven, 120lb tensile strength	*31 32 19.16 1550 / Engineer's Estimate*	175	sy	$2	$391	$ 0.70	$ 122.33	$ -	$ -	$3	$513.77
Native wetland plants	*based on recent quote*	5,500	plants	$ -	$ -	$ -	$ -	$ -	$ -	$4	$22,000
Compost	*based on recent quote*	202	cy	$30	$6,057	$ -	$ -	$ -	$ -	$30	$6,057
Mobilization and Demobilization											**$27,819**
10% of Total Costs of Site Work, Treatment										$278,191	$27,819.11
Contingency											**$41,729**
15% of Total Construction Activities										$278,191	$41,728.67
Professional/Technical Services											**$47,292**
5% Project Management										$278,191	$13,909.56
6% Remedial Design											$16,691.47
6% Construction Management											$16,691.47

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY		LOCATION		MEDIA		Estimated Cost to Implement				$1,055,000	
Alternative 3 Treatment in Constructed Wetland		Busy Bee Landfill Alfred Station, NY		Leachate Groundwater		Construction Time: Operation Time: Post Remediation Monitoring				1 - 30	months months years
		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
LONG TERM MONITORING			**YEARS 1-3**					**ANNUAL LTM COST**			**$25,090**
			YEARS 3 + (No Pond Maint.)					**ANNUAL LTM COST**			**$15,740**
			YEARS 3 + (Incl. Pond Dredging)					**ANNUAL LTM COST**			**$225,277**
								LIFETIME LTM (NPV)			**$867,700**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 20% of combined sampling event for on-site and off-site											$5,778
Site Monitoring											**$3,290**
Inspection of landfill cover	*Engineer's Estimate*	1	hr	$ -	$ -	$ 88.00	$ 88	$ -	$ -	$ 88	$88
Groundwater sampling for 1 event - Includes collection of field parameters		13	well	$ -	$ -	$ 88.00	$ 1,144	$ 424	$ 424	$ 512	$1,568
Materials	*Engineer's Estimate*	1	event	$ 50.00	$ -	$ -	$ -	$ -	$ -	$ -	$50
Mobilization/Demobilization of Field Sampling (	*Engineer's Estimate*	1	event	$ -	$ -	$ 88.00	$ 704	$ -	$ -	$ 704	$704
Reporting	*Engineer's Estimate*	10	hr	$ 88.00	$ 880	$ -	$ -	$ -	$ -	$ 88	$880
SPDES Monitoring, Years 1 - 3 (monthly)		12	events								**$7,449**
Outfall Sampling		1	event	$ -	$ -	$88	$ 374	$ 71	$ 71	$ 159	$445
Reporting (one report needed for each event)	*Engineer's Estimate*	1	report	$ -	$ -	$88	$ 176	$ -	$ -	$ 88	$176
SPDES Monitoring, Years 3+ (quarterly)		4	events								**$2,483**
Outfall Sampling		1	event	$ -	$ -	$88	$ 374	$ 71	$ 71	$ 159	$445
Reporting (one report needed for each event)	*Engineer's Estimate*	1	report	$ -	$ -	$88	$ 176	$ -	$ -	$ 88	$176
Groundwater Sampling Laboratory Analysis											**$2,488**
Metals, plus 20% QA/QC	*Recent bid from Accutest*	13	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 83	$1,287
VOCs, plus 20% QA/QC	*Recent bid from Accutest*	13	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 77	$1,201
SPDES Sampling Laboratory Analysis		1	event								**$548**
Metals, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 83	$99
VOCs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 77	$92
SVOCs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 165	$198
Pesticides / PCBs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 132	$158
Maintenance- Cap Maintenance											**$4,089**
Mowing brush, tractor with rotary mower, Medium density 2x per year	*32 01 90.19 1670*	55	msf	$ -	$ -	$ -	$ -	$ -	$ -	$ 74.80	$4,089
Maintenance- Pond Maintenance		1	event								**$209,537**
Excavate/Dredge Pond	*31 23 16.13 0050*	606	bcy	$ -	$ -	$ 6.75	$ 4,088.34	$ 3.10	$1,877.61	$10	$5,965.95
Confirmation Sampling (TCLP)	*Recent bid from Accutest*	2	samples	$ -	$ -	$ -	$ -	$ -	$ -	$ 539.00	$1,078
Native wetland plants	*based on recent quote*	5,500	plants	$ -	$ -	$ -	$ -	$ -	$ -	$4	$22,000
Compost	*based on recent quote*	202	cy	$30	$6,057	$ -	$ -	$ -	$ -	$30	$6,057
Transpotation & Disposal	*recent quote / Engineer's Estimate*	872	tons	$ -	$ -	$ -	$ -	$ 200.00	$ 174,436	$ 200.00	$174,436
Lifetime Long Term Monitoring (Net Present Value)											
30 Years of Bi-Annual Monitoring											
5% Discount Factor (per NYSDEC)											
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$1,055,000**

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY	LOCATION	MEDIA	Estimated Cost to Implement	$1,055,000	
Alternative 3 Treatment in Constructed Wetland	Busy Bee Landfill Alfred Station, NY	Leachate Groundwater	Construction Time:	1	months
			Operation Time:	-	months
			Post Remediation Monitoring	30	years

Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost

Quantities — Cost Breakdown (if available)

Assumptions:

- Working condition is Safety Level: D/C (**Labor productivity:** 82% ; **Equipment productivity:** 100%)
- Weighted Average of city cost index (Buffalo, NY) 101.4% **(not applicable for costs derived from vendor quotes).**
- Costs are loaded with a profit factor 10%
- Inflation 3% per year

Estimated number of groundwater samples 13 samples; 1 times sampled; 20% added for QA/QC samples; 1.00 hrs/sample; 1 worker sampling; Labor $88 Cost per hr

Characterization Cost	Table A (per CWM)	$593.48 per sample	1	hrs / well sampling
Analytical cost	TAL Metals	$75.00 per sample	1	worker/gw sample
	VOCs	$62.00	Total Hours Mob 8	hrs
For each sampling event, assumed:		$50 for materials (gloves, notebooks, etc.)	Total Hours Work 16	hrs

Typical Rental Rates - Includes G&A and 10% Profit

Item	Rate	
Mini-Rae Survey Mode PID	$96.08	per day
Truck/SUV (1/2 ton or smaller)	$70.74	per day
Horiba U-10 Water Quality Meter	$73.77	per day
Submersible Pump	$42.16	per day
2 in Pump Control Box	$72.27	per day
Generator: 110 V	$57.24	per day
Level D PPE	$11.91	per day

1.6 tons/cy

SPDES Monitoring

Time to Site From Buffalo Office	2	hr
Mileage (Round Trip)	190	miles
Sampling Time	0.25	hr
Reporting	2	hr
Cost of One Event (includes truck, and time cost)	$620.74	

Work day consists of: 10 hrs

Volume Calculations

Trench / Piping

Length of trench between BB-T1 and BB-T2	800	ft
Depth of trench	6	ft
Width (of 3/8 CY bucket	2	ft
VOLUME	11,184	bcy
	13,980	lcy

Open Channel

Length	75	ft
Depth	2	ft
	349.5	cu ft
	12.944432	bcy

Tank Volumes

BB-T1 North	15,000	gals
BB-T1 South	18,000	gals
BB-T2 North	2,000	gals
BB-T2 South	4,000	gals
Total	39,000	
FS 50%	60,000	gal
	8,021	cu ft

Borrow Pit

Area	5451.12	sq. ft
Depth	1.47140955	ft

Wetland Plant Density 5451.12 1 plant per 1 square feet

Pond Dredging

Depth	2	ft
Area	5451.12	sq ft
Vol	605.7	bcy
Density	120	lb/ft3
	1.44	ton/cy
Total Tons	872.2	

Sample Density 1 sample/500 tons

Notes

sy	square yard	mo	month
cy	cubic yard	ls	lump sum
lcy	loose cubic yard	O&M	Operation and maintenance
bcy	bank cubic yard	H&S	Health and Safety
lf	linear feet		
sf	square feet		
msf	1,000 square feet		

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY		LOCATION		MEDIA		Estimated Cost to Implement				$1,360,000	
Alternative 4 Treatment in Two Constructed Wetland		Busy Bee Landfill Alfred Station, NY		Leachate Groundwater		Construction Time:				1	months
						Operation Time:				-	months
						Post Remediation Monitoring				30	years
		Quantities		Cost Breakdown (if available)						Combined Unit Costs	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
REMEDIAL ACTION		**TOTAL CAPITAL COST (totals rounded to nearest thousand)**									**$191,000**
Leachate Tank (UST) Replacement		**1**			**$0**		**$11,425**		**$4,628**	**$59,053**	**$59,053**
Removal											
BB-T1 North (15,000	*02 65 10.30 0130*	1	tank	$ -	$ -	$ -	$1,193	$ -	$655	$1,849	$1,848.55
BB-T1 South (18,000	*02 65 10.30 0130*	1	tank	$ -	$ -	$ -	$1,193	$ -	$655	$1,849	$1,848.55
BB-T2 North (2,000 g	*02 65 10.30 0110*	1	tank	$ -	$ -	$ -	$711	$ -	$116	$827	$827.02
BB-T2 North (4,000 g	*02 65 10.30 0110*	1	tank	$ -	$ -	$ -	$711	$ -	$116	$827	$827.02
Replacement											
2,000 gal tank	*Engineer's Estimate*	1	tank	$3,000	$ -	$ -	$1,422	$ -	$232	$4,654	$4,654
4,000 gal tank	*Engineer's Estimate*	1	tank	$5,000	$ -	$ -	$1,422	$ -	$232	$6,654	$6,654
15,000 gal tank	*Engineer's Estimate*	1	tank	$15,000	$ -	$ -	$2,386	$ -	$1,311	$18,697	$18,697
20,000 gal tank	*Engineer's Estimate*	1	tank	$20,000	$ -	$ -	$2,386	$ -	$1,311	$23,697	$23,697
Permitting/Reporting/Site Preparation											**$69,465**
ROD Ammendment	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$15,000	$15,000
SPDES Permit Application	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$12,000	$12,000
Utility Locator (based on recent bid)	*based on recent quote*	1	day	$ -	$ -	$ -	$ -	$ -	$ -	$2,465	$2,465
Work Plan Preparation	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$10,000	$10,000
Erosion and Sediment Control Plan	*Engineer's Estimate*	1	ls	$ -	$ -	$ -	$ -	$ -	$ -	$5,000	$5,000
Treatability Study	*Engineer's Estimate*	1	LS	$ -	$ -	$ -	$ -	$ -	$ -	$25,000	$25,000
Eastern Wetland Construction											**$54,301**
Excavate for open channel; trenching (1-4' deep); 3/4 CY buc	*31 23 16.13 0062 / Engineer's Estimate*	13	bcy	$ -	$ -	$8	$98	$6	$80	$14	$178.37
Excavation of wetland area	*31 23 16.13 0050 / Engineer's Estimate*	606	bcy			$14	$8,177	$6	$3,755	$20	$11,931.90
Stone; 3/4" to 1 1/2"	*03 05 13.25 1050 / Engineer's Estimate*	200	cy	$68	$13,620	$ -	$ -	$ -	$ -	$68	$13,620.00
Geotextile Fabric, non-woven, 120lb tensile strength	*31 32 19.16 1550 / Engineer's Estimate*	175	sy	$2	$391	$ 0.70	$ 122.33	$ -	$ -	$3	$513.77
Native wetland plants	*based on recent quote*	5,500	plants	$ -	$ -	$ -	$ -	$ -	$ -	$4	$22,000
Compost	*based on recent quote*	202	cy	$30	$6,057	$ -	$ -	$ -	$ -	$30	$6,057
Northern Western Wetland Construction											**$25,512**
Excavate for open channel; trenching (1-4' deep); 3/4 CY buc	*31 23 16.13 0062 / Engineer's Estimate*	13	bcy	$ -	$ -	$8	$98	$6	$80	$14	$178.37
Excavation of wetland area	*31 23 16.13 0050 / Engineer's Estimate*	0	bcy	$ -	$ -	$14	$0	$6	$0	$20	$0.00
Stone; 3/4" to 1 1/2"	*03 05 13.25 1050 / Engineer's Estimate*	200.00	cy	$68	$13,620	$ -	$ -	$ -	$ -	$68	$13,620.00
Geotextile Fabric, non-woven, 120lb tensile strength	*31 32 19.16 1550 / Engineer's Estimate*	175	sy	$2	$391	$ 0.70	$ 122.33	$ -	$ -	$3	$513.77
Native wetland plants	*based on recent quote*	800	plants	$ -	$ -	$ -	$ -	$ -	$ -	$4	$3,200
Compost	*based on recent quote*	267	cy	$30	$8,000	$ -	$ -	$ -	$ -	$30	$8,000
Mobilization and Demobilization											**$20,833**
10% of Total Costs of Site Work, Treatment										$208,331	$20,833.14
Contingency											**$31,250**
15% of Total Construction Activities										$208,331	$31,249.71
Professional/Technical Services											**$35,416**
5% Project Management										$208,331	$10,416.57
6% Remedial Design											$12,499.88
6% Construction Management											$12,499.88

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY		LOCATION		MEDIA				Estimated Cost to Implement			$1,360,000
Alternative 4 **Treatment in Two Constructed Wetland**		**Busy Bee Landfill** **Alfred Station, NY**		**Leachate** **Groundwater**						**Construction Time:**	**1** months
										Operation Time:	**-** months
										Post Remediation Monitoring	**30** years
		Quantities		**Cost Breakdown (if available)**						**Combined Unit Costs**	
Description	Data Source (Means[1] or Other)	Quantity Amount	Quantity Unit	Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Unit Cost	Option Total Cost
LONG TERM MONITORING		**YEARS 1-3**						**ANNUAL LTM COST**			**$32,770**
		YEARS 3 + (No Pond Maint.)						**ANNUAL LTM COST**			**$18,040**
		YEARS 3 + (Incl. Pond Dredging)						**ANNUAL LTM COST**			**$314,801**
								LIFETIME LTM (NPV)			**$1,168,510**
Monitoring, Sampling, Testing and Analysis (Per Event)											
Assume 20% of combined sampling event for on-site and off-site											$5,778
Site Monitoring											**$3,290**
Inspection of landfill cover		1	hr	$ -	$ -	$ 88.00	$ 88	$ -	$ -	$ 88	$88
Groundwater sampling for 1 event - Includes collection of field parameters		13	well	$ -	$ -	$ 88.00	$ 1,144	$ 424	$ 424	$ 512	$1,568
Materials	*Engineer's Estimate*	1	event	$ 50.00	$ -	$ -	$ -	$ -	$ -	$ -	$50
Mobilization/Demobilization of Field Sampling Crew		1	event	$ -	$ -	$ 88.00	$ 704	$ -	$ -	$ 704	$704
Reporting		10	hr	$ -	$ -	$ 88.00	$ 880	$ -	$ -	$ 88	$880
SPDES Monitoring, Years 1 - 3 (monthly)		12	events								**$8,505**
Outfall Sampling		1	event	$ -	$ -	$88	$ 462	$ 71	$ 71	$ 159	$533
Reporting (one report needed for each event)	*Engineer's Estimate*	1	report	$ -	$ -	$88	$ 176	$ -	$ -	$ 88	$176
SPDES Monitoring, Years 3+ (quarterly)		4	events								**$2,571**
Outfall Sampling		1	event	$ -	$ -	$88	$ 396	$ 71	$ 71	$ 159	$467
Reporting (one report needed for each event)	*Engineer's Estimate*	1	report	$ -	$ -	$88	$ 176	$ -	$ -	$ 88	$176
Groundwater Sampling Laboratory Analysis											**$2,488**
Metals, plus 20% QA/QC	*Recent bid from Accutest*	13	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 83	$1,287
VOCs, plus 20% QA/QC	*Recent bid from Accutest*	13	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 77	$1,201
SPDES Sampling Laboratory Analysis		1	event								**$1,100.00**
Metals, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 83	$99
VOCs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 77	$92
SVOCs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 165	$198
Pesticides / PCBs, plus 20% QA/QC	*Recent bid from Accutest*	1	ea	$ -	$ -	$ -	$ -	$ -	$ -	$ 132	$158
Maintenance- Cap Maintenance											**$4,089**
Mowing brush, tractor with rotary mower, Medium density 2x per year	*32 01 90.19 1670*	55	msf	$ -	$ -	$ -	$ -	$ -	$ -	$ 74.80	$4,089
Maintenance- Pond Maintenance											**$296,761**
Excavate/Dredge Pond	*31 23 16.13 0050*	695	bcy	$ -	$ -	$ 6.75	$ 4,689.84	$ 3.10	$2,153.85	$10	$6,843.69
Confirmation Sampling (TCLP)	*Recent bid from Accutest*	3	samples	$ -	$ -	$ -	$ -	$ -	$ -	$ 539.00	$1,617
Native wetland plants	*based on recent quote*	6300	plants	$ -	$ -	$ -	$ -	$ -	$ -	$4	$25,200
Compost	*based on recent quote*	2100	cy	$30	$63,000	$ -	$ -	$ -	$ -	$30	$63,000
Transpotation & Disposal	*recent quote / Engineer's Estimate*	1,000	tons	$ -	$ -	$ -	$ -	$ 200.00	$ 200,100	$ 200.00	$200,100
Lifetime Long Term Monitoring (Net Present Value)											
30 Years of Bi-Annual Monitoring											
5% Discount Factor (per NYSDEC)											
TOTAL ESTIMATED NPV TECHNOLOGY COST (Capital + Lifetime O&M + Post Remediation Monitoring)											**$1,360,000**

TABLE 6 ALTERNATIVE COSTING SHEETS

TECHNOLOGY	LOCATION	MEDIA	Estimated Cost to Implement	$1,360,000
Alternative 4 **Treatment in Two Constructed Wetland**	**Busy Bee Landfill** **Alfred Station, NY**	**Leachate** **Groundwater**	**Construction Time:** **Operation Time:** **Post Remediation Monitoring**	**1** months **-** months **30** years

Description	Data Source (Means[1] or Other)	Quantities: Quantity Amount	Quantity Unit	Cost Breakdown (if available): Material Unit Cost	Material Total Cost	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Combined Unit Costs: Unit Cost	Option Total Cost

Assumptions:

Working condition is Safety Level:	D/C	(Labor productivity: 82% ; Equipment productivity: 100%)	
Weighted Average of city cost index (Buffalo, NY)	101.4%	(not applicable for costs derived from vendor quotes).	
Costs are loaded with a profit factor	10%		
Inflation	3%	per year	

Estimated number of groundwater samples		13	samples	1	times sampled	1.00	hrs/sample	$88	Labor Cost per hr
				20%	added for QA/QC samples	1	worker sampling		
Characterization Cost	Table A (per CWM)	$593.48	per sample					1	hrs / well sampling
Analytical cost	TAL Metals	$75.00	per sample					1	worker/gw sample
	VOCs	$62.00				Total Hours Mob		8	hrs
For each sampling event, assumed:		$50	for materials (gloves, notebooks, etc.)			Total Hours Work		16	hrs

Typical Rental Rates - Includes G&A and 10% Profit				**SPDES Monitoring**	
Mini-Rae Survey Mode PID	$96.08	per day	1.6 tons/cy		
Truck/SUV (1/2 ton or smaller)	$70.74	per day		Time to Site From Buffalo Office	2 hr
Horiba U-10 Water Quality Meter	$73.77	per day		Mileage (Round Trip)	190 miles
Submersible Pump	$42.16	per day		Sampling Time	0.25 hr
2 in Pump Control Box	$72.27	per day		Reporting	2 hr
Generator: 110 V	$57.24	per day			
Level D PPE	$11.91	per day			
				Cost of One Event	$620.74
Work day consists of:	10	hrs		(includes truck, and time cost)	

Volume Calculations

Trench / Piping				Tank Volumes	BB-T1 North	15,000	gals		
Length of trench between BB-T1 and BB-T2		800	ft		BB-T1 South	18,000	gals		
Depth of trench		6	ft		BB-T2 North	2,000	gals		
Width (of 3/8 CY bucket		2	ft		BB-T2 South	4,000	gals		
						BB-T1		BB-T2	
VOLUME		11,184	bcy		Total	33,000	gal	6,000	gal
		13,980	lcy		FS 50%	50,000	gal	9,000	gal
						6,684	cu ft	1203	cu ft
Open Channel	Length	75	ft	Borrow Pit	Area	5451.12	sq. ft	802	sqft
	Depth	2	ft		Depth	1.22617003	ft		
		349.5	cu ft						
		12.944432	bcy	Wetland Plant Density		5451.12	1 plant per 1 square feet	802	1 plant per 1 square feet

					BB-T1 Pond Dredging			**BB-T2 Pond Dredging**		
Notes					Depth	2	ft	Depth	2	ft
sy	square yard	mo	month		Area	5451.12	sq ft	Area	802	sq ft
cy	cubic yard	ls	lump sum							
lcy	loose cubic yard	O&M	Operation and maintenance		Vol	605.7	bcy	Vol	89.1	bcy
bcy	bank cubic yard	H&S	Health and Safety		Density	120	lb/ft3	Density	120	lb/ft3
lf	linear feet					1.44	ton/cy		1.44	ton/cy
sf	square feet				Total Tons	872.2		Total Tons	128.3	
msf	1,000 square feet									
					Sample Density			Sample Density		
						1	sample/500 tons		1	sample/500 tons