CROUSE-HINDS LANDFILL
ONONDAGA COUNTY, NEW YORK
NYSDEC SITE NUMBER: 7-34-004

SITE MANAGEMENT PLAN

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1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 Introduction

This document is required as an element of the remedial program at the Cooper Crouse-Hinds North and South Landfills (hereinafter referred to as the "Site") under the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program administered by New York State Department of Environmental Conservation (NYSDEC). The site was remediated in accordance with Order on Consent Index No. R7-0666-05-11, Site No. 7-34-004, which became effective on September 8, 2011.

1.1.1 General

Cooper Industries entered into an Order on Consent with the NYSDEC to remediate a 21.5-acre North Landfill located in the Town of Salina and a 19.4-acre South Landfill located in the City of Syracuse, Onondaga County, New York. This Order on Consent required the Remedial Party, Cooper Industries, to investigate and remediate contaminated media at the site. A figure showing the site location is provided in Figure 1 and boundaries of the area subject to this plan is provided in Figure 2. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement.

After completion of the remedial work described in the Remedial Action Work Plan, some contamination was left in the subsurface at this site, which is hereafter referred to as "remaining contamination." This Site Management Plan (SMP) was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by Tetra Tech, Inc., on behalf of Cooper, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, effective June 18, 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the site.

1.1.2 Purpose

The site contains contamination left after completion of the remedial action. Engineering Controls have been incorporated into the site remedy to control exposure to remaining contamination during the use of the site to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Onondaga County Clerk, will require compliance with this SMP and all ECs and ICs placed on the site. The ICs place restrictions on site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary to ensure compliance with all ECs and ICs required by the Environmental Easement for contamination that remains at the site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the

Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; (3) maintenance of the landfill caps; and (4) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports.

To address these needs, this SMP includes three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) a Maintenance Plan for the landfill composite cover systems.

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the Order on Consent Index No. R7-0666-05-11, Site No. 7-34-004, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this plan will be proposed in writing to NYSDEC's project manager. In accordance with the Environmental Easement for the site, NYSDEC will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.2 Site Background

1.2.1 Site Location and Description

The Cooper Crouse-Hinds, LLC (CC-H) Site consists of two former landfills, referred to as the North Landfill and South Landfill, with associated wetland areas, separated by Seventh North Street, which are located immediately west of CSX railroad tracks and the adjacent operating CC-H manufacturing facility. The Site is located in the Town of Salina (North Landfill) and City of Syracuse (South Landfill), Onondaga County, New York (Latitude 043º 05' 7" N, Longitude 076º 09' 40" W). The North Landfill consists of three contiguous parcels (Tax ID Nos. 073.-01-08.1, 073.-01-08.3, and 073.-01-08.4) totaling 21.48 acres in size. The South Landfill consists of one parcel (Tax Map ID: 001.1-01-03.0) totaling 19.4 acres in size. The Site is located in an area of mixed usage including light industrial/manufacturing, commercial and retail. Seventh North Street is oriented southeast-northwest and separates the two landfills that comprise the Site. A Site Location

Map is presented as Figure 1 and a Site Plan is presented as Figure 2. The South Landfill is currently zoned as "IA" Industrial by the City of Syracuse. The North Landfill is currently zoned as "I-1" Industrial by the Town of Salina.

1.2.1.1 Landfills

The North Landfill is bordered along its northern border by a former landfill (approximately 37 acres) owned by Plaza East, LLC (Plaza), which consists of areas of fill (municipal waste and miscellaneous debris) with woodland cover and wetland areas. The North Landfill is bordered to the east and southeast by CSX railroad tracks and the CC-H facility and to the south and southwest by Seventh North Street and the South Landfill. West of the North Landfill are wetlands (Plaza property) adjacent to Ley Creek.

The South Landfill is bordered to the north by Seventh North Street and the North Landfill. To the east and southeast of the South Landfill are CSX railroad tracks followed by mixed commercial and retail development and Hiawatha Boulevard. Further to the South are undeveloped woods and wetlands. Mixed commercial and retail development border the South Landfill further to the south. Ley Creek abuts the entire west and northwest boundary of the South Landfill.

Review of available historical documentation indicates that prior to the mid-to-late 1950s the North and South Landfills had been occupied by low lying fields, salt marshes and woodlands. From the mid-1950s to 1989 fill material had been placed across various areas of the North and South Landfills. An overall Site Plan is shown on Figure 2. 2013 topographic conditions are shown on the topographic map included as Figure 3.

1.2.1.2 Topography

The pre-remediation 2013 site topography is shown on Figure 3. Topography of the North Landfill is generally flat across the southern half of the landfill; however, moving to the north from the central area of the North Landfill, the elevation rises moderately and increases to a notably mounded area of the landfill. Topography slopes moderately to steeply downward from the fill-mound along the northern portion of the North Landfill. Drainage across the North Landfill is generally radially outward from the fill-mound area in all directions. Drainage to the north and west is to the west wetland (Wetland B) and then to the adjacent wetland property owned by Plaza East. Drainage to the south and east is towards the east wetland (Wetland A) and the eastern stream segment (Stream A).

Pre-remediation topography of the South Landfill is generally flat across the landfill area. Topography along the edges of the fill-mound slopes moderately to steeply away from the fill-mound to the north, east, south and west. Drainage across the South Landfill is generally radially outward from the fill-mound in all directions. Drainage to the east-southeast is to the stream (Stream B) and wetland areas (Wetland C) located on the east-southeast side of the landfill. Drainage to the south is to the wetland area (Wetland C) located to the south of the fill-mound. Drainage to the west is collected along the landfill's western border for drainage into Wetland C and eventual flows to Ley Creek.

1.2.1.3 Surface Water Features

Ley Creek is located between 80 feet and 120 feet west of the western property boundary of the North Landfill and adjacent to the western boundary of the South Landfill (Figure 2). Ley Creek is part of the Onondaga Lake drainage basin and flows to the south/southwest towards Onondaga Lake. Between the mouth of Ley Creek and the Onondaga County Ley Creek Transfer Station and former sewage treatment plant (POTW) outfall, Ley Creek is classified as a Class C water body. From the POTW outfall to a point located 3.1 miles north of the creek mouth, Ley Creek is classified as a Class B water body. The section of Ley Creek adjacent to the CC-H Landfill Site is classified as a Class C water body. Flood insurance maps indicate that the CC-H Landfill Site is located within the 100-year flood plain of Ley Creek as defined by the Federal Emergency Management Agency (FEMA). The base flood water surface water elevation for the Site is 374 feet AMSL.

Bear Trap Creek drains into Ley Creek at its terminus that is located approximately 260 feet west of the southwest corner of the North Landfill, which is to the immediate north of the bridge at Seventh North Street that crosses Ley Creek (Figure 2). Bear Trap Creek extends northward from its terminus and receives drainage from areas that range from undeveloped usage to commercial usage and potentially light industrial usage.

Two stream segments and one drainage ditch are located on the CC-H Landfill Site and are described in the next section.

1.2.1.4 Wetlands

Prior to remediation in November 2005, wetland delineation was conducted across the Site to define the extent of wetlands on-site. All work was conducted according to the criteria set forth in the *1987 United States Army Corps of Engineers Wetlands Delineation Manual*, *Classification of Wetlands and Deepwater Habitats of the United States*, and the *1995 NYSDEC Freshwater Wetlands Delineation Manual*. Wetland areas identified on-site are described further below.

Two wetland areas and one stream section were identified on the North Landfill (Figure 2). The first wetland, Wetland A (a.k.a. the “east wetland”) extends along the majority of the southeastern side of the North Landfill. The east wetland receives flow from an off-site drainage ditch/stream from the Plaza East former landfill and CSX Railroad properties that enter the wetland at the east corner of the landfill. Surface water in this ditch/stream appears to originate as surface water runoff and drainage from and across the adjacent properties owned by Plaza East, LLC and CSX Railroad. Surface water discharge from the east wetland is to a stream (Stream A) that flows southwest from Wetland A to the south point of the North Landfill where it then turns to the northwest and parallels Seventh North Street. At its terminus, the stream discharges into two 24-inch diameter culverts, which carry flow beneath Seventh North Street and into a drainage ditch that is located along the northeast boundary of the South Landfill. Drainage in the ditch flows northwest and ultimately discharges to Ley Creek. The second wetland, Wetland B (a.k.a. the “west wetland”) is located along the northwest side of the North Landfill. Wetland B occurs adjacent to and within the flood plain of Ley Creek and extends offsite from the northwest

property boundary, and across the adjacent property owned by Plaza East, LLC, to Ley Creek. Wetland B is identified on National Wetland Inventory (NWI) maps (ID No. PFO1/SS1E).

One wetland area, stream section, and drainage ditch were identified on the South Landfill (Figure 2). Wetland C (a.k.a. the "south wetland") is located south of the southwest point of the South Landfill. The stream section (Stream B) extends along the southeast side of the South Landfill. The stream channel begins near the east point of the landfill and runs parallel with the CSX railroad tracks and southeastern edge of the landfill until it enters the Wetland C. Upon entering Wetland C, the stream flows southwest along the northwest edge of Wetland C.

Prior to 2009, surface water from Stream B and Wetland C discharged into Ley Creek at the terminus of the stream via a 36-inch diameter culvert pipe. The culvert pipe was removed in 2009 and the area backfilled with imported gravel material and fill (Figure 2) to prevent the flow of surface water and entrained sediments from Ley Creek to the South Landfill and vice versa. There is no longer a discharge point to Ley Creek; however, surface water can still flow along Stream B and into Wetland C.

Surface water flow in Stream B appears to be primarily from surface water runoff from the South Landfill and the adjacent CSX railroad property. Observations indicate that flow in the stream is generally limited to times of heavy runoff due to either rainfall events or snow melt. Generally, the upper one third of the stream area is dry for the majority of the year. Prior to the removal of the 36-inch culvert pipe, observations indicated that surface water from Ley Creek flowed into Stream B and Wetland C during high water events in Ley Creek.

The drainage ditch is located along the northern boundary of the South Landfill and Seventh North Street. Flow in the ditch is to the northwest to its terminus where it discharges into Ley Creek. The ditch accepts discharge from a culvert pipe located at the head of the ditch and from the two 24-inch culvert pipes leading beneath the roadway. The source of flow from the culvert pipe at the head of the ditch is from unknown off-site sources to the southeast. The head of the ditch is located at an elevation of approximately two feet below the head of the South Landfill (Stream B) and does not provide discharge flow to Stream B.

Based on the NYSDEC wetlands maps, the wetlands located on the North and South Landfills are not under the direct jurisdiction of New York State. The United States Army Corps of Engineers (USACE) provided a preliminary Jurisdictional Determination (JD) dated June 19, 2009 on these wetland areas.

1.2.2 Site History

Available information indicates that prior to the mid-1950s the area of the North Landfill had been undeveloped and occupied by fields, salt marshes and woodlands. Beginning in the mid-1950s, CC-H reportedly began using the North Landfill for disposal of wastes that were generated at their adjacent manufacturing facility. Between the mid- 1950s and 1972

the North Landfill reportedly accepted an unknown quantity of solid industrial waste (i.e., foundry sand) from the CC-H facility. In April of 1981, CC-H applied for a Part 360 permit to operate the North Landfill as a non-hazardous landfill. On March 10, 1982, CC-H withdrew its application. Waste disposal was discontinued at the North Landfill in 1989. The North Landfill has been inactive since 1989.

Available information indicates that prior to 1959 the area of the South Landfill had been undeveloped and occupied by fields, salt marshes and woodlands. Beginning in 1960, CC-H reportedly began using the South Landfill for disposal of wastes that were generated at their adjacent manufacturing facility. Between 1960 to early 1965 the South Landfill also accepted approximately 2,000 cubic yards per week of municipal solid waste (sanitary, domestic, trash, debris, etc.) from the City of Syracuse.

In a memo dated December 1, 1960, from the City of Syracuse Department of Public Works (DPW) to CC-H, the DPW indicated that the landfill (reportedly the South Landfill) would be prepared for usage in a way that would correct drainage issues in ditches and culverts across the South Landfill and along Seventh North Street and also in a way that would allow for the development of a lagoon for use in clarifying liquid plant wastes. [Note: The source of the liquid waste was not identified]. It was also indicated at this time (1960) that the Ley Creek channel west from Seventh North Street would be cleaned for the length of the CC-H creek frontage to improve area drainage and reduce odor problems. In a memo dated June 9, 1961, from the City of Syracuse DPW to CC-H, the DPW presented a plan for cleaning the ditches across the North and South Landfills in lieu of conducting cleaning of the Ley Creek channel by crane and drag-line. The date of channel cleaning completed by the City of Syracuse DPW, and/or how the sediments from Ley Creek were handled and where they were disposed of was not noted in available documentation. However, it is clear from available documentation and aerial photographs that the DPW actively modified drainage in ditches along the east side of both the North and South Landfills and along Seventh North Street to facilitate usage of the South Landfill by DPW. The location of these ditches also correlates with the location of the stream sections (Stream A and B) and drainage ditches that are currently mapped on the CC-H Site in Figure 2.

At some time in early 1965, CC-H terminated use of the South Landfill by the City of Syracuse due to concerns over the remaining useful volume of the fill area and because the City was not providing cover material per the agreement. Waste disposal activities were reportedly discontinued at the South Landfill in 1969 and the South Landfill has been inactive since that time.

After the City of Syracuse's use of the South Landfill was terminated in 1965, the City entered into an agreement with Plaza East, LLC to dispose of municipal solid waste on property located immediately north of the North Landfill. Access to this area was through a 100-foot wide strip of land located along the northwest portion of Wetland B (adjacent to Ley Creek) which was conveyed to Plaza East, LLC by CC-H in 1964. A road was constructed on this strip to allow the City of Syracuse to use Plaza East property for the continued disposal of municipal waste. A letter from the City of Syracuse, Department of Public Works dated June 24, 1968 states that the access road would be first landfilled to

approximately 12 to 18 inches below grade before placement of a road surface. There is no indication as to the type of fill material to be placed by the City.

In the early 1970s, Onondaga County formed the Bear Trap-Ley Creek Drainage District to address periodic flooding in Ley Creek. The County began operations intended to widen and deepen the Ley Creek channel for the majority of its length. As part of that plan the County took the 100-foot wide Plaza East, LLC parcel which left Plaza East, LLC with no access to their property from Seventh North Street. On August 30, 1972, CC-H entered into a land transfer and right of-way (ROW) agreement with Onondaga County in which an additional 100-foot wide strip of land was transferred from CC-H to Onondaga County so that the County could grant an easement to Plaza East, LLC for access to the landfill property. At some point the 100-foot wide parcel was transferred back to Plaza East, LLC. The 150-foot wide strip of land between Wetland B and Ley Creek is currently owned by Plaza East, LLC as shown on Figure 2.

As part of the 1972 ROW agreement, CC-H also granted Onondaga County a semi-permanent ROW along the entirety of the western property border of the South Landfill. This agreement allowed Onondaga County temporary access to the CC-H Site for a period of one year in order to complete widening and deepening of Ley Creek in association with the Ley Creek drainage project. Available information indicates that work on the Ley Creek dredging and drainage channel improvements for the South Landfill was completed in about January 1973. CC-H indicated that a dike had been located in the area of the southwest corner of the South Landfill and that dredge spoils had reportedly been spread over the southwest corner of the South Landfill in the area of Wetland C.

1.2.3 Geologic Conditions

Appendix A includes geologic cross-sections and groundwater flow maps for the site. The site geology consists of unconsolidated glaciolacustrine and glaciofluvial sediments. A shallow groundwater flow system, located from approximately 6 to 30 below ground surface, in the fill, peat, sand and silt deposits, and a deep confined groundwater flow system located in sand and gravel deposits are present at the site. The deep groundwater system is separated from the overlying shallow groundwater system by a continuous confining layer of silt and clay deposits of varying thickness commencing at approximately 30 feet below ground surface.

Groundwater flow in the shallow groundwater system is generally to the west toward Ley Creek. Groundwater flow in the deep groundwater flow system is generally to the east. Groundwater in the deep aquifer exhibits a strong upward vertical gradient and at times exhibits artesian conditions in the deep wells located on the North Landfill.

1.3 Summary of Remedial Investigation Findings

A Remedial Investigation (RI) was performed to characterize the nature and extent of contamination at the site. The results of the RI are described in detail in the following report: Remedial Investigation Report prepared by GeoTrans, Inc. for Cooper Industries, Inc., dated August 5, 2009.

The RI was conducted between June 2004 and August 2009. The RI included test pits and boreholes for collection of waste material and surface and subsurface soil samples. New monitoring wells were installed and groundwater samples were collected from new and existing monitoring wells. Surface water samples were collected from on-site stream segments and Ley Creek. Surface and subsurface sediment samples were collected from the on-site wetlands, stream segments and ditches and from Ley Creek.

Subsequent to the RI an investigation was conducted in November 2010 to delineate the hot spot areas that were targeted for removal in the North Landfill. A landfill methane gas survey was also conducted on the North and South Landfills to determine the level of methane being generated at each landfill. The results were presented in a September 7, 2011 letter report.

Below is a summary of site conditions when the RI was performed in 2004-2009 and the supplemental hot spot delineation and landfill gas survey was performed in 2010:

1.3.1 Waste Materials

The North Landfill is predominantly industrial fill ranging in thickness from 3 to 17 feet and consisting primarily of foundry sand, foundry core butts, foundry molds, metal debris, wood debris, and miscellaneous industrial debris. The industrial fill was generally black in color and had an oily type nature. Varying amounts of municipal waste (glass, bottles, plastic debris, metal cans, paper, etc.) was observed along the northern/northeastern property boundary. The volume of waste in the North Landfill is estimated at 223,000 yd^3. Three hot spot areas were identified within the North Landfill containing NAPL oil, elevated VOCs and elevated PCBs (Figure 2).

The South Landfill contains industrial fill and municipal waste ranging in thickness from 0 to 19 feet. The industrial fill consists primarily of foundry sand, foundry core butts, foundry molds, metal debris, wood debris, and miscellaneous industrial debris. The industrial fill was black in color and generally had an oily type nature. The municipal waste consists of glass, bottles, plastic debris, metal cans, paper, and general municipal refuse. The fill along the western boundary with Ley Creek is all municipal waste and no industrial fill. The volume of waste in the South Landfill is estimated at 220,000 yd^3.

1.3.2 Landfill Gas

A total of 39 bar hole probes were installed on the North (22 probes) and South (17 probes) Landfills (Figure 4). On the North Landfill, methane gas concentrations were observed at three probes located in a small area near the south entrance gate to the North Landfill, where peak methane measurements ranged from 8.2 to 23.5 % and sustained methane measurements ranged from 7.8 to 17 %. On the South Landfill, methane gas measurements were observed at six probes across a large portion of the South Landfill, where peak methane measurements ranged from 7.0 to 79 % and sustained methane measurements ranged from 6.9 to 79 %.

1.3.3 Soil

Shallow and subsurface soil samples were collected at the site during the RI. Shallow soil samples were collected from a depth of 0-6 inches. Subsurface soil samples were collected from a depth of 2 - 18 feet to assess soil contamination impacts to groundwater. The results indicate that soils at the site in the waste masses exceed the unrestricted SCGs for volatile and semi-volatile organics, PCBs/pesticides and metals (Table 1). The results indicate that soils along the eastern property boundary of both landfills along a strip of land between the wetlands and the railroad property exceed the unrestricted SCGs for PCBs.

The primary soil contaminants are benzene, benzo(a)pyrene, phenol and metals (arsenic and cadmium) associated with disposal of wastes in the landfill. In addition, PCB contamination exists in soil along the eastern boundary of the site (see Figure 5).

Based on the findings of the RI, the disposal of hazardous waste has resulted in the contamination of soil. Protection of groundwater SCOs are also exceeded for benzene, chlorobenzene and phenol. The site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are, benzene, benzo(a)pyrene, phenol, metals (arsenic and cadmium) and PCBs.

In August 2013 a total of 38 additional shallow soil samples (0-0.5') were collected along the bank of Ley Creek on the South Landfill to determine if soils overlying waste to be removed in the buffer zone contain PCB concentrations >1 mg/kg.

1.3.4 Sediment

Sediment samples were collected during the RI in Ley Creek from upstream of the site, adjacent to the site and downstream of the site. Sediment samples were also collected from on-site wetlands and drainage channels during the RI. The samples were collected to assess the potential for impacts to on-site wetlands and drainage channel sediment, and Ley Creek sediment, from the site. The results indicate that sediment in the on-site wetlands and on-site drainage channels exceed the Department's SCGs for sediments for benz(a)anthracene, PCBs and metals (Table 2). Additional sediment sampling was conducted in the North Landfill wetlands to further delineate TSCA level (>50 mg/kg) PCB concentrations. In Ley Creek, sediment concentrations exceed criteria for several PAHs, PCBs and several metals; however, sediment quality was generally consistent in Ley Creek from upstream to downstream indicating that the site does not currently impact Ley Creek sediment (see Figure 6).

The primary wetlands and drainage swales sediment contaminants are PCBs and metals, such as cadmium, chromium, lead and zinc, associated with the historic waste disposal at the landfills. The iron found in sediment was also found in groundwater, including deep groundwater not impacted by the site and appears to be ubiquitous. Therefore, iron in sediment is not considered a site specific contaminant of concern.

Based on the findings of the RI, the disposal of hazardous waste has resulted in the contamination of sediment in on-site wetlands and drainage swales. The site contaminants that are considered to be the primary contaminants of concern which will drive the

remediation of sediment to be addressed by the remedy selection process are PCBs and metals, such as cadmium, chromium, lead and zinc.

1.3.4.1 Wetland A and Stream Segment A

As part of the RI a total of 183 sediment samples were collected from the east wetland area (Wetland A) and eastern stream segment (Stream A) of the North Landfill. All samples were analyzed for PCBs and 5 samples were analyzed for VOCs, SVOCs and metals. No VOCs were detected in any of the sediment samples at concentrations in excess of the NYSDEC soil screening values (SSVs). Some SVOCs and metals were detected in the sediment samples at concentrations in excess of the NYSDEC SSVs.

PCBs (including Aroclors 1242, 1248, 1254 and 1260) were detected in 123 of the 183 sediment samples to a maximum depth of 7 feet. Total PCB concentrations ranged from 0.0064 ppm to 140 ppm. The highest concentrations of PCBs were detected in the samples collected from the 0.0 to 0.5 foot depth interval with an average PCB concentration of 31.05 ppm. Average PCB concentrations in sediment samples collected from the subsequently lower depth intervals were observed to decrease significantly with depth.

In August/September 2013 a total of 82 additional sediment samples were collected from Wetland A to further delineate the areas containing PCB concentrations >50 mg/kg which would be removed and transported off-site to a TSCA landfill.

1.3.4.2 Wetland B

As part of the RI a total of 118 sediment samples were collected from the west wetland area (Wetland B) of the North Landfill. All samples were analyzed for PCBs and 5 samples were analyzed for VOCs, SVOCs and metals. No VOCs were detected in any of the sediment samples at concentrations in excess of the NYSDEC SSVs. Some SVOCs and metals were detected in the sediment samples at concentrations in excess of the NYSDEC SSVs.

PCBs (including Aroclors 1248, 1254 and 1260) were detected in 73 of the 118 sediment samples to a maximum depth of 4 feet. Total PCB concentrations ranged from 0.012 ppm to 90.4 ppm. The highest concentrations of PCBs were detected in the samples collected from the 0.0 to 0.5 foot depth interval with an average PCB concentration of 23.13 ppm. Average PCB concentrations in sediment samples collected from the subsequently lower depth intervals were observed to decrease significantly with depth.

In August/September 2013 a total of 36 additional sediment samples were collected from Wetland B to further delineate the areas containing PCB concentrations >50 mg/kg which would be removed and transported off-site to a TSCA landfill.

1.3.4.3 Wetland C, Stream Segment B and North Drainage Ditch

As part of the RI a total of 172 sediment samples were collected from the south wetland area (Wetland C), eastern stream segment (Stream B) and the northern drainage ditch on

the South Landfill. All samples were analyzed for PCBs and 10 samples were analyzed for VOCs, SVOCs and metals. No VOCs were detected in any of the sediment samples at concentrations in excess of the NYSDEC SSVs. Some SVOCs and metals were detected in the sediment samples at concentrations in excess of the NYSDEC SSVs.

PCBs (including Aroclors 1242, 1248, 1254 and 1260) were detected in 123 of the 172 sediment samples to a maximum depth of 9 feet. Total PCB concentrations ranged from 0.013 ppm to 13.2 ppm. The highest average concentrations of PCBs (2.91 ppm) were detected in the samples collected from the 1.0 to 1.5 foot depth interval.

1.3.5 Groundwater

A shallow water table groundwater flow system, located in the fill, peat and associated mixed deposits, and a deep confined groundwater flow system, located in sand and gravel deposits, are located beneath the CC-H Landfill Site. The deep groundwater system is separated from the overlying shallow water bearing system by a continuous confining layer of silt and clay deposits of varying thickness.

The analytical data for shallow groundwater samples collected on the North Landfill indicate that shallow groundwater beneath the North Landfill has been minimally impacted by VOCs (benzene, chlorobenzene, chloroethane, 1,4-dichlorobenzene, ethylbenzene, methylene chloride, chloroform and toluene), SVOCs (fluoranthene, naphthalene, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, phenanthrene and pyrene), total recoverable phenols and metals (primarily iron but also lead and cadmium) at concentrations slightly in excess of the NYSDEC Class GA groundwater standards (Table 3). The analytical data for shallow groundwater samples collected on the South Landfill indicate that shallow groundwater beneath the South Landfill has not been impacted by VOCs or SVOCs and has been minimally, and infrequently, impacted by phenols and limited metals at concentrations slightly in excess of the NYSDEC Class GA groundwater standards. No pesticides, PCBs or cyanide were detected in the shallow groundwater.

The analytical data for deep groundwater samples collected on the North and South Landfills indicate no reproducible detections of VOCs, SVOCs, or total recoverable phenolics. Metals (primarily aesthetic water quality criteria for iron) were detected at concentrations slightly in excess of the NYSDEC Class GA groundwater standards. No pesticides, PCBs or cyanide were detected in the deep groundwater.

Based on the findings of the RI, the disposal of hazardous waste has resulted in the localized contamination of groundwater on-site. While groundwater migrates off-site, there was no discernible impact detected off-site (*e.g.*, to Ley Creek) from site groundwater. The site contaminants that are considered to be the primary contaminants of concern in groundwater are: total phenols, benzene, chlorobenzene and 1, 4- dichlorobenzene (see figure 7). The iron found in groundwater was found in both the shallow aquifer (site impacted aquifer) and deep groundwater (non-impacted aquifer), and appears to be ubiquitous to the area. Therefore, iron in groundwater is not considered a site specific contaminant of concern.

1.3.6 Surface Water

Surface water samples were collected during the RI in Ley Creek from upstream of the site, adjacent to the site and downstream of the site. Surface water samples were also collected from on-site wetlands and drainage channels.

The samples were collected to assess the surface water conditions on and off-site. The results indicate that contaminants in surface water on-site in wetlands and drainage swales exceed the Department's SCG for methylene chloride, benz(a)anthracene, benzo(a)pyrene and metals (aluminum, cadmium, chromium, copper, iron, lead and zinc) (Table 4). Surface water quality was generally consistent and below standards in Ley Creek from upstream to downstream indicating that the site does not currently impact Ley Creek surface water. Lead in Ley Creek surface water was detected at concentrations in excess of the New York State surface water quality standard (17.9 ppb) adjacent to the site; however, the highest concentration (84.2 ppb) detected in Ley Creek during the RI was at the up-gradient sampling location (see Figure 8). PCBs were detected in only one surface water sample (*i.e.*, upstream in Ley Creek**).**

Based on the findings of the RI, the disposal of hazardous waste has resulted in the contamination of on-site surface water in wetlands and drainage swales. The site contaminants that are considered to be the primary contaminates of concern in surface water are SVOCs (benzo(a)anthracene and benzo(a)pyrene) and metals (cadmium, lead and zinc). The iron found in the wetlands and drainage swales surface water was also found in groundwater, including deep groundwater not impacted by the site and appears to be ubiquitous. Therefore, iron in surface water is not considered a site specific contaminant of concern.

1.4 Summary of Remedial Actions

The site was remediated in accordance with the NYSDEC-approved Removal Action Work Plan dated October, 2012 and Remedial Design dated June, 2013. The following is a summary of the Remedial Actions performed at the site:

1. A 2013 Removal Action that included excavation and off-site disposal was conducted on three areas in the North Landfill with elevated contaminant levels. One area included 149 tons of waste containing PCBs at concentrations of 50 parts per million (ppm) or greater. A couple of other areas included 2,267 tons of waste that contained concentrations of VOCs greater than 50 ppm. A final area included 2,882 tons of non-aqueous phase liquid (NAPL) oil saturated waste. The PCB Toxic Substances Control Act (TSCA) waste was transported off-site to the Waste Management Model City Landfill facility. The VOC and oily wastes were transported to the Seneca Meadows Landfill.

2. Both the North and South Landfills were consolidated to reduce their current area. The consolidated areas have engineered cap systems designed and constructed in conformance with the substantive requirements for landfill caps set forth in 6 NYCRR Part 360. The consolidation included waste removal from a 50-foot buffer zone area between the South Landfill and Ley Creek, 30-foot buffer zone areas

between the landfills and on-site wetlands and a buffer zone between the North Landfill and Seventh North Street. The excavated material was consolidated in the landfills above the water table.

3. Wetland sediment with PCB concentrations greater than 1 ppm and less than 50 ppm was excavated for consolidation and capping on-site with the material discussed above. PCB contaminated sediment with concentrations of 50 ppm or greater was properly transported off-site for disposal at the Model City Landfill.

4. The excavated wetlands and buffer zones were restored and will be maintained per the approved restoration plan. Buffer zone soils meet the Unrestricted Use Soil Cleanup Objectives set forth in Table 375-6.8(a) of 6 NYCRR Part 375 for a minimum of two feet in depth measured from the finished surface grade. The remaining buffer zone soils meet, at a minimum, the lower of the protection of groundwater or the protection of public health soil cleanup objectives for commercial use as set forth in Table 375-6.8(b) of 6 NYCRR Part 375.

No long-term treatment systems were installed as part of the site remedy. Remedial activities were completed at the site in November, 2015.

1.4.1 Removal Of Contaminated Materials From The Site

The remedial objectives for the North and South Landfill construction include relocation of soil, waste, and sediment, as previously described. At the North Landfill consolidation of soil and waste occurred at the Wetland A Buffer Zone (25,670 CY), Wetland B Buffer Zone (11,872 CY), Surface Soils (104 CY), and South Property Boundary (2,868 CY). At the South Landfill consolidation of soil and waste occurred at the Water Main Easement (9,633 CY), Wetland C Buffer Zone (15,162 CY), and Ley Creek Buffer Zone (10,828 CY). Figure 9 shows the excavated wetland areas and the constructed cap areas.

The sediment cleanup objective for the wetland sediments was 1 mg/kg PCBs. Iterative excavation sediment sample results to achieve the sediment cleanup objective are shown in Table 5. Confirmation sediment sample locations are indicated on Figures 10, 11, and 12.

A list of the Standards and Guidance Criteria (SGCs) for each contaminated media (groundwater, surface water, soil, and sediment) for the primary contaminants of concern (COCs) and applicable land use for this site is provided in Tables 1-4. Figures 9-12 show areas where excavation was performed.

Wetland sediment with PCB concentrations greater than 1 mg/kg and less than 50 mg/kg were consolidated under the engineered cover systems. PCB contaminated sediment with concentrations of 50 mg/kg or greater, found in the North Landfill's Wetland A and Wetland B, were excavated and properly transported off-site for disposal. In total, the volume of PCB impacted sediment removed from Wetland A was 16,102 CY and from Wetland B 6,808 CY.

Contaminated material and other wastes requiring off-site disposal or recycling included:

- TSCA sediment was sent to the WMI Model City landfill (North Landfill).
- Asbestos pipe was taken to the CC-H plant for proper disposal (North Landfill).
- Discovered drums were taken to the CC-H plant for over pack, analyses, and proper disposal (North Landfill – two drums, South Landfill – three drums).
- Tires were collected in a dedicated roll off container and sent off site for recycling (North Landfill – 486 tires, South Landfill – 465 tires).
- Scrap metal was collected in a dedicated roll off container and sent off site for salvage (North Landfill – 26.11 tons, South Landfill – 3.42 tons).
- PPE was collected in a dedicated solid waste container and sent off site as solid waste (North and South Landfills).
- Construction/decon water was treated in a dedicated on-site treatment train (tanks, sediment filters, pumps, and carbon drums) and discharged under an OCDWEP permit with measured discharge flow to a sanitary sewer manhole at the North Landfill gate (North Landfill – 24,410 gallons, South Landfill – 60,737 gallons).
- Oil-absorbent pads and booms used in a small localized area of Wetland A and Stream A (North Landfill) at the appearance of a sheen (determined to be the result of natural processes) were allowed to air dry and were disposed of as a solid waste. Oil-absorbent pads used in a small localized area of Stream B (South Landfill) at the appearance of a sheen (determined to be the result of natural processes) were allowed to air dry and were disposed of as a solid waste

Asbestos Pipe Removal – North Landfill

A 3-foot section of drainage pipe was uncovered during the excavation of the swale along the North Landfill Site Boundary sheet pile wall; this pipe was made of transite. The pipe was covered with 6 mil polyethylene sheet and delivered to the Cooper Crouse-Hinds plant facility for proper disposal.

TSCA Sediment Removal – North Landfill

Additionally, any sediment excavated from Wetlands A and B with PCB concentrations equal to or greater than 50 milligram per kilogram (mg/kg) were staged on a separate designated dewatering pad and covered with plastic for eventual off-site disposal to Model City, NY. Approximately 650 tons of sediment with PCB concentration equal to or greater than 50 mg/kg were excavated from Wetlands A and B. The sediment was stabilized and transported off-site to Waste Management's Model City Landfill.

Drum Removal

North Landfill - two buried drums were discovered during methane gas collection trench excavation. The two drums were placed into over-pack drums and delivered to the Cooper Crouse-Hinds plant for characterization sampling and proper disposal.

South Landfill – three partially intact 55-gallon drums encountered during the South Landfill construction were placed into over-pack drums, labeled, and delivered to the CC-H Waste Storage Building on North 7th Street for characterization.

The five drums of non-hazardous waste were securely stored at the Cooper Crouse-Hinds Waste Storage building prior to off-site disposal. The non-hazardous waste drums were sent to U.S. Industrial Technologies, Inc. in Livonia, Michigan for disposal.

Tire Removal

Tires were encountered during the North and South Landfill construction. The waste tires were staged in roll-off on the North and South Landfills until the end of the removal action at each landfill. A total of 486 tires (6.84 tons – North Landfill) and 465 tires (5.66 tons – South Landfill) were removed from the site for disposal at the Seneca Meadows Tire Facility.

Scrap Metal Removal

Scrap metal was encountered during the North Landfill construction. The scrap metal was staged in a roll-off at the site until the end of the construction. A total of 26.11 tons (North Landfill) and 3.42 tons (South Landfill) of scrap metal was removed from the site for recycling at Metallica Aluminum Recovery in Syracuse, NY.

Personal Protective Equipment Disposal

PPE was placed into dedicated waste disposal receptacles on an as-needed basis. All general waste was collected as-needed by Riccelli Trucking, a licensed refuse hauler, and taken off-site for proper disposal.

Construction/Decon Water Treatment and Disposal

Included in the NYSDEC-approved 100% Design was a requirement that any water pumped from a disturbed excavation be sediment filtered and passed through activated carbon and then held in temporary storage vessel pending receipt of laboratory analyses indicating permissible disposal to the Onondaga County sanitary sewer. One or two (dependent on anticipated water volume) dedicated 20,000-gallon holding tanks, a dedicated pump, and dedicated sediment filters and carbon units, were placed on the South Landfill site and then moved to the North Landfill site for construction/decon water treatment. Inspection of the water treatment system was performed by representatives from OCDWEP on April 22, 2015 for the North Landfill and on July 9, 2014 for the South Landfill. After the inspection, a permit for disposal, with sampling requirements, was obtained from OCDWEP. A total of 24,410 gallons (North Landfill) and 60,737 gallons (South Landfill) of construction/decon water was treated and disposed of at the Onondaga County sanitary sewer manhole located immediately east of the North Landfill gate along 7th North Street.

Oil Absorbent Boom/Socks/Pads

During the North Landfill construction, excavation in Wetland A and along stream A produced what appeared to be an oily sheen on the water surface. As a precaution, oil absorbent pads were floated surrounding the sheen, and two oil absorbent booms were deployed in stream a. The sheen disappeared overnight. The oil absorbent pads were collected and disposed of as common refuse. The two absorbent booms were kept in place

as a precautionary measure for the remainder of north landfill construction. Once construction was completed the booms were recovered and disposed of as common refuse.

At the South Landfill, excavation along Stream B produced what appeared to be an oily sheen on the water surface. As a precaution, oil absorbent pads were floated surrounding the sheen, and a water sample collected for laboratory analyses (as directed by NYSDEC). No contaminants were found in the laboratory sample, indicating that the sheen was the product of natural decomposition. The sheen disappeared overnight. The oil absorbent pads were disposed of as common refuse. The sheen was believed the result of iron bacteria. Based on the groundwater data collected during the remedial investigation, local shallow groundwater contains elevated iron concentrations.

1.4.2 Site-Related Treatment Systems

No long-term treatment systems were installed as part of the site remedy.

1.4.3 Remaining Contamination

Post-excavation sampling for PCBs in the wetlands took place during site construction. Base of excavation samples were apportioned at 900-square foot intervals as indicated in DER-10(5.4)(b)(5.)(iii). Wall samples were not collected as no cuts greater than four feet deep were made except along buffer zone walls (clean fill). Samples were field located on 30+ feet grids, equally spaced across excavation cell areas, and the locations recorded using a GPS device at the time of sample collection.

There are three areas where solid waste contamination is known to remain at the South Landfill:

- Beneath the South Landfill cap – this area is part of the NYSDEC-approved remedial action where PCB contamination below 50 PPM and greater than 1 PPM may exist, and no further remedial action is necessary.
- Ley Creek bank – an approximately five-foot wide strip – this soil strip along the western edge of the South Landfill was left as a barrier to keep landfill waste, soil, and imported fill material out of Ley Creek during South Landfill construction. The approximately five-foot wide strip (from the high water elevation at the time of construction) was included as a barrier in the 100% Design and the portions that are contaminated will be removed in a future project by others as part of the Lower Ley Creek PCB removal and remediation. No further action as part of the South Landfill construction project is necessary, however this area may be addressed as part of the Lower Ley Creek project.
- Wetland C, confirmation sample WC-E-4 (Figure 12) – this sample point at 1.46 PPM PCBs is above the 1 PPM clean up level. NYSDEC was consulted and approved this PCB level remaining in place. The average residual PCB level for the entire wetland area is much less than one. No further action as part of the South Landfill construction is necessary.

There are three areas where solid waste contamination is known to remain at the North Landfill:

- Beneath the North Landfill cap – this area is part of the NYSDEC-approved remedial action where PCB contamination below 50 mg/kg and greater than 1 mg/kg may exist, and no further remedial action is necessary.
- In Wetland A/Stream A three confirmation sample results were over 1.0 mg/kg (WA-C-4R [1.3 mg/kg], WA-L-2R [1.2 mg/kg], and WA-P-2 [1.68 mg/kg]) (Figure 10). The average residual PCB level for the entire wetland area is much less than one. Per NYSDEC approval, no further action as part of the North Landfill construction is necessary.
- In Wetland B six confirmation sample results were over 1.0 mg/kg (WB-H-11 [1.1 mg/kg], WB-B-2 [1.3 mg/kg], WB-B-7 [1.3 mg/kg], WB-B-18 [1.2 mg/kg], WB-C-2 [1.2 mg/kg], WB-B-29 [1.5 mg/kg] (Figure 11). NYSDEC was consulted and approved these PCB levels remaining in place. The average residual PCB level for the entire wetland area is much less than one. No further action as part of the North Landfill construction is necessary.

Table 5 and Figures 10, 11, and 12 summarize the results of all sediment samples remaining at the site after completion of Remedial Action that exceed the Track 1 (unrestricted) SCOs.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 Introduction

2.1.1 General

Since remaining wastes and contaminated soil and groundwater exists beneath the site, Engineering Controls and Institutional Controls (EC/ICs) are required to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

This plan provides:

- A description of all EC/ICs on the site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the features to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of EC/ICs, such as the implementation of the Excavation Work Plan for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the site remedy, as determined by the NYSDEC.

2.2 Engineering Controls

2.2.1 Engineering Controls Systems

This section includes a description of the engineering controls system in place at the Site. Procedures for monitoring the systems are included in the Monitoring Plan (Section 3 of this SMP). The Monitoring Plan also addresses severe weather condition inspections in the event that a severe weather event, which may affect controls at the site, occurs.

Engineering controls at the site include fencing, the landfill cap cover system, passive landfill gas venting system, monitored natural attenuation, and criteria for the completion of the remedy. This section includes a description of the engineering controls and cites procedures for monitoring and maintaining these controls.

2.2.1.1 Fencing

An eight-foot high chain link screened fence eliminates access from Seventh North Street to both the North and South Landfills. The location of the fence is shown in Figure 9.

2.2.1.2 Landfill Cover

Exposure to remaining contamination in soil/fill is prevented by a 6NYCRR Part 360 compliant composite cover system placed over both the North and South Landfill areas. This composite cover system is comprised of a geocomposite gas vent layer, 60 mil HDPE geomembrane layer, geocomposite drainage layer, 12 inch barrier protection layer of clean soil, and 6 inches of topsoil. The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals as presented in the Inspection Schedule in Section 3.1. The location of the cover systems for the South and North Landfills is shown on Figures 13 and 14 respectively.

The Excavation Work Plan that appears in Appendix B outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection and maintenance of this cover system are provided in the Monitoring Plan included in Section 3 of this SMP. The Monitoring Plan also addresses potential responses in the event that a severe condition, which may affect the Engineering Controls at the site, occurs.

2.2.1.3 Passive Landfill Gas Venting System

The passive landfill gas venting system is an integral part of the Engineering Control and the quality and integrity of this system will be inspected at defined, regular intervals. Procedures for the inspection, monitoring, and maintenance of the gas venting system are provided in the Monitoring Plan included in Section 3 of this SMP.

2.2.1.4 Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC, until residual groundwater concentrations are found to be consistently below NYSDEC standards or have become asymptotic at an acceptable level over an extended period. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional evaluations will be conducted. Groundwater monitoring and surface water monitoring activities are summarized in the Monitoring/Inspection Schedule in Section 3.1.

2.2.2 Criteria for Completion of Remediation

Generally, remedial processes are considered to be complete when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

2.3 Institutional Controls

A series of Institutional Controls are required by the ROD to: (1) implement, maintain and monitor the Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the site. Adherence to these Institutional Controls on the site

is required by the Environmental Easement and will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Environmental Easement and this SMP by the Grantor and the Grantor's successors and assigns;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- All Engineering Controls on the Controlled Property must be inspected at a frequency and in a manner defined in the SMP.
- Groundwater and landfill gas monitoring must be performed as defined in this SMP;
- Data and information pertinent to management of the Controlled Property must be reported to NYSDEC at the frequency and in a manner defined in this SMP;

Institutional Controls identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The site has a series of Institutional Controls in the form of site restrictions. Adherence to these Institutional Controls is required by the Environmental Easement. Site specific restrictions that apply to the Controlled Property will be provided at a later date.

The Environmental Easement identifies the following future uses of the property:

(1) The Controlled Property may only be used for: Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Onondaga County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

The Environmental Easement prohibits the following future uses of the property:

The Controlled Property shall not be used for Residential, Restricted Residential or Commercial purposes as defined in 6NYCRR 375-1.8(g)(i), (ii) and (iii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

2.3.1 Excavation Work Plan

The site has been remediated for restricted industrial use. Any future intrusive work that will penetrate the soil cover or cap, or encounter or disturb the remaining contamination, including any modifications or repairs to the existing cover system, will be performed in compliance with the Excavation Work Plan (EWP) that is attached as Appendix B to this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the site. A HASP is attached as Appendix C to this SMP that is in current compliance with DER-10, and 29 CFR 1910, 29 CFR 1926, and all other applicable Federal, State and local regulations. The CAMP is attached as Appendix D to this SMP and is the generic CAMP provided as Appendix 1A of DER-10. Based on future changes to State and federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP will be updated and re-submitted with the notification provided in the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The site owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all intrusive work, the structural integrity of excavations, proper disposal of excavation de-water, control of runoff from open excavations into remaining contamination (if an excavation is opened at the site, any water entering or leaving must be controlled, sampled, and treated as necessary, in case said water comes in contact with existing contamination, either known or unknown), and for structures that may be affected by excavations (such as building foundations and bridge footings). The site owner will ensure that site development activities will not interfere with, or otherwise impair or compromise, the engineering controls described in this SMP.

2.3.2 Soil Vapor Intrusion Evaluation

Prior to the construction of any enclosed structures located over areas that contain remaining contamination and the potential for soil vapor intrusion (SVI) has been identified (see Figures 9, 13, and 14), an SVI evaluation will be performed to determine whether any mitigation measures are necessary to eliminate potential exposure to vapors in the proposed structure. Alternatively, an SVI mitigation system may be installed as an element of the building foundation without first conducting an investigation. This mitigation system will include a vapor barrier and a passive sub-slab depressurization system that is capable of being converted to an active system. Post mitigation air sampling would be required to determine if the operation of the passive system is protective of human health.

Prior to conducting an SVI investigation or installing a mitigation system, a work plan will be developed and submitted to the NYSDEC and NYSDOH for approval. This work plan will be developed in accordance with the most recent NYSDOH "Guidance for Evaluating Vapor Intrusion in the State of New York". Measures to be employed to mitigate potential vapor intrusion will be evaluated, selected, designed, installed, and maintained based on the SVI evaluation, the NYSDOH guidance, and construction details of the proposed structure.

Preliminary (unvalidated) SVI sampling data will be forwarded to NYSDEC and NYSDOH for initial review and interpretation. Upon validation, the final data will be transmitted to the agencies, along with a recommendation for follow-up action, such as mitigation. SVI sampling results, evaluations, and follow-up actions will also be summarized in the next Periodic Review Report.

2.4 Inspection and Notifications

2.4.1 Inspections

Inspections of all remedial components installed at the site will be conducted at the frequency specified in the SMP Monitoring/Inspection Schedule (Section 3.1.2, page 26). A comprehensive site-wide inspection will be conducted annually, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether Engineering Controls continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- If site records are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring system;

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5.3).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the site by a qualified environmental professional as determined by NYSDEC.

2.4.2 Notifications

Notifications will be submitted by the property owner to NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the Order on Consent, 6NYCRR Part 375, and/or Environmental Conservation Law.
- 7-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundations structures that reduces or has the potential to reduce the effectiveness of other Engineering Controls and likewise any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the Order on Consent and all approved work plans and reports, including this SMP.
- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing.

2.5 Contingency Plan

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to Mike Noel with Tetra Tech, the qualified environmental professional. These emergency contact lists must be maintained in an easily accessible location at the site.

Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Site Contact Numbers

Tom Bonk (Crouse-Hinds)	(315) 491 -3081
Dave Sensinger (Crouse-Hinds)	(315) 477- 5258
Paul Grondin (Crouse-Hinds)	(315) 477- 5560
Jim Campbell (Eng. Mgmt. Inc.)	(412) 244-0917
Mike Noel (Tetra Tech)	(262) 853-4983

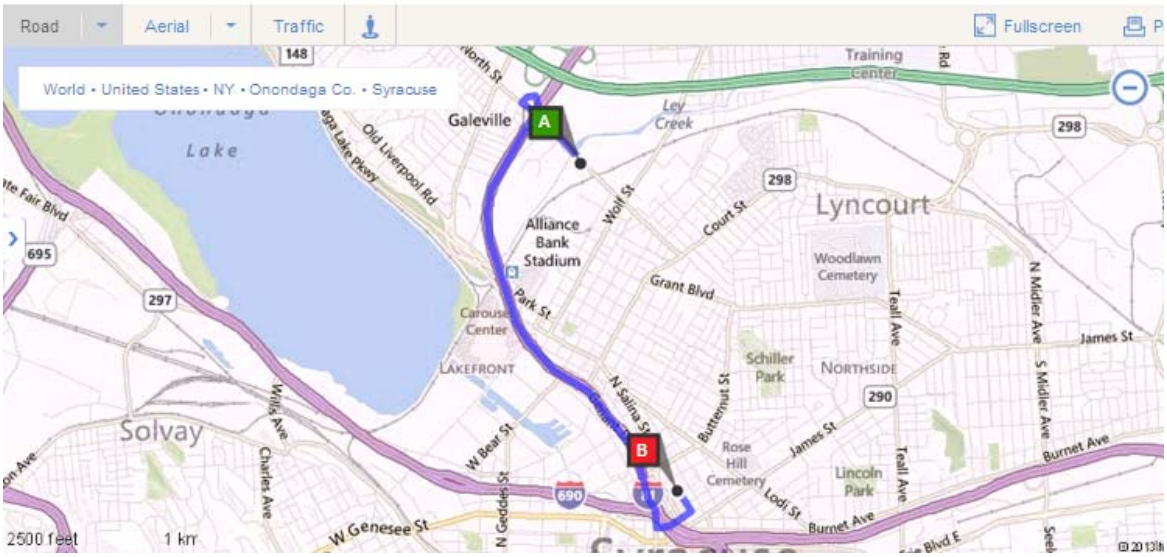
* Note: contact numbers subject to change and should be updated as necessary

2.5.2 Map and Direction to Nearest Hospital

Site Location: Crouse-Hinds Landfills [A]
Nearest Hospital Name: St. Joseph's Hospital Health Center [B]
Hospital Location: 301 Prospect Avenue, Syracuse, NY
Hospital Telephone: 315-448-5111
Directions to the Hospital:

1. North on 7th North St / CR-45 toward Terminal Rd (0.5 mi)
2. Take ramp right for I-81 South toward Syracuse (3.0 mi)
3. At exit 19, take ramp right for Salina St toward Clinton St (0.3 mi)
4. Turn left onto E Willow St (0.3 mi)
5. Turn left onto Prospect Ave (0.1 mi)
6. Arrive at 301 Prospect Ave.
   Total Distance: 4.2 miles
   Total Estimated Time: 7 minutes

Map Showing Route from the site to the Hospital:



2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found above in paragraph 2.5.1. This list will be made readily available to all relevant personnel at all times.

3.0 SITE MONITORING PLAN

3.1 Introduction

3.1.1 General

The Monitoring Plan describes the measures for:

- Evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the site,
- Maintain the composite cover system, and
- Monitor all affected site media identified below.

This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, surface water, landfill gas, wetlands vegetation);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly ambient groundwater standards and Part 375 SCOs for soil;
- Assessing achievement of the remedial action objectives.
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

To adequately address these issues, this Monitoring Plan provides information on:

- Sampling locations, protocol, and frequency;
- Information on all designed monitoring systems (e.g., well logs);
- Analytical sampling program requirements;
- Reporting requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Quarterly monitoring of the performance of the remedy and overall reduction in contamination on-site will be conducted for the first two years. The frequency thereafter may be reduced as approved by NYSDEC. Trends in contaminant levels in groundwater, surface water, and landfill gas will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. Wetland vegetation will be inspected annually and evaluated for survival for a five year time period. Monitoring programs are summarized in the following table and outlined in detail in the sections below.

Table 6. Monitoring/Inspection Schedule

Program	Frequency*	Matrix	Analysis
Landfill Cover	Semiannual	cover	visual
Landfill Gas	Quarterly	gas	% LEL
Groundwater	Quarterly	water	VOCs
Surface Water	Quarterly	water	PCBs, metals
Wetlands	Semi-annually	vegetation	visual

* The frequency of monitoring events will be conducted as specified for the first two years, thereafter the frequency may be reduced as approved by NYSDEC.

3.2 Landfill Cover System Maintenance and Monitoring

3.2.1 Landfill Cover System Monitoring

Maintenance and monitoring activities for the landfill cover are generally described below. A comprehensive and detailed maintenance schedule is detailed below. This will allow for early identification and correction of potential problems. Observations noted during the inspections shall be recorded on the Post-Closure Inspection Checklist (Appendix E). The cover maintenance activities include the following:

- Conduct inspections of the landfill cap once during the spring and fall, noting condition of soil slopes, and vegetative cover. Any changes in the soil or vegetative cover will be noted and corrected as weather conditions permit;
- Mow the cap area cover vegetation and manage vegetation present along the buffer zones as needed;
- During the spring and fall inspections, walk the North Landfill north boundary and inspect the sheet pile wall line and the drainage swale. Any observed vertical or horizontal miss-alignment of the sheet pile wall shall be photographed and noted on the inspection documentation for correction. Any displacement, erosion, settlement, or heaving of the drainage swale shall be photographed and noted on the inspection documentation for correction. At each end (east and west) of the drainage swale, the path for free flow of runoff shall be inspected. Any silt buildup or debris accumulation shall be photographed and noted in the inspection documentation for correction.

3.2.2 Potential Operating Problems

Potential operational problems that may be encountered with the landfill cap include the following:

Soil Grades – Potential operational problems may arise through the formation of erosional rills, landfill blowout zones, loss of vegetative cover, underbrush growth, trash accumulation, soil fracturing, or rutting. Any of these situations could potentially impair the effectiveness of the landfill cap to minimize infiltration of surface runoff and precipitation. Burrowing wildlife may also undermine the integrity of the landfill cap and side slope stability. Controls to deter burrowing wildlife shall include baited live trapping

and relocation, use of non-life threatening products to discourage burrowing wildlife habitation, and installation of appropriate temporary barriers to burrowing wildlife traffic. Surface traffic, such as ground maintenance equipment, will be controlled and monitored to minimize disruption of the soil cover.

Vegetative Cover – the function of the vegetative cover is to protect the soil layer and to minimize erosion. The effectiveness of the vegetative cover may be impaired through invasion of non-desirable and competitive species, destruction by wildlife (overgrazing, burrowing) and other situations that would result in loss of growth. Deep-rooting plant species, such as deciduous trees and shrubs, will not be allowed to grow, as they may interfere with the integrity of the landfill cap, particularly the geotextiles. Over-growth of the vegetative cover could result in increased non-desirable species.

Settlement – Settlement may occur with decomposition of the deposited waste materials. Changes in surface grades may result from the settlement and could create situations of ponding of surface water and precipitation, and could also result in shifting of the cap's compositional layers.

3.2.3 Corrective Action

Corrective actions for the landfill cap will be instituted appropriate to the given operational situation, and will be in accordance with the original design specifications for the cap system. Weather or unanticipated site activities may cause portions of the landfill surface to become eroded. Any areas of erosion will require restoration and reseeding to prevent degradation of the cover system and ensure the cover system integrity. Areas that are observed to be in need of repair will be scheduled for repair as soon as practical. Repairs to eroded areas may include placement of additional topsoil and reseeding. Corrective actions might also entail the placement of additional topsoil in settled areas, where ponded surface water is observed, to restore or maintain positive drainage off the cap. Whenever possible, corrective actions should be performed during the drier, summer months to minimize damage to the cap soils from operating heavy equipment during periods of wet weather. However, corrective measures must also be undertaken and implemented in a timely manner.

3.3 Media Monitoring Program

3.3.1 Groundwater Monitoring

Groundwater monitoring will be performed at the North Landfill on a quarterly basis for the first two years to assess the performance of the remedy. After the second year the sampling frequency may be modified with the approval of NYSDEC. If this occurs the SMP will be modified to reflect changes in sampling plans approved by NYSDEC. Groundwater monitoring is not required for the South Landfill as the Remedial Investigation sampling showed ground water quality did not exceed criteria.

A network of monitoring wells (4) has been installed to monitor both up-gradient and down-gradient groundwater conditions at the North Landfill. The network of on-site wells has been designed based on the following criteria:

- Monitoring wells are located around the perimeter of the North Landfill and outside the limits of waste. Because of the adjoining Plaza East landfill along the north boundary of the CC-H North Landfill, it is not possible to place monitoring wells along the north property line without penetrating the landfill cap.

Groundwater flow is expected to be towards Ley Creek. The locations of the monitoring wells are shown on Figure 14 with one (MW-4) up-gradient, one (MW-3) side-gradient and two (MW-1 and MW-2) downgradient locations. The wells are completed within the upper water bearing unit and extend to a nominal depth of 13 feet with a 10-foot screen interval. The well screens are positioned to intersect the shallow water table located within the sand/silty sand unit, if present, sandwiched between the overlying peat layer and the underlying silty clay unit. Monitor well construction logs are included in Appendix F. Deliverables for the groundwater monitoring program are specified below.

3.3.1.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log presented in Appendix E. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring wells.

Sample Collection

Groundwater samples will be collected from the monitor wells using dedicated polyvinyl chloride (PVC) bailers and new hollow-braid polypropylene rope. The procedures that will be used to sample the monitor wells are summarized below:

1. Open the protective casing cover and remove the well cap from the monitor well casing. The monitor wells have a dedicated PVC bailer hanging inside the well from an I-bolt attached to the well cap. Remove the bailer from the well cap and place the bailer on a clean surface. Measure the depth to groundwater from the top of the well casing using an electronic water level meter. The depth to groundwater should be measured at the surveyed measuring point on the top of the well casing, which is typically placed on the north side of the casing and is identified by a line drawn on the top and side of the casing using a permanent marker. Record the measurement to the nearest 0.01 feet on the field water quality sampling and analysis form (Appendix E). Rinse the water level meter off with distilled water after reeling the cable back onto the spool.

2. Calculate the volume of water inside the well casing using the following equation:

   1 casing volume in gallons (gal) = 7.48 gal/ft^3 ((pi x r^2) x h), using

   pi = 3.14159

   r = radius of well casing in feet

   h = height of water column in well casing in feet = total well depth minus depth to groundwater

   Record the casing volume on the field water quality sampling and analysis form.

3. Use the dedicated bailer to purge a minimum of three (3) well casing volumes of groundwater from the well by slowly lowering the bailer attached to the rope into the water column. When retrieving the bailer, do not allow the bailer or rope to touch the ground or contact other surfaces that may cause foreign particles or contaminants to be introduced into the well. If a monitoring well is a very low yield well, purge one casing volume of water from the well (purge dry) and allow the water level in the well to recover until there is enough water in the well to collect a groundwater sample. Wait a maximum of 24 hours for the water level in the well to recover. If after 24 hours there is insufficient water for sampling <u>any</u> parameter, then the well is considered dry for the sampling event. If the volume of water available is insufficient for filling <u>all</u> of the sample containers, portions of the sample are to be collected (unless otherwise specified by the regulatory agency or the Project Manager). In all of these situations, notify the Project Manager immediately.

   Use a calibrated bucket to determine the volume of groundwater purged from the monitor well. Record the volume of groundwater purged from the monitor well on the field water quality sampling and analysis form.

4. After the monitor well has been purged, slowly lower the bailer into the water column and retrieve groundwater samples for laboratory analyses and field parameters. If possible, completely fill the bailer with a groundwater sample. First fill the sample containers for laboratory analyses, then fill the container to be used to measure the field parameters.

5. Record the date and time that the groundwater sample was collected on the field water quality sampling and analysis form. Also record the color, odor and clarity of the groundwater sample on the field water quality sampling and analysis form.

6. Place the water quality meter probe into the container holding the field parameters sample. Record the field measurements on the field water quality sampling and analysis form. Discard the water in the container used to measure the field parameters and rinse with distilled water.

7. After a sufficient volume of groundwater is collected from the monitor well to fill all of the sample containers required for the laboratory analyses and to measure field parameters, remove the rope from the bailer, rinse the bailer with distilled water, re-attach the bailer to the well cap, place the well cap over the well casing and close the well.

Field Parameters

Field measurements of pH, temperature and specific conductance will be collected from each monitoring well. A portable digital pH-salinity-conductivity-temperature meter will

be used to measure the field parameters for the groundwater samples collected from the monitor wells.

The field parameters will be recorded on field forms. The date and time that the groundwater samples were collected and the color, odor and clarity of each groundwater sample will also be noted on the field forms. Copies of the various field forms that will be used are provided in Appendix E.

Laboratory Parameters

The groundwater samples will be submitted to the Test America Analytical Services laboratory in Buffalo, NY (or a comparable laboratory), a New York State Department of Health ELAP certified laboratory, for analysis of target compound list (TCL) VOCs by EPA Method SW-846 8260C. The groundwater samples submitted for analysis will be collected in glass sample vials provided by the laboratory that have a screw-on cap with a teflon-lined septum. The sample containers will be filled so that a positive meniscus is formed at the top of the container and there is no headspace between the sample and the top of cap. The groundwater samples will be kept chilled to at least 4 degrees Celsius prior to analysis and will be delivered to the laboratory following standard chain-of-custody procedures.

Each sample container will have a label affixed to it. The label on each container will contain the following information:

- Project number;
- Date and time the sample was collected;
- Well/Sample identification;
- Sample type (DI for distilled water, GW for groundwater or SW for surface water);
- Sampler's initials;
- Preservative

3.3.1.2 Monitoring Well Repairs, Replacement and Decommissioning

If biofouling or silt accumulation occurs in the monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan), if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance. The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless

otherwise approved by the NYSDEC.

3.3.2 Landfill Gas Monitoring

The objectives of the landfill gas venting system are to limit the migration of gas through the landfill cap and perimeter soils, and to preserve the integrity of the landfill cap. As part of the remedial design a passive landfill gas venting system was installed. The system consists of nine (9) passive gas vents located on the North Landfill and ten (10) passive gas vents on the South Landfill. The passive gas vents consist of four-inch diameter vertical pipes with turbine-style vent heads. Landfill gas migration on the cap perimeters will be monitored quarterly at six (6) gas probes around the North Landfill and seven (7) gas probes around the South Landfill. These gas probes are located outside the waste limits, along the borders of each landfill. The location of gas vents and probes are shown on Figures 13 and 14.

3.3.2.1 System Inspection and Maintenance

Inspection and maintenance activities for the landfill gas venting and monitoring system are generally described below. Inspections/maintenance of the system will be conducted during scheduled monitoring/inspection activities. Observations noted during the inspection(s) shall be recorded on the Post-Closure Inspection Checklist.

Each time gas monitoring is conducted the integrity of the gas vents and monitoring probes will be inspected. A record of each inspection and corrective action or repairs will be made on both the Post-Closure Inspection Checklist and the Explosive Gas Monitoring Field Data Sheet (Appendix E). Inspection performed outside of scheduled explosive gas monitoring activities will be recorded on the Post Closure Inspection Checklist only.

The expected maintenance activities include the following:

- Observations will be noted for integrity of gas probe riser, cap, and locking cap.
- Observations will be noted for the gas discharge vents to include any notations on obstructions in the discharge vents or integrity of riser pipe.
- Observations of the condition of the ground surface surrounding the gas vents and probes will be noted to check for integrity of seals and to check for possible heaving of the riser pipes or erosion around the piping.

3.3.2.2 Landfill Gas Sampling Protocol

The purpose of the gas monitoring program is to evaluate the concentration of explosive gases generated at the site compared to the lower explosive limit of methane. The “lower explosive limit” is defined as the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25 degrees Celsius and atmospheric pressure. Methane is explosive when present in the range of 5% to 15% by volume in air. The lower (5%) threshold is referred to as the lower explosive limit (LEL) for methane in air. The upper (15%) threshold is referred to as the upper explosive limit (UEL) for methane in air.

Maximum allowable explosive gas concentrations have been established in Subpart 360-2.17 for the facility property boundary. The concentration of methane and other explosive gases generated at the site must not exceed:

- The lower explosive limit for the gases at or beyond the property boundary.

Monitoring Equipment

Field metering equipment will be used to measure pressure, explosive gas concentration, and depth to water in the gas monitoring probes.

A gas differential pressure gauge (Dwyer Magnehelic or equivalent) capable of measuring positive and negative pressure in the range of five inches of water column (±5" W.C.) will be used to measure pressure in the monitoring probes. The gauge will be mounted in a portable carrying case and equipped with the necessary fittings so that it can be attached to the hose barb fittings on the top of the monitoring probes.

A dual range, double gas meter (Gas Scope Model 62S or equivalent) will be used to measure the concentration of explosive gas in the monitoring probes and punch bar probes (if applicable). This type of instrument employs a dual range meter, i.e. it measures the lower explosive limit (LEL) of methane and also measures oxygen levels. The instrument will be operated and calibrated according to the manufacturer's instructions.

An electronic water level meter will be used to measure the depth to water within the gas monitoring probes. This type of instrument utilizes a conductivity probe that senses when the water surface has been contacted.

Monitoring Procedures

The gas monitoring probe will normally be sealed such that it is not vented to the atmosphere. The pressure in the sealed monitoring probe will be measured and the presence and concentration of explosive gas will be determined. The probe will then be opened to allow the measurement of the depth to water, if any. The specific procedures are described below in greater detail.

- *Pressure Measurement* - A pressure measurement will be made on the sealed monitoring probe. This will be accomplished by connecting the pressure gauge to the quick-connect fitting that is installed on each monitoring probe. The pressure will then be read directly off the instrument and recorded.

- *Explosive Gas Measurements* - The measurement of explosive gas (LEL referenced to methane) within the sealed monitoring probe will be made after pressure gauge have been remove. This will be accomplished by attaching the explosive gas meter to the sealed monitoring probed through the connection with hose barb fitting. An initial reading for LEL will be made with the meter set to the high range in order to prevent damage to the filament in the meter during subsequent readings. If the reading is less than 5% of the LEL, the measurement will be repeated at the low range. Upon stabilization of the LEL reading, the LEL reading will be recorded on the field data (Appendix E).

3.3.2.3 Gas Vent and Gas Probe Repair and Replacement

If damage or excessive wear to the gas vents or gas probes is observed, they will be repaired, if possible. If it is not possible to repair the gas vent it will be replaced. If it is not possible to repair the gas probe and the damage can potentially affect the integrity of gas measurement, the gas probe will be replaced.

3.3.3 Surface Water Monitoring

Surface water samples shall be collected from three station locations at the South Landfill and three stations at the North Landfill as follows:

South Landfill

- At the upstream end of Stream B at the South Landfill (SW-1, Figure 9)
- At the downstream end of Stream B at the South Landfill (SW-2)
- At the downstream end of the site along the east bank of Ley Creek (SW-3)

North Landfill

- At the upstream end of the site along the east bank of Ley Creek (SW-4) (Note, this point is within an easement granted on the Plaza East property, 75feet wide shown on Figure 9 but increased to 100 feet wide by a later agreement)
- At the north end of Wetland A at the northeast corner of the site (SW-5), and
- At the south end of Stream A along Seventh North Street (SW-6).

Surface water samples shall be collected from downstream to upstream during any sampling event.

3.3.3.1 Sampling Protocol

The surface water samples will be collected directly in the sample containers provided by the laboratory following the sampling procedures presented below:

1. Measure the water depth at the sampling point with a tape measure and record the value on the field surface water sampling and analysis form.
2. Lower the sample container to the desired depth below the water surface with the sample container sealed.
3. When the sample container is at the desired depth, remove the lid of the sample container so that water enters the container.
4. Secure the lid of the sample container over the opening of the container while the container is still submerged. Retrieve the sample container and place in a cooler filled with ice.
5. If the depth to water is not sufficient to submerge the probe of the water quality meter, fill a beaker or graduated cylinder with water so that the field parameters can be measured. Record the pH, temperature and electrical conductance values on the field surface water sampling and analysis form. Also record the date and time that the sample was collected and the color, odor and clarity of the sample on the field surface water sampling and analysis form.
6. Decontaminate the container used for the field parameter measurements by double-rinsing with distilled water.

Field Parameters

Field measurements of pH, temperature, specific conductance and water depth will be collected at each surface water station. A portable digital pH-salinity-conductivity-temperature meter will be used to measure the field parameters.

The field parameters will be recorded on field forms. The date and time that the surface water samples were collected and the color, odor and clarity of each surface water sample will also be noted on the field forms. Copies of the various field forms that will be used are provided in Appendix E.

Laboratory Parameters

The surface water samples will be submitted to the Test America Analytical Services laboratory in Buffalo, NY (or a comparable laboratory), a New York State Department of Health ELAP certified laboratory, for analysis of PCBs by EPA Method SW-846 8082A and RCRA metals by EPA Method SW-846 6010C. The surface water samples submitted for analysis will be collected in glass sample bottles provided by the laboratory. The surface water samples will be kept chilled to at least 4 degrees Celsius prior to analysis and will be delivered to the laboratory following standard chain-of-custody procedures.

Each sample container will have a label affixed to it. The label on each container will contain the following information:

- Project number;
- Date and time the sample was collected;
- Well/Sample identification;
- Sample type (DI for distilled water, GW for groundwater or SW for surface water);
- Sampler's initials;
- Preservative.

3.3.4 Wetlands

3.3.4.1 Wetlands Restoration Monitoring

The North and South Landfills each contained streams and wetlands that had contaminated sediments removed. Each wetland and stream was restored as follows:

- The wetlands restoration details and plant species were selected to match those for emergent wetland reconstruction as required by the state of NY.
- A portion of Wetland A in the North Landfill was restored to an emergent wetland to match its current state.
- A portion of Stream A in the North Landfill was restored to an open water stream with an emergent wetland bank to match its current state.
- Wetland B in the North Landfill was restored to an emergent wetland to match its current state.
- Stream B in the South Landfill was restored to an open water stream with an emergent wetland bank to match its current state.

- Wetland C in the South Landfill was restored to an emergent wetland to match its current state.

The buffer zones surrounding the landfill caps were restored as grassed swales to conduct surface water flow to the adjacent wetlands in a gradual sheet manner to avoid erosion.

3.3.4.2 Wetland Plants Monitoring

The wetland restoration areas will be monitored semi-annually for a minimum of five years to evaluate the success of the restoration. The monitoring program will commence following the first full growing season and will involve two monitoring events per year. A field reconnaissance and detailed monitoring program will be conducted during the mid-part of the growing season (e.g., July). A field reconnaissance will be performed during the latter-part of the growing season (e.g., September). The parameters to be monitored include:

- Vegetation (type, percent cover, and frequency);
- Hydrology; and,
- Wildlife usage.

The field reconnaissance surveys will include observations of overall vegetation establishment and wildlife usage, and gauging of surface water depths. Wildlife usage will be assessed by recording evidence of reptiles, amphibians, birds and mammals within the restoration area, and the vicinity through standard field observation methods (e.g., visual observation, tracks, scat, etc.). Information collected at each landfill will be as follows:

South Landfill:

1) Photograph and record grass health in each direction along the buffer zones at gas probe GP-5, gas vent GV-2, and gas vent GV-7 (Figure 13),
2) Photograph and record wetland bush health/die-off at four equal distance intervals along the west side of Stream B, noting the health of wetland plants and grasses at each of the four points, along with observed wildlife, and
3) Take a three-photo panoramic view from surface water sampling station SW-2 (Figure 9) and record the percentage open water in Wetland C (with Figure 9) along with plant health and any observed wildlife.

North Landfill:

1) Photograph and record grass health in each direction along the buffer zones at gas probe GP-1 through GP-6 (Figure 14),(note the presence of the New England Conservation/Wildlife Seed Mix species (Appendix G),
2) Photograph and record wetland bush health/die-off at four representative locations, two per wetland, and record total number of dead bushes. Note the health of wetland plants and grasses at each of the four points, along with observed wildlife, and
3) Take a three-photo panoramic view from GP-2 (Wetland B) and GP-5 (Wetland A) and record the percentage open water in each wetland (with Figure 9) along with plant health and any observed wildlife.

The information gathered during the wetland plant monitoring events will be documented in an annual periodic review report, as described in Section 5.3. Contents of the monitoring report will include, at a minimum, the following elements:

1. Photographs taken at each of the monitoring points;
2. Surface water coverage data within open water area(s);
3. Observed cover and frequency of each grass and plant species at each of the monitoring points;
4. Vegetation cover comments marked on Figures 9, 13, and 14 with a date and observing person's name;
5. A list of wildlife species using the area; and,
6. An overall qualitative description of the success of the restoration areas and recommendations to correct problems within the restoration area, if necessary.

The final report (fifth year) will identify trends in data collected during each of the previous monitoring events, as described in Section 6.4. Additionally, the final report will evaluate hydrological conditions to date and project whether these conditions will be sustained in the future.

3.3.4.3 Wetlands Maintenance

The wetland monitoring program will incorporate an adaptive management approach that identifies and rectifies restoration concerns. Potential concerns will be identified and mitigated on a case-by-case basis. For example, if by the end of year two the vegetative cover has not met the prescribed percent herbaceous cover listed above, those areas lacking acceptable coverage will be reseeded or replanted as appropriate. Additionally, measures to control the propagation of invasive species (e.g., Phragmites and purple loosestrife) within the restored wetlands may be warranted.

The restored wetlands were designed to promote long-term control of invasive species. For example, the design incorporates the creation of conditions that are not conducive for the growth of Phragmites and that provide other species an opportunity to compete against Phragmites. These conditions include: 1) a good quality topsoil of sufficient depth (6 – 12 inches), 2) water depths greater than can be tolerated by Phragmites (deeper than 1 to 2 feet), 3) use of fast growing species of wetland plants, and 4) planting of shrubs and trees where saturated surfaces occur on a seasonal basis to provide shade. Even though these strategies will limit the occurrence of Phragmites, the total eradication of Phragmites that may propagate within the restoration areas will be difficult, at best, and likely unattainable due to the presence of extensive Phragmites stands within and adjacent to the restoration areas.

Nonetheless, a hand application of a chemical herbicide (e.g., Rodeo®) will be applied to help control invasive species over the short term, if necessary. To avoid harming any amphibian larvae and/or young of the year chemical herbicide (e.g., Rodeo®) will be applied in later summer/early fall, although prior to seed production, or as directed by NYSDEC. This will entail applying chemical herbicides to isolated patches of invasive species observed within the restoration area. Chemical herbicides will not be applied to invasive species observed within standing water areas. Chemical herbicides will be applied

in accordance with the manufactures instructions. The application of herbicides will be conducted once in the spring of 2016 (allowed only once in the spring of 2016 to give introduced new vegetation the optimum chance to out-complete the invasive species; the risk to amphibian larvae and/or young is minimal due to the recent site disturbance during cap construction) and thereafter at NYSDEC direction. A hand application of a chemical herbicide will be applied to help control the invasive species – Phragmites in the spring of 2016 to the areas noted on Figure 9.

3.4 Site Wide Inspection

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. Site-wide inspections will also be performed after all severe weather conditions that may affect Engineering Controls or monitoring devices. During these inspections, an inspection form will be completed (Appendix E). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and
- Confirm that site records are up to date.

Section 5.0 following details site inspections, reporting, and certifications.

3.5 Monitoring Quality Assurance/Quality Control

All sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) prepared for the site (Appendix H). Main Components of the QAPP include:

- QA/QC Objectives for Data Measurement;
- Sampling Program:
    - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
    - Sample holding times will be in accordance with the NYSDEC ASP requirements.
    - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody;
- Calibration Procedures:
    - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.

  - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical Procedures;
- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method (furnished only on NYSDEC request).
- Internal QC and Checks;
- QA Performance and System Audits;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures.

3.6 Monitoring Reporting Requirements

Forms and any other information generated during regular monitoring events and inspections will be kept on file at the CC-H facility. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. A letter report will also be prepared [if required by NYSDEC], subsequent to each sampling event. The report (or letter) will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., groundwater, surface water, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether groundwater conditions have changed since the last reporting event.

Data will be reported in hard copy or digital format as determined by NYSDEC. A summary of the monitoring program deliverables are summarized in the table below.

Table 7. Schedule of Monitoring/Inspection Reports

Task	**Reporting Frequency***
Monitoring Report: Landfill Gas, Groundwater and Surface Water	per event
Inspection Report: Landfill Cover and Wetlands	per event
Periodic Review Report	Annual

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC

4.0 OPERATION AND MAINTENANCE PLAN

The site remedy does not rely on any mechanical systems, such as sub-slab depressurization systems or air sparge/ soil vapor extraction systems, to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 Site Inspections

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan of this SMP. At a minimum, a site-wide inspection will be conducted annually. Inspections of remedial components will also be conducted whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.1.2 Inspection Forms, Sampling Data and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms for their respective system which are contained in Appendix E. Additionally, a general site-wide inspection form will be completed during the site-wide inspection (see Appendix E). These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and site monitoring data will be evaluated as part of the EC/IC certification to confirm that the:

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- Operation and maintenance activities are being conducted properly; and, based on the above items,
- The site remedy continues to be protective of public health and the environment and is performing as designed in the RAWP and FER.

5.2 Certification of Engineering and Institutional Controls

After the last inspection of the reporting period, a qualified environmental professional or Professional Engineer licensed to practice in New York State will prepare the following certification:

For each institutional or engineering control identified for the site, I certify that all of the following statements are true:

- The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;
- The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;

- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;
- Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- Use of the site is compliant with the environmental easement (Appendix J);
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and
- The information presented in this report is accurate and complete.
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name (a qualified environmental professional)], of [O&M Consultant name and business address], am certifying as the Owner's Designated Site Representative for the site.

The signed certification will be included in the Periodic Review Report described below.

5.3 Periodic Review Report

A Periodic Review Report will be submitted to the Department every year. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site. The report will be prepared in accordance with NYSDEC DER-10 and submitted by the first day of the month following the anniversary of the start of Site management. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site;
- Results of the required annual site inspections and severe condition inspections, if applicable;
- All applicable inspection forms and other records generated for the site during the reporting period in electronic format;
- A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions;
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, surface water), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific RAWP, ROD or Decision Document;

- Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
- Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
- The overall performance and effectiveness of the remedy.

The Periodic Review Report will be submitted, in hard-copy format, to the NYSDEC Central Office and Regional Office in which the site is located, and in electronic format to NYSDEC Central Office, Regional Office and the NYSDOH Bureau of Environmental Exposure Investigation.

5.4 Corrective Measures Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a corrective measures plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the corrective measures plan until it is approved by the NYSDEC.

Table 1. Soil Contamination Summary

Contaminants of Concern	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency of Exceeding Unrestricted SCG	Restricted SCG[c] (ppm)	Frequency of Exceeding Industrial Land Use SCG
VOCs					
1,1,1-Trichloroethane	0.002-15	0.68	1 of 61	1000	0 of 61
1,1-Dichloroethane	0.004-22	0.27	1 of 61	480	0 of 61
Acetone	0.002-2.6	0.05	28 of 61	1000	0 of 61
Benzene	0.001-0.230	0.06	3 of 61	0.06 [d]	3 of 61
Chlorobenzene	0.004-2.1	1.1	1 of 61	1.1 [d]	1 of 61
Ethylbenzene	0.002-330	1	9 of 61	780	0 of 61
Methylene Chloride	0.001-87	0.05	2 of 61	1000	0 of 61
Tetrachloroethene	0.002-5.8	1.3	1 of 61	300	0 of 61
Toluene	0.002-310	0.7	5 of 61	1000	0 of 61
Trichloroethene	1.7	0.47	1 of 61	400	0 of 61
Xylenes, Total	0.004-19	0.26	8 of 61	1000	0 of 61
SVOCs					
Benzo(a)anthracene	0.045-14	1	15 of 61	11	1 of 61
Benzo(a)pyrene	0.035-12	1	14 of 61	1.1	13 of 61
Benzo(b)fluoranthene	0.041-20	1	19 of 61	11	1 of 61
Benzo(k)fluoranthene	0.021-7.5	0.8	13 of 61	110	0 of 61
Chrysene	0.053-17	1	14 of 61	110	0 of 61
Dibenzo(a,h) anthracene	0.014-1.4	0.33	10 of 61	1.1	1 of 61
Dibenzofuran	0.019-7.2	6.2	1 of 61	1000	0 of 61
Indeno(1,2,3-cd)pyrene	0.020-3.8	0.5	13 of 61	11	0 of 61
Phenol	0.060-3.9	0.33	15 of 61	0.33 [d]	15 of 61
Pesticides/PCBs					
4,4'-DDE	0.0022-0.017	0.0033	3 of 20	120	0 of 20
Aldrin	0.011	0.005	1 of 20	1.4	0 of 20
Dieldrin	0.0053-0.032	0.005	5 of 20	2.8	0 of 20
Total PCBs	0.000835-65	0.1	53 of 96	25	2 of 96
Metals					
Arsenic	1.6-31.3	13	8 of 61	16	4 of 61
Cadmium	0.11-1200	2.5	29 of 61	60	5 of 61
Chromium	7.5-1560	10 or SB[j]	55 of 61	800	2 of 61
Copper	15.9-12900	50	40 of 61	10000	1 of 61
Lead	11.8-621	63	26 of 61	3900	0 of 61
Mercury	0.02-2.0	0.18	26 of 61	5.7	0 of 61
Nickel	4.0-302	30	17 of 61	10000	0 of 61
Zinc	41.5-33600	109	47 of 61	10000	1 of 61
Total Cyanide	107	27	1 of 20	10000	0 of 61

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil.
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted (Industrial landuse) Soil Cleanup Objectives.
d - SCG: Part 375-6.8 (b), Restricted Soil Cleanup Objectives, Protection of Groundwater - used for the primary contaminants of concern.

Table 2. Sediment Contamination Summary

Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)	Frequency of Exceeding SCG	Site Derived Value (SDV)[c] (ppm)	Frequency of Exceeding SDV
SVOCs					
Benzo(a)anthracene	0.220-4.2	2	7 of 33	NA	NA
Pesticides/PCBs					
Total PCBs	0.0055-140	0.228	257 of 499	1.0	186 of 499
Metals					
Arsenic	1.9-30.5	LEL- 6	27 of 33	NA	NA
		SEL- 33	0 of 33		
Cadmium	0.66-199	LEL- 0.6	33 of 33	NA	NA
		SEL- 9	23 of 33		
Chromium	28.4-5,440	LEL- 26	33 of 33	NA	NA
		SEL- 110	18 of 33		
Iron	13,900-51,700	LEL- 20,000	21 of 33	NA	NA
		SEL-40,000	18 of 33		
Lead	46.0-676	LEL- 31	33 of 33	NA	NA
		SEL- 110	23 of 33		
Manganese	165-1,360	LEL- 460	15 of 33	NA	NA
		SEL- 1,000	1 of 33		
Mercury	0.097-0.774	LEL- 0.15	27 of 33	NA	NA
		SEL- 1.3	0 of 33		
Nickel	26.7-1990	LEL- 16	33 of 33	NA	NA
		SEL- 50	15 of 33		
Silver	0.43-11.6	LEL- 1	26 of 33	NA	NA
		SEL- 2	18 of 33		
Zinc	274-3,500	LEL- 120	28 of 33	NA	NA
		SEL- 270	28 of 33		

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment.
b - SCG: The Department's "Technical Guidance for Screening Contaminated Sediments."
c - Site Derived Value: Previously selected sediment clean-up goal at New York State hazardous waste sites.
NA - Not Applicable

Table 3. Groundwater Contamination Summary

Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency of Exceeding SCG
VOCs			
1,4-Dichlorobenzene	2.0-8.2	3.0	8 of 74
Benzene	1.1-10.0	1.0	22 of 74
Chlorobezene	10.0-42	5.0	9 of 74
Chloroethane	.68-190	5.0	3 of 74
Chloroform	0.7-25	7.0	2 of 74
Ethylbenzene	2.0-19	5.0	3 of 74
Methylene Chloride	7.6-110	5.0	2 of 74
Toluene	1.0-14	5.0	1 of 74
SVOCs			
Benzo(a)anthracene	0.2-5.0	0.002	4 of 74
Benzo(a)pyrene	0.2-9.0	0.002	2 of 74
Benzo(b)fluoranthene	1.5	0.002	1 of 74
Benzo(k)fluoranthene	1.5	0.002	1 of 74
Bis(2-Ethylhexyl)phthalate	1.0-20	5.0	1 of 74
Chrysene	0.4-9.0	0.002	3 of 74
Fluoranthene	0.3-85	50	1 of 74
Indeno(1,2,3-cd)pyrene	6	0.002	1 of 74
Naphthalene	0.4-11	10	1 of 74
Phenanthrene	0.2-73	50	1 of 74
Pyrene	0.2-97	50	1 of 74
Total Phenols	1.5-1360	1.0	18 of 74
Metals			
Arsenic	2.0-28	25	2 of 50
Barium	24-2350	1000	3 of 50
Beryllium	0.31-5.8	3.0	4 of 50
Cadmium	0.39-37.5	5.0	3 of 74
Chromium	0.81-85.6	50	1 of 74
Iron	706-53000	300	25 of 50
Lead	1.6-351	25	4 of 74
Magnesium	12200-199000	35000	2 of 50
Manganese	36-657	300	2 of 50
Selenium	9.1-49	10	8 of 50
Sodium	64600-4370000	20000	4 of 50
Zinc	1.6-5160	2000	2 of 74

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

Table 4. Surface Water Contamination Summary

Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCGb (ppb)[b]	Frequency of Exceeding SCG
VOCs			
Methylene Chloride	34-3700	200	1 of 11
SVOCs			
Benzo(a)athracene	0.6-12	0.03	3 of 19
Benzo(a)pyrene	0.2-16	0.0012	5 of 19
Pesticides/PCBs			
Heptachlor	0.017	0.0002	1 of 8
Heptachlor epoxide	0.01	0.0003	1 of 8
4,4'-DDE	0.011	0.000007	1 of 8
4,4'-DDT	0.038-0.044	0.00001	3 of 8
Total PCBs	0.86	0.000001	1 of 8
Metals			
Aluminum	96.1-548	100	2 of 8
Cadmium	0.42-83.9	6.6[f]	3 of 19
Chromium	0.78-332	250[f]	1 of 19
Copper	1.4-60.2	31.4[f]	2 of 8
Iron	955-30600	300	8 of 8
Lead	3.4-675	17.9[f]	7 of 19
Zinc	12.1-3500	290[f]	5 of 19

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), and 6 NYCRR Part 703, Surface Water and Groundwater Quality Standards.

Table 5. Post-Remediation Soil Sample Results

Sample ID	Northing	Easting	Elevation	Sample Date	Result (mg/kg)	Comment
WETLAND A						
WA-S3	1124366.35	933978.68	362.74	01/15/15	4.5	Depth of cut ~1 ft bgs, Re-excavate
WA-S1	1124383.9	933971.23	364.70	01/15/15	1.7	Depth of cut ~1 ft bgs, Re-excavate
WA-R4	1124411.34	933988.29	364.48	01/15/15	ND	Depth of cut ~4 ft bgs
WA-R3	1124426.12	934023.69	362.406	01/15/15	ND	Depth of cut ~4 ft bgs
WA-S2	1124379.5	934005.12	366.522	01/15/15	2.1	Depth of cut ~1 ft bgs, Re-excavate
WA-R5	1124404.92	934016.76	362.215	01/15/15	ND	Depth of cut ~4 ft bgs
WA-R2	1124442.9	934032.49	362.341	01/15/15	ND	Depth of cut ~4 ft bgs
WA-T1	1124442.37	934063.62	366.122	01/15/15	3.2	Depth of cut ~1.9 ft bgs, Re-excavate
WA-T4	1124393.25	934046.79	365.993	01/15/15	0.5	Depth of cut ~1.9 ft bgs
WA-T2	1124422.06	934106.54	365.926	01/15/15	ND	Depth of cut ~1.9 ft bgs
WA-T3	1124407.07	934074.27	365.967	01/15/15	1.1	Depth of cut ~1.9 ft bgs, Re-excavate
WA-U2	1124437.22	934150.89	366.824	01/15/15	2.2	Depth of cut ~3.1 ft bgs, Re-excavate
WA-U1	1124433.47	934128.97	366.654	01/15/15	0.27	Depth of cut ~3.1 ft bgs
WA-V1	1124453.64	934186.78	366.595	01/15/15	4.1	Depth of cut ~2.0 ft bgs, Re-excavate
WA-M6	1124425.63	933949.78	361.70	01/19/15	ND	Depth of cut ~4.8 ft bgs
WA-M4	1124429.41	933916.64	361.57	01/19/15	ND	Depth of cut ~4.8 ft bgs
WA-M2	1124454.22	933906.91	361.66	01/19/15	0.22	Depth of cut ~4.8 ft bgs
WA-M1	1124471.10	933925.15	361.57	01/19/15	ND	Depth of cut ~4.8 ft bgs
WA-P3	1124473.37	933957.00	364.78	01/19/15	6.7	Depth of cut ~3 ft bgs, Re-excavate
WA-M5	1124448.64	933938.05	361.61	01/19/15	ND	Depth of cut ~4.8 ft bgs
WA-R1	1124448.15	933996.94	362.33	01/19/15	ND	Depth of cut ~4 ft bgs
WA-P4	1124449.56	933964.57	364.84	01/19/15	120	Depth of cut ~3 ft bgs, Re-excavate
WA-P2	1124495.37	933956.81	364.74	01/19/15	0.75	Depth of cut ~3 ft bgs
WA-Q5	1124492.61	933994.63	360.76	01/19/15	ND	Depth of cut ~5.5 ft bgs
WA-Q3	1124473.19	934048.67	360.82	01/19/15	ND	Depth of cut ~5.5 ft bgs
WA-Q4	1124469.93	934017.36	360.72	01/19/15	ND	Depth of cut ~5.5 ft bgs
WA-Q2	1124505.66	934018.94	360.79	01/19/15	0.11	Depth of cut ~5.5 ft bgs
WA-Q1	1124518.06	934000.69	361.01	01/19/15	ND	Depth of cut ~5.5 ft bgs
WA-L1	1124388.39	933942.37	364.47	01/19/15	35	Depth of cut ~1.8 ft bgs, Re-excavate
WA-L3	1124365.98	933945.35	364.30	01/19/15	20	Depth of cut ~1.8 ft bgs, Re-excavate
WA-K1	1124342.01	933938.09	367.38	01/19/15	1.15	Depth of cut ~1.0 ft bgs, Re-excavate
WA-L2	1124375.31	933909.06	364.64	01/19/15	7.8	Depth of cut ~1.8 ft bgs, Re-excavate
WA-J1	1124371.93	933877.02	362.75	01/19/15	ND	Depth of cut ~3.5 ft bgs
WA-N7	1124477.60	933831.45	364.88	01/19/15	11	Depth of cut ~1.7 ft bgs, Re-excavate
WA-N2	1124501.45	933843.49	364.58	01/19/15	7.2	Depth of cut ~1.7 ft bgs, Re-excavate
WA-N1	1124522.36	933874.47	364.44	01/19/15	48	Depth of cut ~1.7 ft bgs, Re-excavate
WA-N6	1124485.36	933858.40	364.65	01/19/15	0.11	Depth of cut ~2 ft bgs
WA-N3	1124506.08	933882.71	364.53	01/19/15	27	Depth of cut ~2 ft bgs, Re-excavate
WA-O5	1124537.94	933907.33	361.65	01/19/15	ND	Depth of cut ~3 ft bgs
WA-O4	1124549.37	933938.83	361.45	01/19/15	0.11	Depth of cut ~3 ft bgs
WA-O1	1124566.10	933969.71	361.70	01/19/15	ND	Depth of cut ~3 ft bgs
WA-P1	1124512.50	933960.62	364.65	01/19/15	3.7	Depth of cut ~3 ft bgs, Re-excavate
WA-O3	1124535.23	933962.20	361.48	01/19/15	ND	Depth of cut ~3 ft bgs
WA-O2	1124537.72	933987.26	361.71	01/19/15	ND	Depth of cut ~3 ft bgs
WA-N8	1124470.56	933869.42	364.64	01/19/15	9.6	Depth of cut ~1.7 ft bgs, Re-excavate
WA-N5	1124481.64	933893.70	364.68	01/19/15	5.3	Depth of cut ~1.7 ft bgs, Re-excavate
WA-N4	1124497.65	933912.07	364.48	01/19/15	14	Depth of cut ~1.7 ft bgs, Re-excavate
WA-I8	1124367.18	933810.88	365.14	01/19/15	88	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I5	1124408.47	933808.39	365.04	01/19/15	24	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I4	1124389.42	933833.04	365.10	01/19/15	51	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I7	1124372.76	933772.13	365.32	01/19/15	100	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I6	1124391.50	933794.05	365.01	01/19/15	37	Depth of cut ~1.2 ft bgs, Re-excavate
WA-H4	1124387.29	933742.16	364.78	01/19/15	50	Depth of cut ~2 ft bgs, Re-excavate
WA-H3	1124391.87	933714.36	364.76	01/19/15	53	Depth of cut ~2 ft bgs, Re-excavate
WA-H2	1124409.63	933694.58	364.85	01/19/15	84	Depth of cut ~2 ft bgs, Re-excavate
WA-H1	1124421.22	933675.89	364.76	01/19/15	88	Depth of cut ~2 ft bgs, Re-excavate
WA-I13	1124397.73	933655.38	365.13	01/19/15	44	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I12	1124377.97	933675.30	365.09	01/19/15	14	Depth of cut ~1.2 ft bgs, Re-excavate
WA-G1	1124388.11	933624.35	363.03	01/19/15	0.1	Depth of cut ~3.3 ft bgs
WA-G2	1124358.35	933624.35	363.17	01/19/15	ND	Depth of cut ~3.3 ft bgs
WA-G3	1124340.84	933639.65	363.11	01/19/15	0.35	Depth of cut ~3.3 ft bgs
WA-F1	1124316.19	933650.05	364.04	01/19/15	210	Depth of cut ~2.4 ft bgs, Re-excavate
WA-F2	1124297.00	933660.76	363.79	01/19/15	0.24	Depth of cut ~2.4 ft bgs

Table 5. Post-Remediation Soil Sample Results

Sample ID	Northing	Easting	Elevation	Sample Date	Result (mg/kg)	Comment
WETLAND A						
WA-A3	1124190.07	933309.02	365.43	01/20/15	11.2	Depth of cut ~1 ft bgs, Re-excavate
WA-A2	1124142.17	933363.49	365.34	01/20/15	1.8	Depth of cut ~1 ft bgs, Re-excavate
WA-A1	1124165.57	933427.24	365.43	01/20/15	5	Depth of cut ~1 ft bgs, Re-excavate
WA-B2	1124189.23	933471.66	364.38	01/20/15	ND	Depth of cut ~2 ft bgs
WA-B1	1124209.51	933524.28	364.41	01/20/15	ND	Depth of cut ~2 ft bgs
WA-C4	1124224.54	933558.86	364.84	01/20/15	2.3	Depth of cut ~2.1 ft bgs, Re-excavate
WA-C1	1124264.22	933607.51	364.75	01/20/15	0.46	Depth of cut ~2.1 ft bgs
WA-F3	1124294.42	933625.84	364.00	01/20/15	ND	Depth of cut ~2.4 ft bgs
WA-C3	1124214.62	933599.78	364.99	01/20/15	ND	Depth of cut ~2.1 ft bgs
WA-C2	1124244.87	933613.60	364.88	01/20/15	ND	Depth of cut ~2.1 ft bgs
WA-D1	1124249.99	933649.46	365.66	01/20/15	0.3	Depth of cut ~3 ft bgs
WA-I2	1124418.11	933863.54	365.17	02/17/15	30	Depth of cut ~1.2 ft bgs, Re-excavate
WA-M7	1124399.31	933890.13	361.63	02/17/15	0.92	Depth of cut ~4.8 ft bgs
WA-M3	1124442.00	933866.64	361.52	02/17/15	0.1	Depth of cut ~4.8 ft bgs
WA-I1	1124437.89	933829.99	365.21	02/18/15	82	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I3	1124418.82	933824.36	365.18	02/18/15	29	Depth of cut ~1.2 ft bgs, Re-excavate
WA-J3	1124365.66	933846.47	362.84	02/18/15	ND	Depth of cut ~3.5 ft bgs
WA-V1R	1124453.64	934186.78	364.5	02/18/15	0.26 J	Depth of cut ~5.5 ft bgs
WA-U2R	1124437.22	934150.89	364.5	02/18/15	0.076 J	Depth of cut ~5.4 ft bgs
WA-J2	1124351.40	933886.70	362.69	02/23/15	1.36	Depth of cut ~3.5 ft bgs, Re-excavate
WA-J4	1124343.68	933826.14	362.77	02/23/15	23.80	Depth of cut ~3.5 ft bgs, Re-excavate
SED 98/99	1124339.09	933962.99	367.73	02/23/15	0.24	Depth of cut ~2.3 ft bgs
WA-L3R	1124365.98	933945.35	362.80	02/23/15	ND	Depth of cut ~3.7 ft bgs
WA-L1R	1124388.39	933942.37	362.80	02/23/15	ND	Depth of cut ~3.7 ft bgs
WA-S3R	1124366.35	933978.68	364.60	02/23/15	17.80	Depth of cut ~2.1 ft bgs, Re-excavate
WA-S1R	1124383.9	933971.23	364.60	02/23/15	ND	Depth of cut ~2.1 ft bgs
WA-S2R	1124379.5	934005.12	364.5	02/24/15	ND	Depth of cut ~2.2 ft bgs
WA-T1R	1124442.37	934063.62	364.1	02/25/15	14.00	Depth of cut ~2.1 ft bgs, Re-excavate
WA-S3RR	1124366.35	933978.68	363.70	03/03/15	ND	Depth of cut ~4.0 ft bgs
WA-K1R	1124342.01	933938.09	365.40	03/03/15	0.29	Depth of cut ~3.1 ft bgs
WA-J2R	1124351.40	933886.70	360.80	03/03/15	ND	Depth of cut ~5.6 ft bgs
WA-I10	1124371.49	933737.68	365.13	03/03/15	0.45	Depth of cut ~1.2 ft bgs
WA-I9	1124345.88	933798.01	365.12	03/03/15	40.00	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I18	1124328.20	933781.54	365.18	03/03/15	21.00	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I15	1124335.42	933755.51	365.20	03/03/15	56.00	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I17	1124310.84	933749.72	365.13	03/03/15	41.00	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I11	1124363.79	933716.52	365.26	03/03/15	55.00	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I14	1124348.80	933686.46	365.19	03/03/15	28.00	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I16	1124323.91	933691.04	365.09	03/03/15	0.87	Depth of cut ~1.2 ft bgs
WA-I19	1124305.13	933720.91	365.14	03/03/15	22.30	Depth of cut ~1.2 ft bgs, Re-excavate
WA-D2	1124331.38	933656.36	365.65	03/03/15	0.23	Depth of cut ~3 ft bgs
WA-D3	1124218.03	933628.75	365.62	03/03/15	ND	Depth of cut ~3 ft bgs
WA-E1	1124301.76	933692.46	366.41	03/03/15	ND	Depth of cut ~1.6 ft bgs
WA-E2	1124275.45	933673.80	366.37	03/03/15	ND	Depth of cut ~1.6 ft bgs
WA-E3	1124285.26	933714.51	366.41	03/03/15	ND	Depth of cut ~1.6 ft bgs
WA-E4	1124253.46	933685.74	366.31	03/03/15	0.10	Depth of cut ~1.6 ft bgs
WA-E5	1124258.30	933720.13	366.33	03/03/15	ND	Depth of cut ~1.6 ft bgs
WA-I21	1124297.61	933801.16	365.16	03/03/15	ND	Depth of cut ~1.2 ft bgs
WA-I20	1124313.27	933781.44	365.10	03/03/15	6.41	Depth of cut ~1.2 ft bgs, Re-excavate
WA-I22	1124293.73	933797.96	365.10	03/03/15	ND	Depth of cut ~1.2 ft bgs
WA-I23	1124268.88	933753.78	365.13	03/03/15	ND	Depth of cut ~1.2 ft bgs
WA-F4	1124270.58	933634.22	363.98	03/03/15	ND	Depth of cut ~2.4 ft bgs
WA-T3R	1124407.07	934074.27	363.9	03/04/15	ND	Depth of cut ~3.9 ft bgs
WA-T1RR	1124442.37	934063.62	362.122	03/04/15	ND	Depth of cut ~4.1 ft bgs
WA-J4R	1124343.68	933826.14	360.80	03/05/15	ND	Depth of cut ~5.6 ft bgs
WA-I2R	1124418.11	933863.54	363.20	03/05/15	ND	Depth of cut ~3.2 ft bgs
WA-N8R	1124470.56	933869.42	362.70	03/06/15	ND	Depth of cut ~3.7 ft bgs
WA-N4R	1124497.65	933912.07	362.60	03/06/15	ND	Depth of cut ~3.8 ft bgs
WA-N7R	1124477.60	933831.45	362.70	03/06/15	ND	Depth of cut ~3.7 ft bgs
WA-N5R	1124481.64	933893.70	362.70	03/06/15	ND	Depth of cut ~3.7 ft bgs
WA-N2R	1124501.45	933843.49	363.00	03/06/15	ND	Depth of cut ~3.4 ft bgs

"R" or "RR" indicates final post-excavation result

Table 5. Post-Remediation Soil Sample Results

Sample ID	Northing	Easting	Elevation	Sample Date	Result (mg/kg)	Comment
WETLAND A						
WA-N1R	1124522.36	933874.47	362.80	03/06/15	ND	Depth of cut ~3.6 ft bgs
WA-N3R	1124506.08	933882.71	362.70	03/06/15	ND	Depth of cut ~3.7 ft bgs
WA-A1R	1124165.57	933427.24	363.00	03/10/15	ND	Depth of cut ~3.4 ft bgs
WA-A2R	1124142.17	933363.49	361.00	03/10/15	ND	Depth of cut ~5.4 ft bgs
WA-C4R	1124224.54	933558.86	362.90	03/10/15	1.03	Depth of cut ~4.1 ft bgs
WA-I18R	1124328.20	933781.54	363.20	03/10/15	ND	Depth of cut ~3.6 ft bgs
WA-I8R	1124367.18	933810.88	361.10	03/14/15	ND	Depth of cut ~5.7 ft bgs
WA-I17R	1124310.84	933749.72	363.30	03/14/15	ND	Depth of cut ~3.5 ft bgs
WA-I20R	1124313.27	933781.44	363.30	03/14/15	ND	Depth of cut ~3.5 ft bgs
WA-I19R	1124305.13	933720.91	363.00	03/14/15	ND	Depth of cut ~3.8 ft bgs
WA-A3RR	1124190.07	933309.02	361.00	03/18/15	ND	Depth of cut ~5.4 ft bgs
WA-A2RR	1124142.17	933363.49	361.00	03/18/15	ND	Depth of cut ~5.4 ft bgs
WA-P3R	1124473.37	933957.00	362.80	03/25/15	ND	Depth of cut ~3.6 ft bgs
WA-P4-2R	1124449.56	933964.57	359.84	03/25/15	ND	Depth of cut ~5 ft bgs
WA-P1R	1124512.50	933960.62	362.00	03/25/15	ND	Depth of cut ~4.4 ft bgs
WA-I4RR	1124389.42	933833.04	359.20	03/25/15	ND	Depth of cut ~4.8 ft bgs
WA-I9R	1124345.88	933798.01	362.00	03/25/15	ND	Depth of cut ~4.4 ft bgs
WA-I14R	1124348.80	933686.46	363.00	03/27/15	ND	Depth of cut ~3.4 ft bgs
WA-I13R	1124397.73	933655.38	363.20	03/27/15	ND	Depth of cut ~3.2 ft bgs
WA-I12R	1124377.97	933675.30	363.00	03/27/15	ND	Depth of cut ~3.4 ft bgs
WA-I1R	1124437.89	933829.99	362.20	03/27/15	ND	Depth of cut ~4.2 ft bgs
WA-I15R	1124335.42	933755.51	362.60	03/27/15	ND	Depth of cut ~3.8 ft bgs
WA-F1R	1124316.19	933650.05	358.20	03/30/15	ND	Depth of cut ~8.2 ft bgs
WA-I5R	1124408.47	933808.39	362.90	03/30/15	ND	Depth of cut ~3.5 ft bgs
WA-I3R	1124418.82	933824.36	363.10	03/30/15	ND	Depth of cut ~3.3 ft bgs
WA-I6R	1124391.50	933794.05	363.20	03/30/15	ND	Depth of cut ~3.2 ft bgs
WA-I7R	1124372.76	933772.13	362.20	04/01/15	ND	Depth of cut ~4.2 ft bgs
WA-I11R	1124363.79	933716.52	361.60	04/01/15	ND	Depth of cut ~4.8 ft bgs
WA-H1R	1124421.22	933675.89	361.70	04/01/15	ND	Depth of cut ~5.1 ft bgs
WA-H2R	1124409.63	933694.58	360.50	04/01/15	ND	Depth of cut ~6.3 ft bgs
WA-H3R	1124391.87	933714.36	360.40	04/01/15	ND	Depth of cut ~6.4 ft bgs
WA-H4R	1124387.29	933742.16	361.10	04/01/15	ND	Depth of cut ~5.7 ft bgs

"R" or "RR" indicates final post-excavation result

Note: Grid sample results for TSCA sediment grid samples are not tabulated as these sediments were exported off-site. Grid sample analytical laboratory reports are included in Appendix G.

Table 5. Post-Remediation Soil Sample Results

Sample ID	Northing	Easting	Elevation	Sample Date	Result (mg/kg)	Comment
WETLAND B						
WB-H-10	1124916.56	932936.53	363.45	12/15/14	24.00	Depth of cut ~1 ft bgs, Re-excavate
WB-H-9	1124949.60	932959.07	363.35	12/15/14	17.00	Depth of cut ~1 ft bgs, Re-excavate
WB-H-8	1124958.75	932986.07	363.16	12/15/14	64.00	Depth of cut ~1 ft bgs, Re-excavate
WB-H-7	1124960.32	933019.85	363.34	12/15/14	22.00	Depth of cut ~1 ft bgs, Re-excavate
WB-H-6	1124967.34	933038.13	364.14	12/15/14	3.60	Depth of cut ~1 ft bgs, Re-excavate
WB-H-5	1124962.87	933059.65	363.69	12/15/14	38.00	Depth of cut ~1 ft bgs, Re-excavate
WB-H-3	1124954.01	933077.70	364.05	12/15/14	90.00	Depth of cut ~1 ft bgs, Re-excavate
WB-H-2	1124978.05	933088.15	363.18	12/15/14	44.00	Depth of cut ~1 ft bgs, Re-excavate
WB-H-1	1124985.67	933068.89	363.38	12/15/14	81.00	Depth of cut ~1 ft bgs, Re-excavate
WB-H-4	1124954.71	933113.13	363.67	12/15/14	7.80	Depth of cut ~1 ft bgs, Re-excavate
WB-I-16	1124977.48	932980.43	363.78	12/15/14	5.60	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-15	1124990.78	932995.20	363.55	12/15/14	12.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-14	1125003.47	933000.33	363.62	12/15/14	26.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-9	1125014.38	932994.43	363.59	12/15/14	8.10	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-13	1125022.98	933039.58	363.71	12/15/14	12.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-12	1125028.12	933077.18	363.49	12/15/14	13.00	Depth of cut ~1.2 ft bgs, Re-excavate
Wb-I-8	1125050.16	933038.79	363.68	12/15/14	68.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-3	1125084.93	933060.67	363.48	12/15/14	13.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-1	1125095.56	933059.10	363.41	12/15/14	0.55	Depth of cut ~1.2 ft bgs
WB-I-7	1125061.40	933075.48	363.50	12/15/14	50.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-6	1125039.83	933105.48	363.42	12/15/14	30.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-11	1125010.58	933107.84	363.42	12/15/14	42.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-2	1125064.88	933122.81	363.62	12/15/14	30.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-5	1125033.48	933131.58	363.58	12/15/14	15.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-4	1125055.57	933141.14	363.57	12/15/14	44.00	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-10	1125034.10	933145.62	363.78	12/15/14	ND	Depth of cut ~1.2 ft bgs
WB-I-3R	1125084.93	933060.67	361.4	12/22/14	ND	Depth of cut ~3.2 ft bgs
WB-I-7R	1125061.40	933075.48	361.53	12/22/14	ND	Depth of cut ~3.2 ft bgs
WB-I-8R	1125050.16	933038.79	361.44	12/22/14	ND	Depth of cut ~3.2 ft bgs
WB-H-11	1124933.39	933089.97	363.81	12/22/14	1.1	Depth of cut ~1 ft bgs, Re-excavate
WB-H-12	1124921.95	933101.16	363.53	12/22/14	42	Depth of cut ~1 ft bgs, Re-excavate
WB-H-13	1124892.99	933078.45	363.62	12/22/14	0.19	Depth of cut ~1 ft bgs
WB-H-14	1124885.38	933108.17	363.56	12/22/14	22	Depth of cut ~1 ft bgs, Re-excavate
WB-D-1	1124888.74	932987.76	362.69	12/22/14	ND	Depth of cut ~1.5 ft bgs
WB-D-2	1124872.39	932967.66	362.61	12/22/14	0.37	Depth of cut ~1.5 ft bgs
WB-D-6	1123419.46	932043.64	363.72	12/22/14	0.38	Depth of cut ~1.5 ft bgs
WB-D-7	1123414.17	932019.96	363.9	12/22/14	1.3	Depth of cut ~1.5 ft bgs, Re-excavvate
WB-D-8	1123421.78	931985.44	363.72	12/22/14	0.54	Depth of cut ~1.5 ft bgs
WB-D-9	1123403.72	931996	362.03	12/22/14	ND	Depth of cut ~1.5 ft bgs
WB-D-12	1123423.02	931953.13	363.20	12/22/14	0.15 J	Depth of cut ~1.5 ft bgs
WB-B-11	1124850.14	932967.32	363.14	12/23/14	0.29 J	Depth of cut ~1 ft bgs
WB-I-9(T)	1125031.33	933020.07	363.56	12/23/14	1.70	Depth of cut ~1.2 ft bgs, Re-excavate
WB-I-9(T)R	1125031.33	933020.07	361.52	12/23/15	ND	Depth of cut ~3.2 ft bgs
WB-B-27	1124778.80	933050.88	363.25	12/23/14	ND	Depth of cut ~1 ft bgs
WB-B-19	1124801.95	933079.66	363.21	12/23/14	ND	Depth of cut ~1 ft bgs
WB-B-30	1124748.96	933102.22	363.30	12/23/14	0.56	Depth of cut ~1 ft bgs
WB-B-31	1124750.62	933075.13	362.98	12/23/14	ND	Depth of cut ~1 ft bgs
WB-B-29	1124766.18	933107.11	363.15	12/23/14	1.5	Depth of cut ~1 ft bgs, Re-excavate
WB-B-18	1124801.95	933079.66	363.21	12/23/14	1.2	Depth of cut ~1 ft bgs, Re-excavate
WB-B-28	1124771.09	933072.92	363.04	12/23/14	2.1	Depth of cut ~1 ft bgs, Re-excavate
WB-B-32	1124753.37	933051.10	363.18	12/23/14	11	Depth of cut ~1 ft bgs, Re-excavate
WB-I-15R	1124826.14	932988.30	361.20	12/23/14	ND	Depth of cut ~3.2 ft bgs
WB-H-17	1124837.93	933102.71	363.59	12/23/14	0.19	Depth of cut ~1 ft bgs
WB-H-18	1124816.44	933129.62	363.42	12/23/14	ND	Depth of cut ~1 ft bgs
WB-H-16	1124853.43	933118.08	363.79	12/23/14	6.2	Depth of cut ~1 ft bgs, Re-excavate
WB-H-15	1124863.38	933087.45	363.44	12/23/14	0.20 J	Depth of cut ~1 ft bgs
WB-G-3	1124867.56	933058.72	363.53	12/23/14	0.20 J	Depth of cut ~0.7 ft bgs
WB-G-4	1124838.76	933061.19	363.40	12/23/14	37	Depth of cut ~0.7 ft bgs, Re-excavate
WB-D-1	1124888.74	932987.76	362.69	12/23/14	ND	Depth of cut ~1.5 ft bgs

"R" indicates final post-excavation result

Table 5. Post-Remediation Soil Sample Results

Sample ID	Northing	Easting	Elevation	Sample Date	Result (mg/kg)	Comment
WETLAND B						
WB-B-3	1124920.55	932997.01	363.23	12/23/14	0.73	Depth of cut ~1 ft bgs
WB-B-4	1124930.94	933032.09	363.18	12/23/14	0.11J	Depth of cut ~1 ft bgs
WB-B-5	1124906.85	933033.92	363.21	12/23/14	ND	Depth of cut ~1 ft bgs
Wb-G-1	1124889.22	933009.00	363.47	12/23/14	ND	Depth of cut ~0.7 ft bgs
WB-G-2	1124879.23	933027.66	363.46	12/23/14	ND	Depth of cut ~0.7 ft bgs
WB-D-2	1124872.39	932967.66	362.61	12/23/14	0.37 J	Depth of cut ~1.5 ft bgs
WB-B-11	1124850.14	932967.32	363.14	12/23/14	0.29 J	Depth of cut ~1 ft bgs
WB-B-14	1124828.42	932963.80	363.17	12/23/14	9.2	Depth of cut ~1 ft bgs, Re-excavate
WB-B-15	1124826.16	932988.86	363.23	12/23/14	4.3	Depth of cut ~1 ft bgs, Re-excavate
WB-E-1	1124867.12	933013.53	363.20	12/23/14	ND	Depth of cut ~1 ft bgs
WB-B-12	1124806.62	933012.16	363.12	12/23/14	0.11 J	Depth of cut ~1 ft bgs
WB-F-1	1124851.62	933006.76	362.72	12/23/14	0.35 J	Depth of cut ~1.5 ft bgs
WB-B-16	1124826.30	933028.05	363.26	12/23/14	33	Depth of cut ~1 ft bgs, Re-excavate
WB-B-17	1124825.11	933069.78	363.22	12/23/14	1.8	Depth of cut ~1 ft bgs, Re-excavate
WB-B-20	1124804.29	933049.41	363.16	12/23/14	0.94	Depth of cut ~1 ft bgs
WB-I-16R	1124977.48	932980.43	361.45	12/23/14	ND	Depth of cut ~3.2 ft bgs
WB-I-14R	1125003.47	933000.33	361.50	12/23/14	ND	Depth of cut ~3.2 ft bgs
WB-I-2R	1125064.88	933122.81	361.30	12/24/14	0.37 J	Depth of cut ~3.2 ft bgs
WB-I-5R	1125033.48	933131.58	361.20	12/24/14	ND	Depth of cut ~3.2 ft bgs
WB-B-45	1124730.15	932825.99	363.16	12/26/14	0.26 J	Depth of cut ~1 ft bgs
WB-A-5	1124751.57	932850.17	362.37	12/26/14	0.39 J	Depth of cut ~2 ft bgs
WB-B-50	1124683.63	932791.51	363.18	12/26/14	1.10	Depth of cut ~1 ft bgs, Re-excavate
WB-B-46	1124711.40	932805.92	363.12	12/26/14	0.29 J	Depth of cut ~1 ft bgs
WB-B-51	1124675.24	932822.75	363.24	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-47	1124721.14	932843.52	363.24	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-49	1124696.12	932831.00	363.24	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-53	1124651.53	932850.87	363.18	12/26/14	1.60	Depth of cut ~1 ft bgs, Re-excavate
WB-B-52	1124677.65	932858.09	363.23	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-10	1124864.65	932930.15	363.24	12/26/14	0.85	Depth of cut ~1 ft bgs
WB-B-13	1124825.99	932930.12	363.22	12/26/14	0.11 J	Depth of cut ~1 ft bgs
WB-B-22	1124797.67	932938.13	363.24	12/26/14	0.65 J	Depth of cut ~1 ft bgs
WB-B-25	1124780.08	932957.79	363.17	12/26/14	ND	Depth of cut ~1 ft bgs
WB-C-1	1124803.45	932972.31	363.46	12/26/14	0.62 J	Depth of cut ~0.7 ft bgs
WB-C-2	1124793.44	932996.35	363.63	12/26/14	1.10	Depth of cut ~0.7 ft bgs
WB-B-34	1124757.85	932984.52	363.19	12/26/14	20	Depth of cut ~1 ft bgs, Re-excavate
WB-B-36	1124736.03	932970.96	363.26	12/26/14	0.52 J	Depth of cut ~1 ft bgs
WB-B-26	1124777.95	933008.82	363.25	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-37	1124729.85	933006.61	363.17	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-33	1124756.53	933010.77	363.21	12/26/14	0.19 J	Depth of cut ~1 ft bgs
WB-B-38	1124719.57	933037.85	363.23	12/26/14	5.97	Depth of cut ~1 ft bgs, Re-excavate
WB-B-23	1124809.06	932912.52	363.18	12/26/14	ND	Depth of cut ~1 ft bgs
WB-A-1	1124807.37	932870.11	362.31	12/26/14	ND	Depth of cut ~2 ft bgs
WB-A-4	1124759.22	932877.78	362.28	12/26/14	0.26 J	Depth of cut ~2 ft bgs
WB-A-2	1124787.47	932891.73	362.27	12/26/14	ND	Depth of cut ~2 ft bgs
WB-B-24	1124777.35	932917.38	363.24	12/26/14	0.53 J	Depth of cut ~1 ft bgs
WB-B-35	1124755.78	932945.99	363.30	12/26/14	0.15 J	Depth of cut ~1 ft bgs
WB-B-40	1124708.23	932968.61	363.23	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-39	1124708.26	933002.19	363.19	12/26/14	0.20 J	Depth of cut ~1 ft bgs
WB-B-42	1124676.78	932969.39	363.07	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-48	1124703.49	932865.50	363.26	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-54	1124653.03	932875.51	363.21	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-44	1124678.67	932894.20	363.08	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-58	1124624.20	932889.21	363.25	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-43	1124678.76	932932.61	363.18	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-55	1124651.32	932901.49	363.20	12/26/14	ND	Depth of cut ~1 ft bgs
WB-B-57	1124626.26	932923.54	363.19	12/26/14	0.068 J	Depth of cut ~1 ft bgs
WB-B-56	1124650.87	932944.11	363.22	12/26/14	5.8	Depth of cut ~1 ft bgs, Re-excavate
WB-B-41	1124692.47	932991.52	363.13	12/26/14	ND	Depth of cut ~1 ft bgs
WB-A-3	1124786.26	932851.73	362.31	12/26/14	2	Depth of cut ~2 ft bgs, Re-excavate
WB-I-6R	1125038.87	933105.28	361.63	12/29/14	ND	Depth of cut ~3.2 ft bgs
WB-I-12R	1125028.82	933076.33	361.54	12/29/14	ND	Depth of cut ~3.2 ft bgs

"R" indicates final post-excavation result

Table 5. Post-Remediation Soil Sample Results

Sample ID	Northing	Easting	Elevation	Sample Date	Result (mg/kg)	Comment
WETLAND B						
WB-I-11R	1125008.26	933107.94	361.59	12/29/14	ND	Depth of cut ~3.2 ft bgs
WB-I-4R	1125055.22	933141.34	361.42	12/29/14	ND	Depth of cut ~3.2 ft bgs
WB-H-10R	1125034.91	933144.77	361.58	12/30/14	ND	Depth of cut ~3 ft bgs
WB-H-9R	1124947.16	932959.01	361.48	12/30/14	ND	Depth of cut ~3 ft bgs
WB-H-5R	1124964.65	933060.10	361.47	12/30/14	ND	Depth of cut ~3 ft bgs
WB-B-1R	1124934.07	933044.54	361.28	01/05/15	ND	Depth of cut ~3 ft bgs
WB-H-12R	1124923.16	933101.49	361.38	01/05/15	ND	Depth of cut ~3 ft bgs
WB-H-14R	1124886.69	933108.32	361.56	01/05/15	ND	Depth of cut ~3 ft bgs
WB-H-16R	1124853.42	933116.67	361.58	01/05/15	ND	Depth of cut ~3 ft bgs
WB-B-16R	1124826.75	933028.15	361.25	01/06/15	ND	Depth of cut ~3 ft bgs
WB-G-4R	1124839.58	933063.36	361.47	01/06/15	ND	Depth of cut ~2.7 ft bgs
WB-B-14R	1124828.48	932963.69	361.15	01/07/15	ND	Depth of cut ~3 ft bgs
WB-B-15R	1124826.14	932988.30	361.20	01/08/15	ND	Depth of cut ~3 ft bgs
WB-B-28R	1124771.56	933072.07	361.07	01/08/15	ND	Depth of cut ~3 ft bgs
WB-B-32R	1124753.37	933051.24	361.21	01/08/15	ND	Depth of cut ~3 ft bgs
WB-B-34R	1124757.78	932984.30	361.12	01/12/15	ND	Depth of cut ~3 ft bgs
WB-B-38R	1124719.42	933037.11	361.20	01/12/15	ND	Depth of cut ~3 ft bgs
WB-B-56R	1124648.3	932943.7	361.265	01/15/15	ND	Depth of cut ~3 ft bgs
WB-I-13R	1125023.00	933039.60	363.50	01/15/15	ND	Depth of cut ~3.2 ft bgs
WB-H-1R	1124985.67	933068.89	360.38	01/15/15	ND	Depth of cut ~4 ft bgs
WB-H-3R	1124954.01	933077.70	364.05	01/15/15	ND	Depth of cut ~4 ft bgs
WB-H-8R	1124958.70	932986.10	363.53	01/27/15	ND	Depth of cut ~3 ft bgs
WB-H-7R	1124960.30	933019.80	361.46	01/27/15	ND	Depth of cut ~3 ft bgs
WB-H-6R	1124967.30	933038.10	361.58	01/27/15	ND	Depth of cut ~3 ft bgs
WB-H-2R	1124978.00	933088.20	361.49	01/27/15	0.44 J	Depth of cut ~3 ft bgs
WB-H-4R	1124954.70	933113.10	361.50	01/27/15	ND	Depth of cut ~3 ft bgs
WB-A3R	1124786.95	932851.87	360.28	02/12/15	ND	Depth of cut ~4 ft bgs
WB-B17R	1124825.26	933069.19	361.29	02/12/15	ND	Depth of cut ~3 ft bgs
WB-B50R	1124683.63	932791.51	363.18	03/04/15	ND	Depth of cut ~3 ft bgs
WB-B53R	1124651.53	932850.87	363.18	03/04/15	ND	Depth of cut ~3 ft bgs

"R" or "RR" indicates final post-excavation result

Note: Grid sample results for TSCA sediment grid samples are not tabulated as these sediments were exported off-site. Grid sample analytical laboratory reports are included in Appendix G.

Table 5. Post-Remediation Soil Sample Results

Sample ID	Northing	Easting	Elevation	Sample Date	Result (mg/kg)	Comment
WETLAND C						
WC-K-1	1124048.45	933259.44	362.74	06/11/14	**ND**	Depth of cut ~ 7 ft bgs
WC-K-2	1124028.07	933215.75	364.70	06/11/14	**0.66**	Depth of cut ~3.5 ft bgs
WC-J-1	1123972.99	933083.86	364.48	06/17/14	**1**	Depth of cut ~3 ft bgs
WC-J-2	1123959.90	933063.81	364.53	06/18/14	**2.5**	Depth of cut ~3 ft bgs, Re-excavate
WC-J-3	1123931.93	933026.28	364.57	06/18/14	**3.9**	Depth of cut ~3 ft bgs, Re-excavate
WC-J-4	1123922.68	933002.54	364.30	06/18/14	**0.94**	Depth of cut ~3 ft bgs
WC-J-5	1123910.70	932977.67	364.26	06/19/14	**2.05**	Depth of cut ~3 ft bgs, Re-excavate
WC-J-6	1123896.29	932958.68	364.21	06/19/14	**ND**	Depth of cut ~3 ft bgs
WC-I-1	1123722.74	932527.81	356.01	06/19/14	**ND**	Depth of cut ~9 ft bgs
WC-I-2	1123766.35	932585.21	355.87	06/20/14	**ND**	Depth of cut ~9.5 ft bgs
WC-I-3	1123745.07	932541.18	355.87	06/20/14	**0.55J**	Depth of cut ~9 ft bgs
WC-I-4	1123741.53	932570.18	356.15	06/20/14	**ND**	Depth of cut ~9 ft bgs
WC-I-5	1123753.34	932608.14	356.00	06/23/14	**ND**	Depth of cut ~9 ft bgs
WC-I-6	1123773.28	932623.68	355.20	06/23/14	**5.26**	Depth of cut ~9.5 ft bgs, Re-excavate
WC-I-7	1123771.92	932649.70	355.80	06/23/14	**0.25**	Depth of cut ~9 ft bgs
WC-I-8	1123796.76	932660.22	356.03	06/23/14	**2.63**	Depth of cut ~9 ft bgs, Re-excavate
WC-I-9	1123783.50	932677.53	355.79	06/24/14	**0.11J**	Depth of cut ~9 ft bgs
WC-I-10	1123818.07	932718.65	355.98	06/24/14	**ND**	Depth of cut ~9 ft bgs
WC-I-11	1123837.88	932731.02	355.98	06/24/14	**0.15J**	Depth of cut ~9 ft bgs
WC-I-12	1123824.97	932748.63	356.55	06/24/14	**0.48J**	Depth of cut ~9.5 ft bgs
WC-I-13	1123843.19	932757.07	355.89	06/24/14	**ND**	Depth of cut ~9 ft bgs
WC-I-14	1123844.30	932777.88	355.45	06/24/14	**ND**	Depth of cut ~9.5 ft bgs
WC-I-15	1123858.76	932798.09	356.06	06/25/14	**ND**	Depth of cut ~9 ft bgs
WC-I-15 Dup	1123858.76	932798.09	356.06	06/25/14	**ND**	Depth of cut ~9 ft bgs
WC-I-16	1123866.76	932823.84	355.96	06/26/14	**ND**	Depth of cut ~9 ft bgs
WC-J-5R	1123910.00	932977.00	362.00	06/26/14	**ND**	Depth of cut ~+2 ft bgs
WC-J-2R	1123962.95	933062.98	362.43	06/30/14	**ND**	Depth of cut ~+2 ft bgs
WC-J-3R	1123936.36	933023.37	362.83	06/30/14	**ND**	Depth of cut ~+2 ft bgs
WC-I-17	1123895.46	932868.55	355.75	07/01/14	**ND**	Depth of cut ~9 ft bgs
WC-I-18	1123909.55	932898.23	356.41	07/01/14	**ND**	Depth of cut ~9 ft bgs
WC-I-19	1123878.08	932847.33	355.56	07/02/14	**3.94**	Depth of cut ~9 ft bgs, Re-excavate
WC-I-20	1123901.47	932928.67	358.52	07/07/14	**ND**	Depth of cut ~9 ft bgs
WC-I-8R	1123785.00	923671.01	354.10	07/10/14	**ND**	Depth of cut ~+2 ft bgs
WC-I-19R	1123874.23	932842.35	354.09	07/11/14	**ND**	Depth of cut ~+2 ft bgs
WC-I-6R	1123779.16	923624.81	353.96	07/11/14	**ND**	Depth of cut ~+2 ft bgs
WC-H-1	1123637.47	932386.35	362.95	07/16/14	**ND**	Depth of cut ~2 ft bgs
WC-H-2	1123653.32	932412.81	363.10	07/17/14	**ND**	Depth of cut ~2 ft bgs
WC-H-3	1123654.57	932441.04	363.20	07/17/14	**ND**	Depth of cut ~2 ft bgs
WC-H-4	1123673.21	932468.88	362.79	07/17/14	**ND**	Depth of cut ~2 ft bgs
WC-A-1TA	1123167.66	931754.36	363.38	07/21/14	**0.27**	Depth of cut ~2 ft bgs
WC-A-2TA	1123183.86	931765.71	363.54	07/21/14	**3.39**	Depth of cut ~2 ft bgs, Re-excavate
WC-A-3	1123197.51	931778.03	363.70	07/21/14	**3.58**	Depth of cut ~2 ft bgs, Re-excavate
WC-B-1	1123215.14	931790.28	363.57	07/21/14	**3.66**	Depth of cut ~2 ft bgs, Re-excavate
WC-B-2	1123224.23	931800.40	362.96	07/21/14	**3.26**	Depth of cut ~2 ft bgs, Re-excavate
WC-B-3	1123237.20	931812.24	363.00	07/21/14	**0.17**	Depth of cut ~2 ft bgs
WC-B-4	1123243.69	931825.21	363.05	07/21/14	**1.85**	Depth of cut ~2 ft bgs, Re-excavate
WC-B-5	1123256.40	931836.26	363.50	07/21/14	**ND**	Depth of cut ~2 ft bgs
WC-B-6	1123262.20	931847.46	363.30	07/21/14	**1.44**	Depth of cut ~2 ft bgs, Re-excavate
WC-C-1	1123276.23	931875.50	364.62	07/21/14	**2.11**	Depth of cut ~1 ft bgs, Re-excavate
WC-C-2	1123290.92	931896.46	363.73	07/21/14	**3.98**	Depth of cut ~1 ft bgs, Re-excavate
WC-C-3	1123311.33	931925.08	364.19	07/21/14	**1.4**	Depth of cut ~1 ft bgs, Re-excavate
WC-I-21	1123729.36	932488.33	356.01	07/21/14	**4.34**	Depth of cut ~9 ft bgs, Re-excavate
WC-I-22	1123713.50	932460.74	355.92	07/21/14	**ND**	Depth of cut ~9 ft bgs
WC-I-23	1123686.32	932415.38	356.10	07/21/14	**3.4**	Depth of cut ~9 ft bgs, Re-excavate
WC-I-24	1123674.92	932387.02	355.54	07/21/14	**3.84**	Depth of cut ~9 ft bgs, Re-excavate
WC-H-5	1123614.37	932370.37	363.17	07/22/14	**ND**	Depth of cut ~2 ft bgs
WC-H-6	1123599.42	932348.86	362.87	07/22/14	**ND**	Depth of cut ~2 ft bgs

"R" indicates final post-excavation result

Table 5. Post-Remediation Soil Sample Results

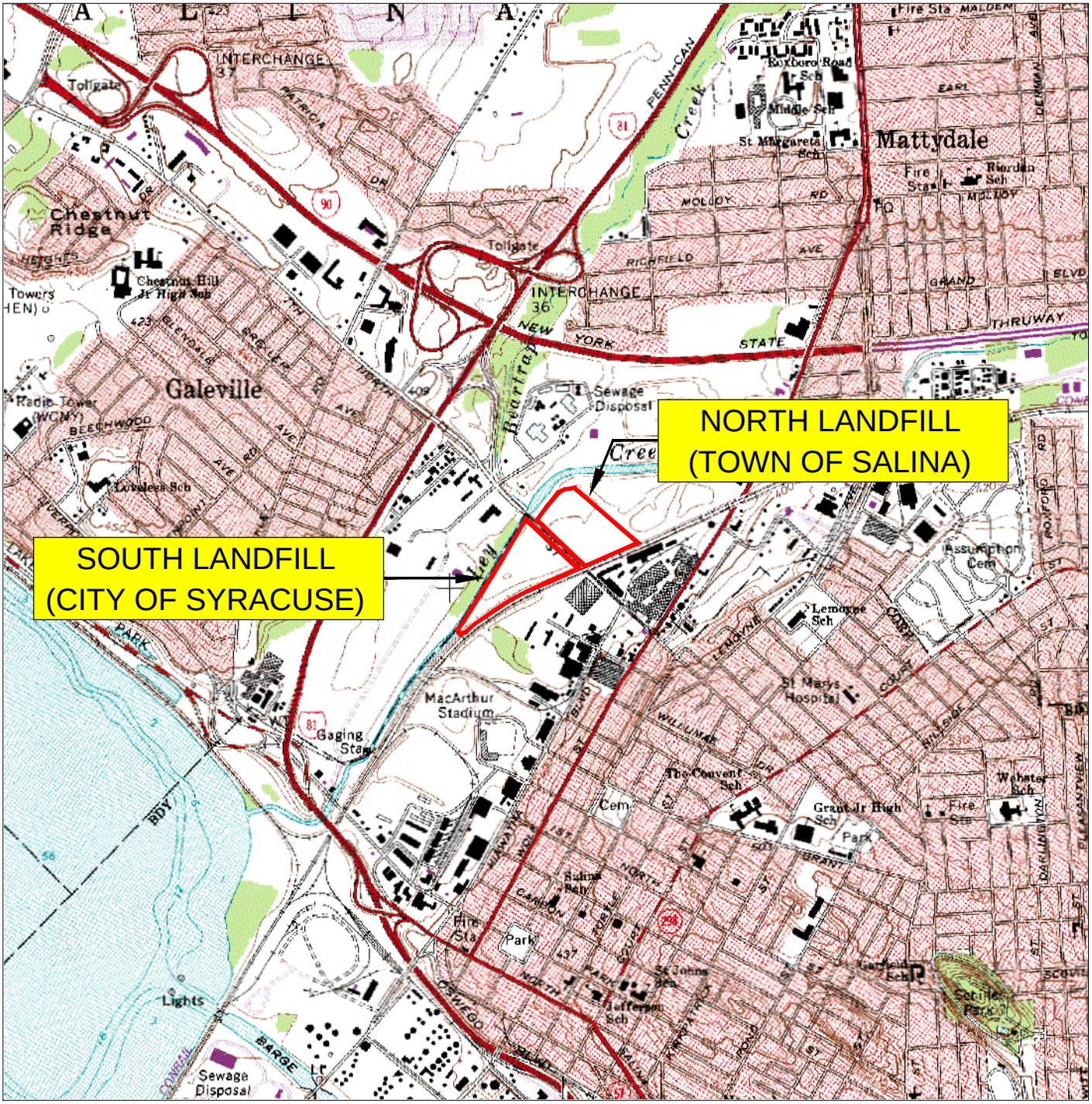
Sample ID	Northing	Easting	Elevation	Sample Date	Result (mg/kg)	Comment
WETLAND C						
WC-H-7	1123591.58	932309.96	363.80	07/22/14	**ND**	Depth of cut ~2 ft bgs
WC-I-25	1123663.76	932364.28	355.70	07/23/14	**ND**	Depth of cut ~9 ft bgs
WC-I-26	1123653.26	932340.76	356.06	07/23/14	**0.31**	Depth of cut ~9 ft bgs
WC-I-27	1123646.96	932322.87	355.93	07/23/14	**ND**	Depth of cut ~9 ft bgs
WC-I-28	1123639.81	932304.93	355.46	07/23/14	**ND**	Depth of cut ~9 ft bgs
WC-I-29	1123596.12	932210.36	355.36	07/23/14	**ND**	Depth of cut ~9 ft bgs
WC-I-30	1123609.78	932228.06	355.96	07/23/14	**ND**	Depth of cut ~9 ft bgs
WC-I-31	1123613.96	932251.26	355.96	07/23/14	**ND**	Depth of cut ~9 ft bgs
WC-I-32	1123625.54	932273.86	355.47	07/23/14	**ND**	Depth of cut ~9 ft bgs
WC-I-33	1123653.33	932331.92	355.98	07/23/14	**ND**	Depth of cut ~9 ft bgs
WC-I-34	1123704.61	932445.28	355.97	7/24/214	**ND**	Depth of cut ~9 ft bgs
WC-I-35	1123693.98	932429.15	356.10	7/24/214	**0.21**	Depth of cut ~9 ft bgs
WC-I-36	1123589.26	932190.28	355.69	7/24/214	**ND**	Depth of cut ~9 ft bgs
WC-I-37	1123580.55	932169.63	355.87	7/24/214	**ND**	Depth of cut ~9 ft bgs
WC-H-8	1123669.94	932485.49	363.85	7/24/214	**ND**	MS/MSD and Field Dup
WC-H-9	1123674.42	932445.61	362.32	7/24/214	**ND**	Depth of cut ~2 ft bgs
WC-H-10	1123629.44	932412.56	363.30	7/24/214	**ND**	Depth of cut ~2 ft bgs
WC-D-1	1123462.55	932100.69	363.29	07/25/14	**ND**	Depth of cut ~1 ft bgs
WC-D-2	1123444.72	932106.58	363.45	07/25/14	**ND**	Depth of cut ~1 ft bgs
WC-D-3	1123442.20	932071.56	363.05	07/25/14	**ND**	Depth of cut ~1 ft bgs
WC-D-4	1123444.24	932048.83	363.50	07/25/14	**ND**	Depth of cut ~1.5 ft bgs
WC-D-5	1123419.77	932072.15	363.12	07/25/14	**ND**	Depth of cut ~1.5 ft bgs
WC-D-6	1123419.46	932043.64	363.72	07/25/14	**0.4**	Depth of cut ~2 ft bgs
WC-D-7	1123414.17	932019.96	363.90	07/25/14	**1.76**	Depth of cut ~1 ft bgs, Re-excavate
WC-D-8	1123421.78	931985.44	363.72	07/25/14	**ND**	Depth of cut ~2 ft bgs
WC-D-9	1123403.72	931996.00	362.03	07/25/14	**ND**	Depth of cut ~3 ft bgs
WC-D-10	1123390.44	931981.52	361.72	07/25/14	**ND**	Depth of cut ~3.5 ft bgs
WC-D-11	1123369.52	931953.12	361.41	07/25/14	**ND**	Depth of cut ~3.5 ft bgs
WC-D-7R	1123414.17	932019.96	361.90	08/01/14	**ND**	Depth of cut ~+2 ft bgs
WC-E-1	1123475.44	932061.20	362.68	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-E-2	1123454.78	932024.71	362.93	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-E-3	1123507.66	932035.27	362.75	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-H-11	1123606.58	932292.51	362.40	08/05/14	**0.238**	Depth of cut ~2 ft bgs
WC-H-12	1123600.34	932275.35	362.40	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-H-13	1123589.53	932246.85	362.68	08/05/14	**3.34**	Depth of cut ~2 ft bgs, Re-excavate
WC-H-14	1123575.68	932225.76	362.40	08/05/14	**1.02**	Depth of cut ~2 ft bgs, Re-excavate
WC-H-15	1123550.88	932203.04	362.37	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-H-16	1123549.19	932165.04	362.60	08/05/14	**0.82**	Depth of cut ~2 ft bgs
WC-F-1	1123569.56	931981.60	363.20	08/05/14	**9.9**	Depth of cut ~2 ft bgs, Re-excavate
WC-F-2	1123553.40	931992.47	363.30	08/05/14	**2.07**	Depth of cut ~2 ft bgs, Re-excavate
WC-F-3	1123548.18	931967.77	363.00	08/05/14	**1.46**	Depth of cut ~2 ft bgs, Re-excavate
WC-F-5	1123527.82	931956.40	363.10	08/05/14	**11.1**	Depth of cut ~2 ft bgs, Re-excavate
WC-F-7	1123506.94	931942.20	363.10	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-F-9	1123479.40	931926.27	363.20	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-F-10	1123474.05	931955.24	362.64	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-F-11	1123452.64	931938.60	364.10	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-D-12	1123423.02	931953.13	363.20	08/05/14	**0.94**	Depth of cut ~3 ft bgs
WC-D-13	1123387.51	931929.10	364.10	08/05/14	**2.19**	Depth of cut ~3 ft bgs, Re-excavate
WC-D-14	1123370.01	931916.43	364.10	08/05/14	**1.18**	Depth of cut ~3 ft bgs, Re-excavate
WC-D-15	1123342.97	931903.65	363.90	08/05/14	**0.35**	Depth of cut ~3 ft bgs
WC-D-16	1123299.69	931863.20	363.15	08/05/14	**4.64**	Depth of cut ~2 ft bgs, Re-excavate
WC-D-17	1123315.40	931846.31	363.00	08/05/14	**3.5**	Depth of cut ~2 ft bgs, Re-excavate
WC-D-18	1123326.61	931871.81	363.30	08/05/14	**12.6**	Depth of cut ~2 ft bgs, Re-excavate
WC-D-19	1123355.55	931884.85	363.26	08/05/14	**6.6**	Depth of cut ~2 ft bgs, Re-excavate
WC-D-20	1123379.21	931879.73	362.60	08/05/14	**4.4**	Depth of cut ~2 ft bgs, Re-excavate
WC-D-21	1123395.74	931890.09	363.10	08/05/14	**0.51**	Depth of cut ~2 ft bgs
WC-D-24	1123418.62	931899.80	362.69	08/05/14	**1.8**	Depth of cut ~2 ft bgs, Re-excavate
WC-D-25	1123444.61	931909.61	363.40	08/05/14	**ND**	Depth of cut ~2 ft bgs
WC-E-4	1123439.10	931983.22	363.01	08/06/14	**1.46**	Depth of cut ~2 ft bgs, Leave in place
WC-E-5	1123472.53	932018.10	362.90	08/06/14	**ND**	Depth of cut ~2 ft bgs

"R" indicates final post-excavation result

Table 5. Post-Remediation Soil Sample Results

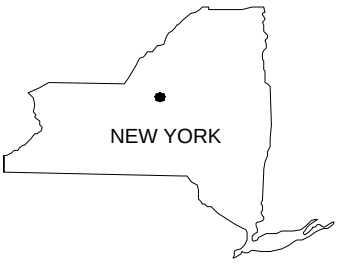
Sample ID	Northing	Easting	Elevation	Sample Date	Result (mg/kg)	Comment
WETLAND C						
WC-E-6	1123492.96	932020.30	362.91	08/06/14	**ND**	Depth of cut ~2 ft bgs
WC-E-7	1123457.77	931997.06	362.78	08/06/14	**ND**	Depth of cut ~2 ft bgs
WC-C-1R	1123277.67	931876.60	362.40	08/06/14	**ND**	Depth of cut ~+2 ft bgs
WC-C-2R	1123306.69	931907.85	361.89	08/06/14	**ND**	Depth of cut ~+2 ft bgs
WC-C-3R	1123323.81	931923.33	361.74	08/06/14	**ND**	Depth of cut ~+2 ft bgs
WC-A-2R	1123180.53	931763.02	360.94	08/06/14	**ND**	Depth of cut ~+2 ft bgs
WC-A-3R	1123197.49	931775.76	359.99	08/06/14	**ND**	Depth of cut ~+2 ft bgs
WC-B-1R	1123215.00	931790.00	360.00	08/06/14	**ND**	Depth of cut ~+2 ft bgs
WC-D-22	1123373.82	931908.72	362.86	08/07/14	**ND**	Depth of cut ~2 ft bgs
WC-D-23	1123400.87	931922.80	362.87	08/07/14	**ND**	Depth of cut ~2 ft bgs
WC-B-2R	1123224.00	931800.00	360.00	08/07/14	**ND**	Depth of cut ~+2 ft bgs
WC-B-4R	1123244.00	931825.00	361.00	08/07/14	**ND**	Depth of cut ~+2 ft bgs
WC-B-6R	1123262.00	931847.00	361.00	08/07/14	**0.7**	Depth of cut ~+2 ft bgs
WC-H-17	1123579.09	932128.80	362.56	08/07/14	**ND**	Depth of cut ~2 ft bgs
WC-H-18	1123569.81	932109.71	362.30	08/07/14	**3.74**	Depth of cut ~2 ft bgs, Re-excavate
WC-H-19	1123584.18	932087.59	362.31	08/07/14	**9.3**	Depth of cut ~2 ft bgs, Re-excavate
WC-F-10	1123474.05	931955.24	362.64	08/07/14	**ND**	Depth of cut ~2 ft bgs
WC-F-6	1123517.99	931991.63	362.96	08/08/14	**ND**	Depth of cut ~2 ft bgs
WC-F-4	1123537.44	932010.79	363.03	08/08/14	**1.56**	Depth of cut ~2 ft bgs, Re-excavate
WC-G-WS7	1123545.74	932056.13	361.20	08/08/14	**ND**	Depth of cut ~2 ft bgs
WC-G-WS6	1123542.13	932045.77	361.63	08/08/14	**2.02**	Depth of cut ~2 ft bgs, Re-excavate
WC-G-7	1123556.81	932023.90	357.20	08/08/14	**ND**	Depth of cut ~2 ft bgs
WC-G-5	1123553.89	932043.78	357.06	08/08/14	**0.52**	Depth of cut ~2 ft bgs
WC-G-2	1123579.08	932009.37	357.06	08/08/14	**ND**	Depth of cut ~2 ft bgs
WC-G-1	1123602.37	932015.62	356.96	08/08/14	**ND**	Depth of cut ~2 ft bgs
WC-G-4	1123582.53	932065.12	356.87	08/08/14	**ND**	Depth of cut ~2 ft bgs
WC-F-8	1123503.92	931976.48	362.34	08/08/14	**0.96**	Depth of cut ~2 ft bgs
WC-I-23R	1123686.32	932415.38	354.20	08/11/14	**ND**	Depth of cut ~+2 ft bgs
WC-I-24R	1123674.92	932387.02	354.90	08/11/14	**ND**	Depth of cut ~+2 ft bgs
WC-I-21R	1123729.36	932488.33	354.01	08/11/14	**ND**	Depth of cut ~+2 ft bgs
WC-H-18R	1123569.81	932109.71	360.30	08/18/14	**ND**	Depth of cut ~+2 ft bgs
WC-H-19R	1123584.18	932087.59	360.31	08/18/14	**ND**	Depth of cut ~+2 ft bgs
WC-D-16R	1123299.69	931863.20	360.50	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-D-17R	1123315.40	931846.31	360.50	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-D-18R	1123326.61	931871.81	360.50	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-D-19R	1123355.55	931884.85	360.50	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-D-20R	1123379.21	931879.73	360.50	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-D-24R	1123418.62	931899.80	360.50	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-D-13R	1123387.51	931929.10	360.50	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-D-14R	1123370.01	931916.43	360.50	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-F-1R	1123569.56	931981.60	361.20	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-F-2R	1123553.40	931992.47	361.30	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-F-3R	1123548.18	931967.77	361.00	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-F-4R	1123537.44	932010.79	361.03	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-F-5R	1123527.82	931956.40	361.10	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-H-13R	1123589.53	932246.85	360.68	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-H-14R	1123575.68	932225.76	360.40	08/19/14	**ND**	Depth of cut ~+2 ft bgs
WC-G-WS-6R	1123542.13	932045.77	359.63	08/21/14	**ND**	Depth of cut ~+2 ft bgs
WC-G-6	1123564.49	932022.80	355.41	08/21/14	**ND**	Depth of cut ~2 ft bgs
WC-G-3	1123589.17	932041.89	355.80	08/21/14	**ND**	Depth of cut ~2 ft bgs

"R" indicates final post-excavation result



National Geodetic Vertical Datum of 1929
Contour Interval 10 Feet

SCALE
0 5000
FEET



QUADRANGLE LOCATION



Base map from U.S.G.S. 7.5' SYRACUSE WEST, NEW YORK topographic quadrangle map.

COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
SYRACUSE, NEW YORK

SITE LOCATION MAP

DATE:	8/1/12
DESIGNED:	HJW
CHECKED:	MRN
APPROVED:	MRN
DRAWN:	HJW
PROJ.:	117-2202046

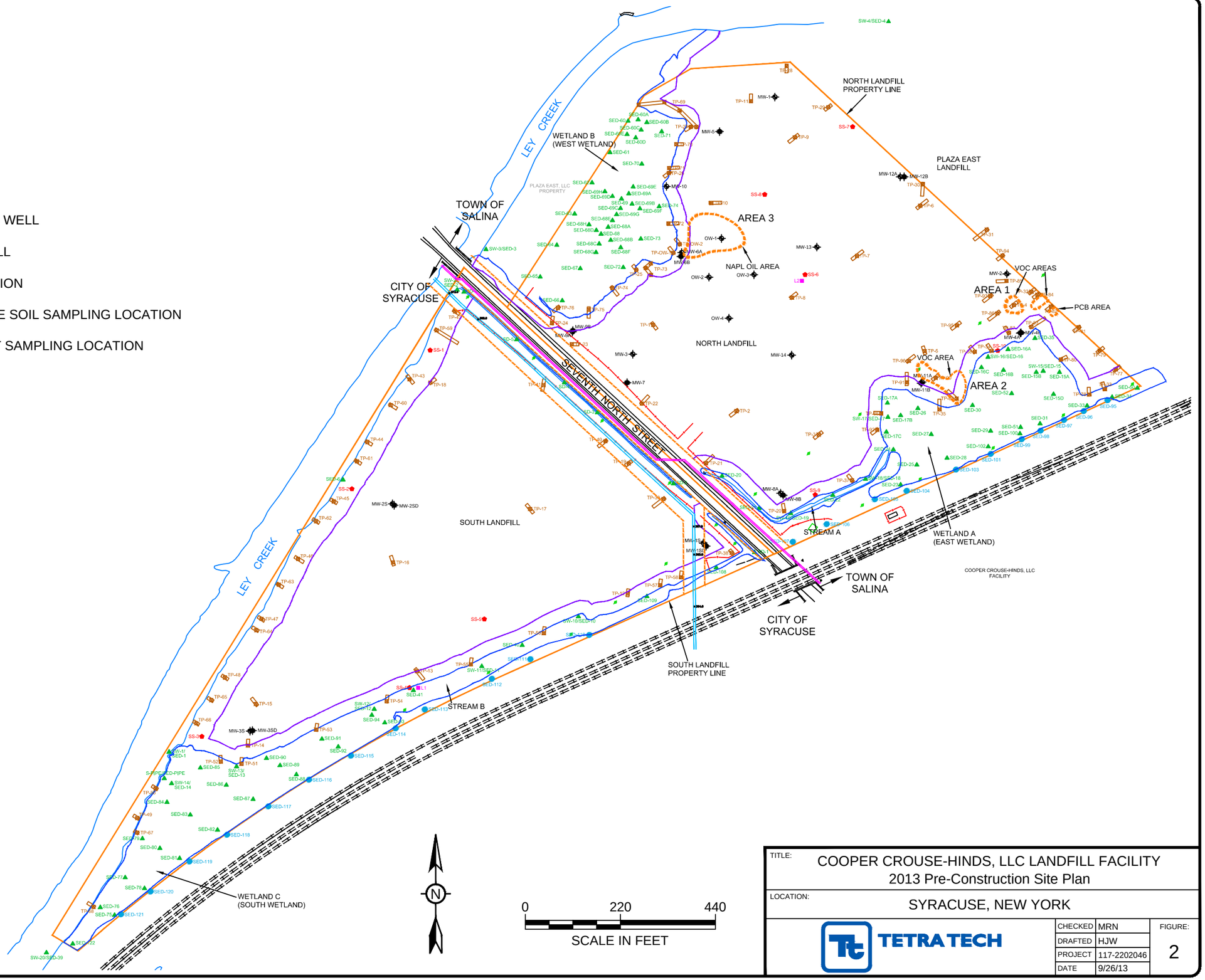
TETRA TECH

Figure 1

S:\CAD\COOPER\SYRACUSE\12-11-09\2202036FIG1.DWG

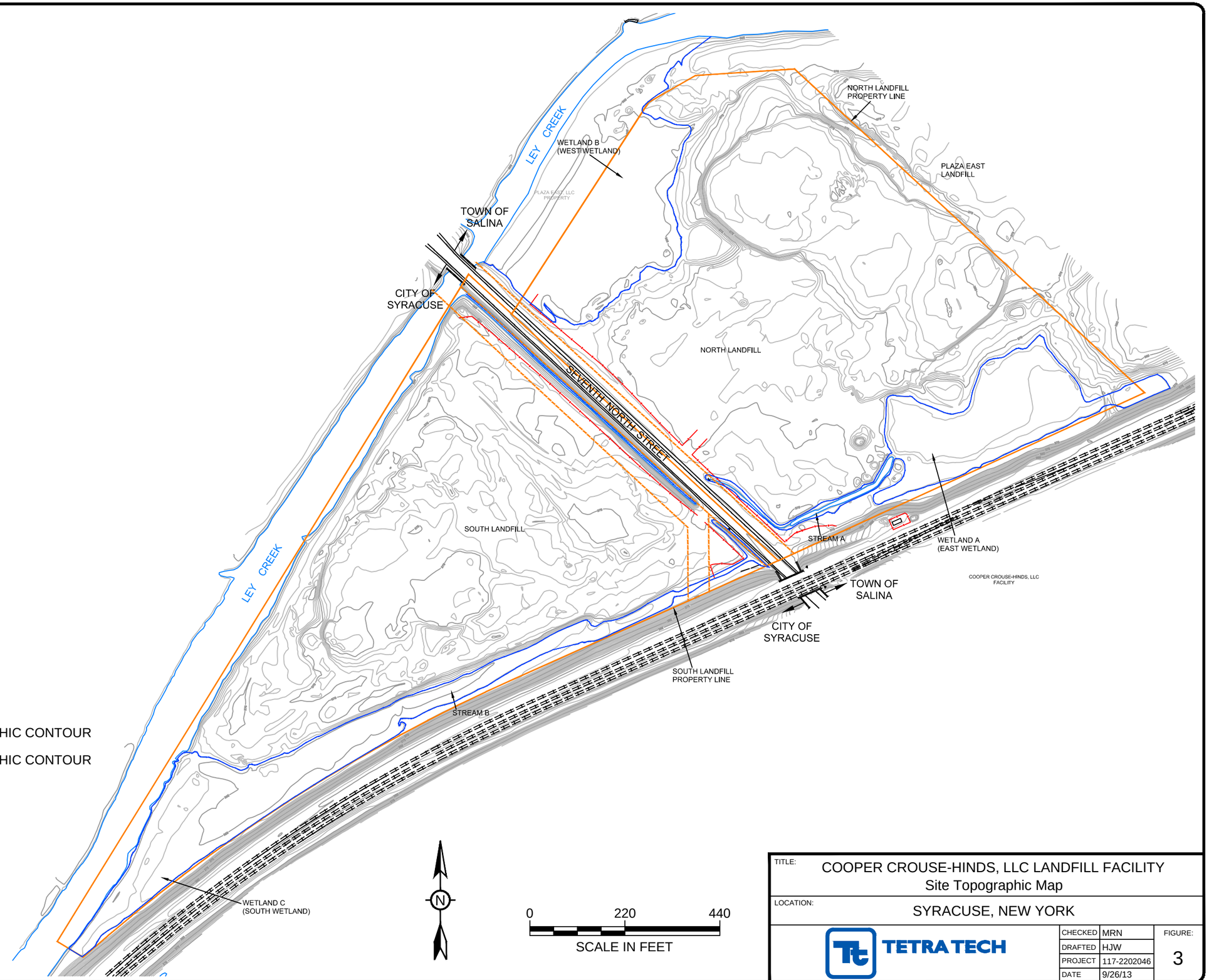
EXPLANATION

- MW-3S — SHALLOW AQUIFER MONITORING WELL
- MW-3SD — DEEP AQUIFER MONITORING WELL
- SS-1 — SURFACE SOIL SAMPLING LOCATION
- SED-95 — SURFACE SOIL AND SUBSURFACE SOIL SAMPLING LOCATION
- SW-1/SED-1 — SURFACE WATER AND SEDIMENT SAMPLING LOCATION
- SED-27 — SEDIMENT SAMPLING LOCATION
- TP-48 — TEST PIT LOCATION
- L1 — LEACHATE SAMPLING LOCATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- GAS MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE



TITLE:	COOPER CROUSE-HINDS, LLC LANDFILL FACILITY 2013 Pre-Construction Site Plan
LOCATION:	SYRACUSE, NEW YORK
TETRA TECH	CHECKED: MRN DRAFTED: HJW PROJECT: 117-2202046 DATE: 9/26/13 FIGURE: 2

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG2 - SITE PLAN.DWG



EXPLANATION

- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- WETLAND BOUNDARY
- 5-FOOT INTERVAL TOPOGRAPHIC CONTOUR
- 1-FOOT INTERVAL TOPOGRAPHIC CONTOUR

N

0 220 440

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
Site Topographic Map

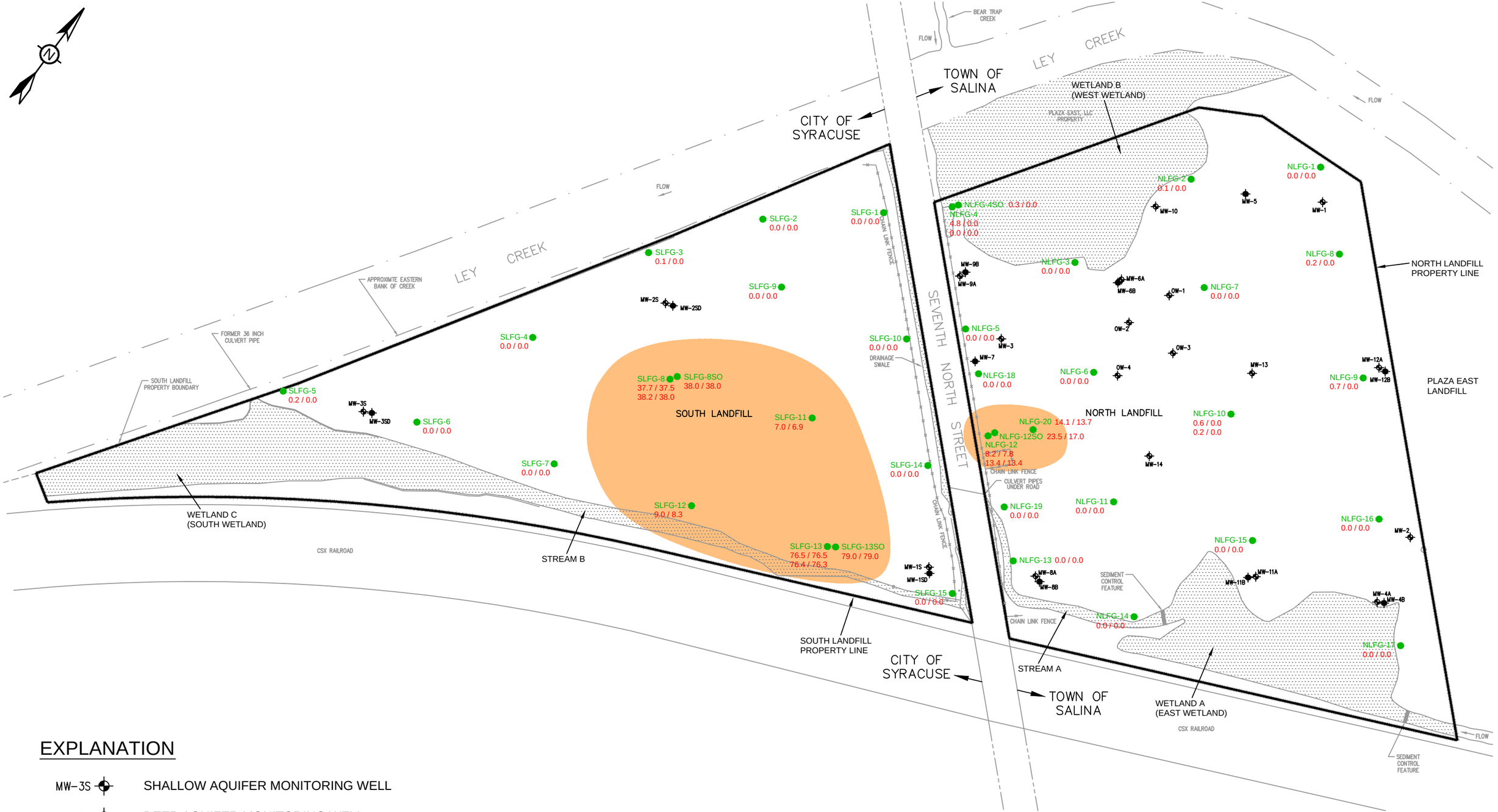
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	9/26/13

FIGURE: 3

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG3 - SITE TOPOGRAPHIC MAP.DWG



EXPLANATION

MW-3S	SHALLOW AQUIFER MONITORING WELL
MW-3SD	DEEP AQUIFER MONITORING WELL
NLFG-1	BARHOLE SAMPLING LOCATION
8.2 / 7.8	PEAK / STABLE METHANE PERCENTAGE
	AREAS OF HIGHEST METHANE GAS DETECTION

0 180 360

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
LANDFILL GAS RESULTS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202036
DATE	9/6/11

FIGURE: 4

S:\CAD\COOPER\SYRACUSE\SITE MANAGEMENT PLAN\FIGURE 4.DWG

N

CITY OF SYRACUSE

TOWN OF SALINA

LEY CREEK

BEAR TRAP CREEK

FLOW

PLAZA EAST, LLC PROPERTY WETLANDS

WETLAND B (WEST WETLAND)

APPROXIMTE EASTERN BANK OF CREEK

SOUTH LANDFILL PROPERTY BOUNDARY

SOUTH LANDFILL

NORTH LANDFILL

DRAINAGE SWALE

SEVENTH NORTH STREET

NORTH LANDFILL PROPERTY LINE

PLAZA EAST, LLC PROPERTY LANDFILL

CHAIN LINK FENCE

CULVERT PIPES UNDER ROAD

WETLAND C (SOUTH WETLAND)

STREAM B

CSX RAILROAD

SOUTH LANDFILL PROPERTY LINE

CITY OF SYRACUSE

STREAM A

TOWN OF SALINA

WETLAND A (EAST WETLAND)

SEDIMENT CONTROL FEATURE

EXPLANATION

MW-3S	SHALLOW AQUIFER MONITORING WELL
MW-3SD	DEEP AQUIFER MONITORING WELL
SS-1	SURFACE SOIL SAMPLING LOCATION
SED-95	SURFACE SOIL AND SUBSURFACE SOIL SAMPLING LOCATION
SW-1/SED-1	SURFACE WATER AND SEDIMENT SAMPLING LOCATION
SED-27	SEDIMENT SAMPLING LOCATION
TP-13	TEST PIT LOCATION
L1	LEACHATE SAMPLING LOCATION
	EXTENT OF SOIL ABOVE SCOs (UNRESTRICTED)

0 180 360

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
EXTENT OF SOIL CONTAMINATION

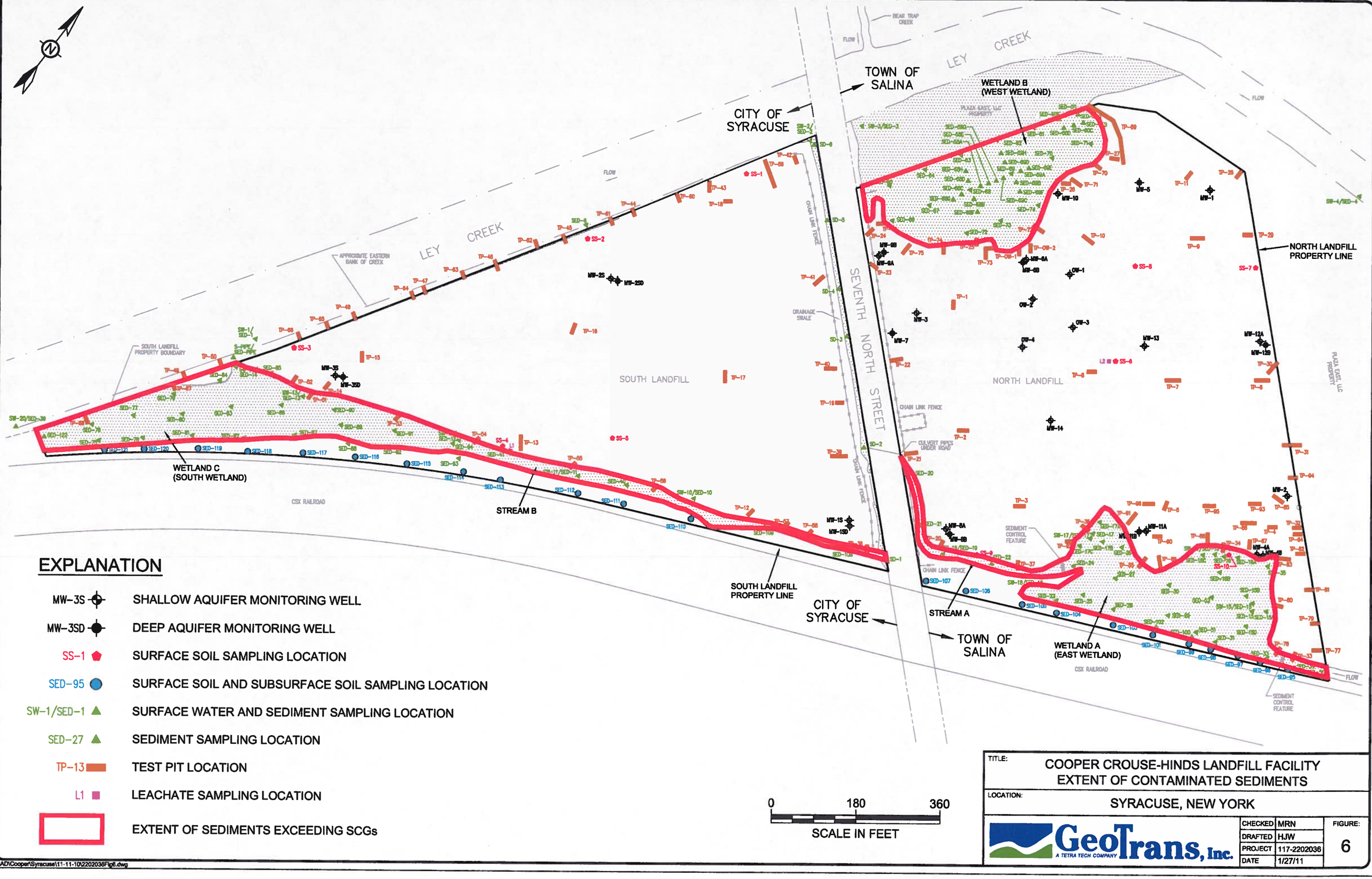
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202036
DATE	1/27/11

FIGURE: 5

S:\CAD\COOPER\SYRACUSE\SITE MANAGEMENT PLAN\FIGURE 5.DWG



TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
EXTENT OF CONTAMINATED SEDIMENTS

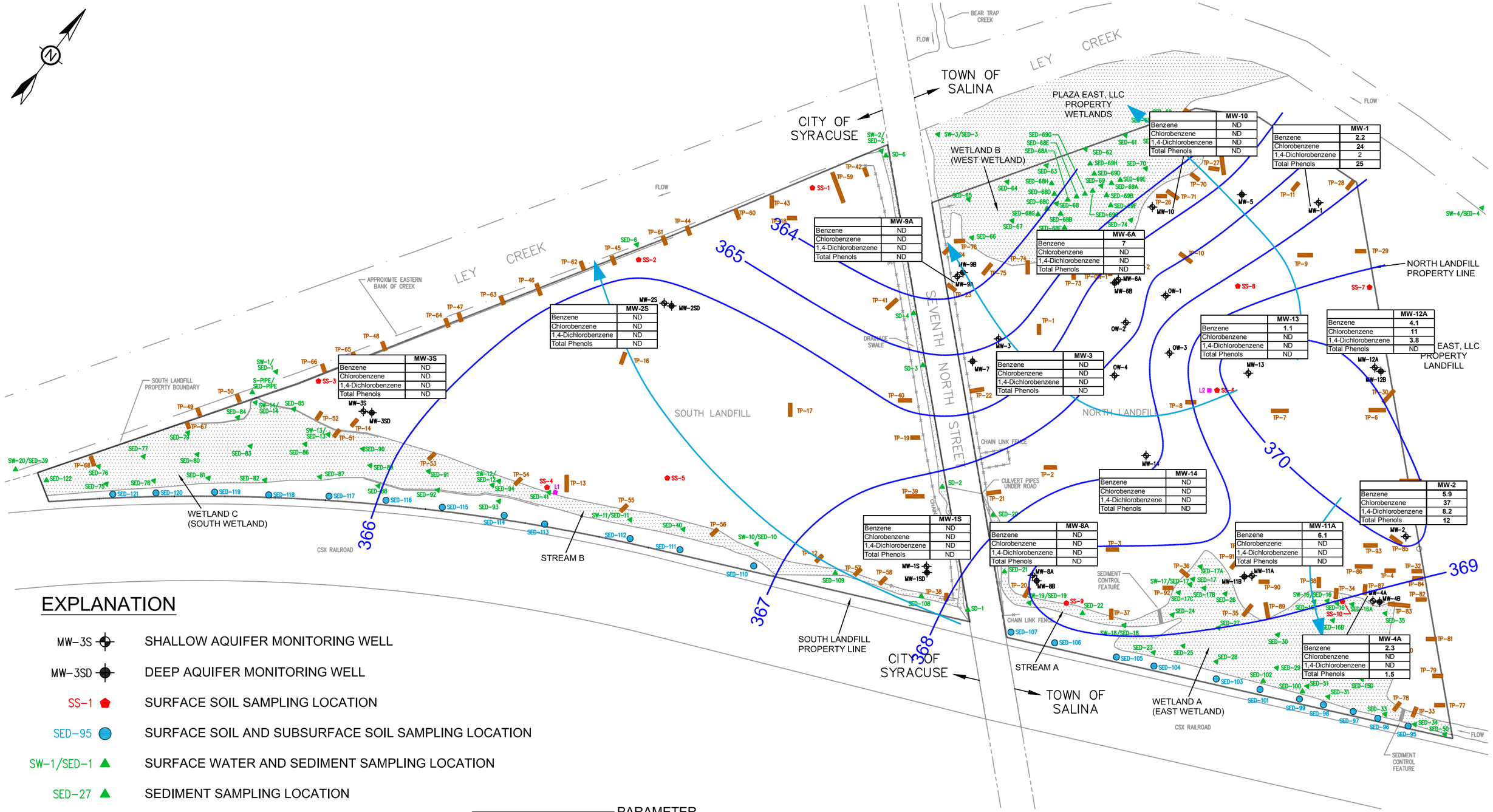
LOCATION: SYRACUSE, NEW YORK

GeoTrans, Inc. A TETRA TECH COMPANY

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202036
DATE	1/27/11

FIGURE: 6

S:\CAD\Cooper\Syracuse\11-11-10\2202036Fig6.dwg



EXPLANATION

- MW-3S — SHALLOW AQUIFER MONITORING WELL
- MW-3SD — DEEP AQUIFER MONITORING WELL
- SS-1 — SURFACE SOIL SAMPLING LOCATION
- SED-95 — SURFACE SOIL AND SUBSURFACE SOIL SAMPLING LOCATION
- SW-1/SED-1 — SURFACE WATER AND SEDIMENT SAMPLING LOCATION
- SED-27 — SEDIMENT SAMPLING LOCATION
- TP-13 — TEST PIT LOCATION
- L1 — LEACHATE SAMPLING LOCATION
- 366 — GROUNDWATER ELEVATION CONTOUR (SEPTEMBER 10, 2008)
- GROUNDWATER FLOW DIRECTION

	MW-4A
Benzene	2.3
Chlorobenzene	ND
1,4-Dichlorobenzene	ND
Total Phenols	1.5

PARAMETER
SAMPLING LOCATION
NON-DETECT
CONCENTRATION (ug/L)
BOLD INDICATES NYSDEC CLASS GA GROUNDWATER STANDARDS EXCEEDED

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
EXTENT OF CONTAMINATED SHALLOW GROUNDWATER

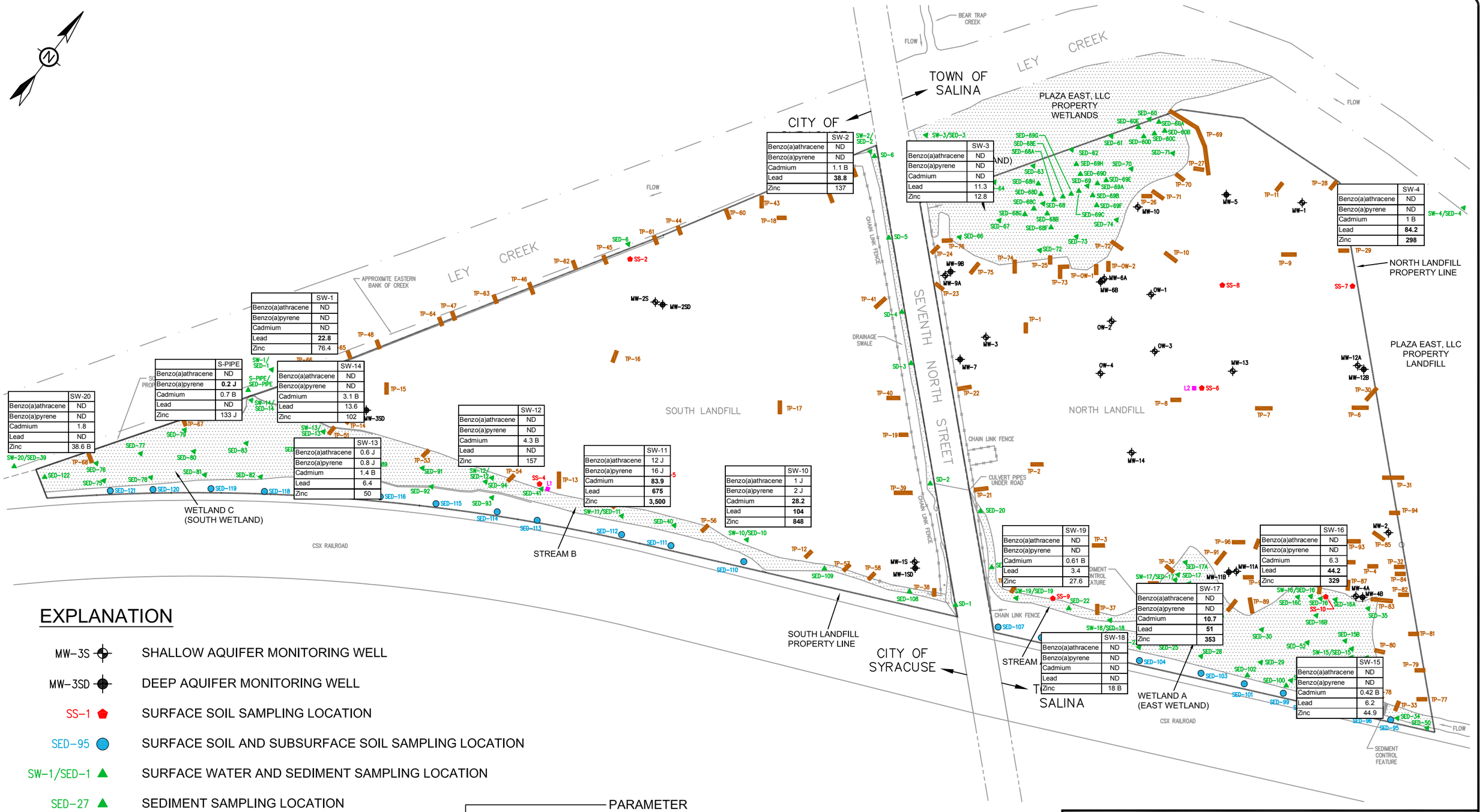
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202036
DATE	11/11/10

FIGURE: 7

S:\CAD\COOPER\SYRACUSE\SITE MANAGEMENT PLAN\FIGURE 7.DWG



	SW-20
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	1.8
Lead	ND
Zinc	38.6 B

	S-PIPE
Benzo(a)athracene	ND
Benzo(a)pyrene	**0.2 J**
Cadmium	0.7 B
Lead	ND
Zinc	133 J

	SW-1
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	ND
Lead	**22.8**
Zinc	76.4

	SW-14
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	3.1 B
Lead	13.6
Zinc	102

	SW-13
Benzo(a)athracene	0.6 J
Benzo(a)pyrene	0.8 J
Cadmium	1.4 B
Lead	6.4
Zinc	50

	SW-12
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	4.3 B
Lead	ND
Zinc	157

	SW-11
Benzo(a)athracene	12 J
Benzo(a)pyrene	16 J
Cadmium	**83.9**
Lead	**675**
Zinc	**3,500**

	SW-10
Benzo(a)athracene	1 J
Benzo(a)pyrene	2 J
Cadmium	**28.2**
Lead	**104**
Zinc	**848**

	SW-2
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	1.1 B
Lead	**38.8**
Zinc	137

	SW-3
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	ND
Lead	11.3
Zinc	12.8

	SW-4
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	1 B
Lead	**84.2**
Zinc	**298**

	SW-19
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	0.61 B
Lead	3.4
Zinc	27.6

	SW-18
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	ND
Lead	ND
Zinc	18 B

	SW-17
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	**10.7**
Lead	**51**
Zinc	**353**

	SW-16
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	6.3
Lead	**44.2**
Zinc	**329**

	SW-15
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	0.42 B
Lead	6.2
Zinc	44.9

EXPLANATION

- MW-3S — SHALLOW AQUIFER MONITORING WELL
- MW-3SD — DEEP AQUIFER MONITORING WELL
- SS-1 — SURFACE SOIL SAMPLING LOCATION
- SED-95 — SURFACE SOIL AND SUBSURFACE SOIL SAMPLING LOCATION
- SW-1/SED-1 — SURFACE WATER AND SEDIMENT SAMPLING LOCATION
- SED-27 — SEDIMENT SAMPLING LOCATION
- TP-13 — TEST PIT LOCATION
- L1 — LEACHATE SAMPLING LOCATION

	SW-4
Benzo(a)athracene	ND
Benzo(a)pyrene	ND
Cadmium	1 B
Lead	**84.2**
Zinc	**298**

PARAMETER
SAMPLING LOCATION
NON-DETECT
CONCENTRATION (ug/L)
BOLD INDICATES NYSDEC CLASS C SURFACE WATER STANDARD EXCEEDED

0 180 360
SCALE IN FEET

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
EXTENT OF CONTAMINATED SURFACE WATER

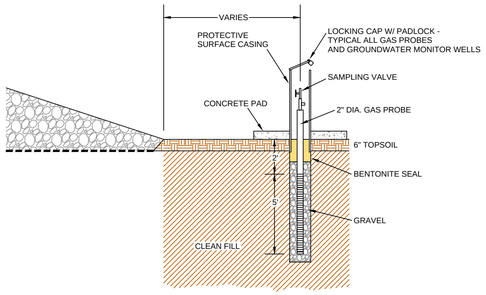
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202036
DATE	11/11/10

FIGURE: 8

S:\CAD\COOPER\SYRACUSE\SITE MANAGEMENT PLAN\FIGURE 8.DWG

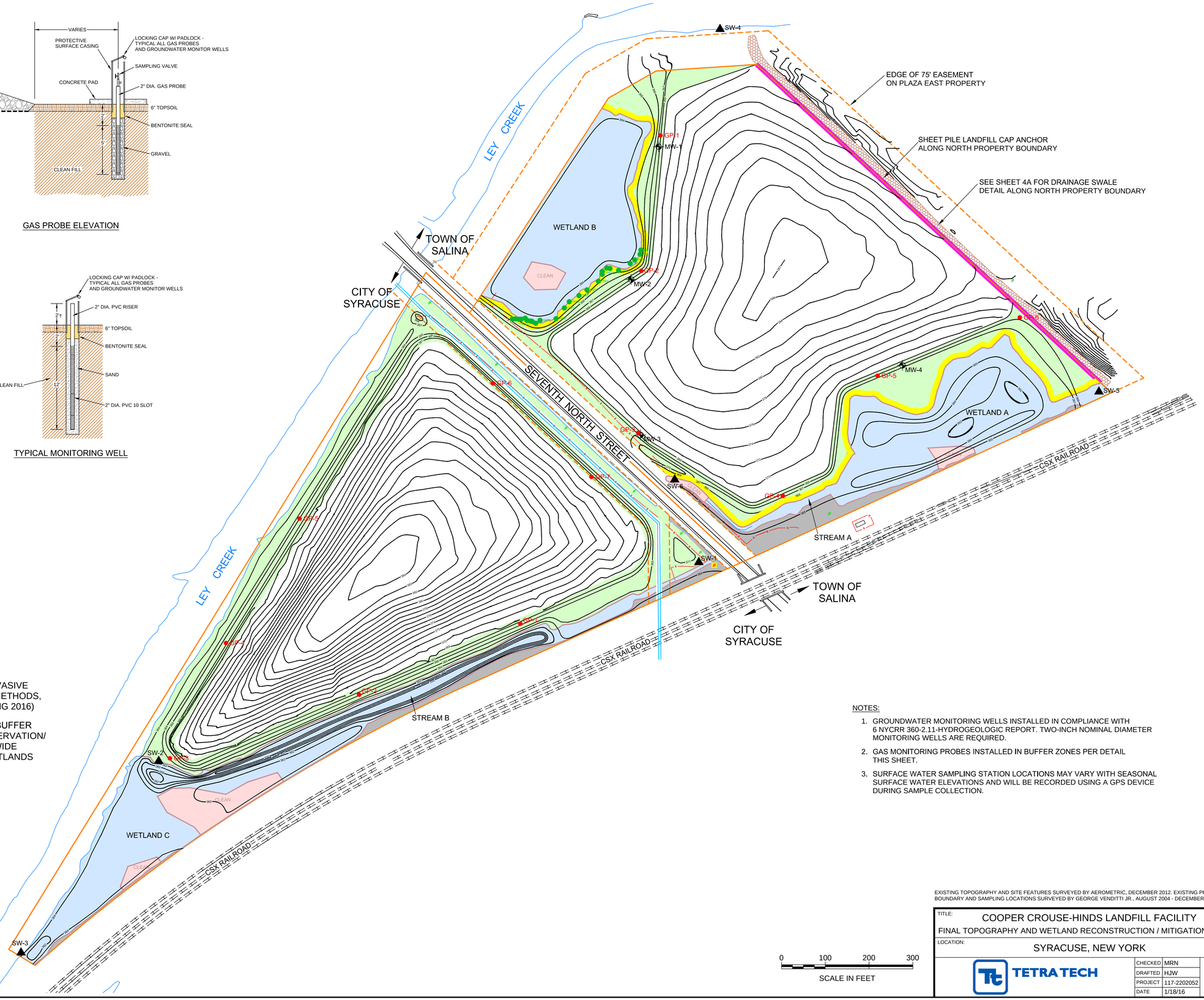


GAS PROBE ELEVATION

TYPICAL MONITORING WELL

EXPLANATION

- PROPOSED FINAL LANDFILL CAP
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- EXISTING ELECTRIC UTILITY POLE
- BUFFER ZONE
- OPEN WATER WITH RECONSTRUCTED EMERGENT WETLAND PERIPHERY
- CLEAN WETLAND CELL - ERADICATE INVASIVE SPECIES USING NYSDEC - APPROVED METHODS, THEN APPLY WETLAND SEEDING (SPRING 2016)
- 6" OF TOPSOIL OVER CLEAN BACKFILL BUFFER ZONE, AND THEN NEW ENGLAND CONSERVATION/ WILDLIFE SEED MIX OVER 10-15 FOOT WIDE BUFFER ZONE STRIP ADJACENT TO WETLANDS
- PLAZA EAST PROPERTY SWALE
- SW-1 SURFACE WATER SAMPLING STATION
- GP-1 LANDFILL GAS PROBE
- MW-2 GROUNDWATER MONITORING WELL
- PROPOSED ELECTRIC UTILITY POLE



NOTES:

1. GROUNDWATER MONITORING WELLS INSTALLED IN COMPLIANCE WITH 6 NYCRR 360-2.11-HYDROGEOLOGIC REPORT. TWO-INCH NOMINAL DIAMETER MONITORING WELLS ARE REQUIRED.
2. GAS MONITORING PROBES INSTALLED IN BUFFER ZONES PER DETAIL THIS SHEET.
3. SURFACE WATER SAMPLING STATION LOCATIONS MAY VARY WITH SEASONAL SURFACE WATER ELEVATIONS AND WILL BE RECORDED USING A GPS DEVICE DURING SAMPLE COLLECTION.

0 100 200 300

SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY

FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION / MITIGATION PLAN

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202052
DATE	1/18/16

FIGURE: 9

S:\CAD\COOPER\SYRACUSE\SITE MANAGEMENT PLAN\FIGURE 3 - FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION-MITIGATION PLAN.DWG

SAMPLE ZONE	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Actual Cut Volume (CUFT)	Actual Cut Volume (CUYD)	Area (SQFT)	Number Bottom Confirmation Samples Initial/Resample	Approx. Depth of Cut (FT)	Actual Soil Amendment Wetland Seed Mix Mulch (SQYD)
V	605	364.5	2,652	98	1,012	1/1	2.0	See Note 3
U	610	364.5	3,588	133	1,718	1/1	2	
O	613	361.2	26,210	971	4,803	5	6	
Q	614	360.6	35,580	1,318	4,398	5	7-8	
T	615	362.1-364.1	14,157	524	3,555	4/3	1.9-4.9	
P	616	364	16,870	625	3,252	4/6	5	
R	617	362.4	16,592	615	4,346	5	5	
N	622	362.7	30,541	1,131	6,866	8/7	5	
M	623	361.5	19,156	709	6,737	7	5.3-6.5	
S	624	365.5	16,948	628	2,823	3/4	1-4.5	
K	625	365	2,072	77	1,291	1/1	1.5-4	
L	626	362.5	17,410	645	2,837	3/3	4	
H	629	361	34,368	1,273	4,027	4/14	8	
J	631	360.9-362.9	21,825	808	3,790	4/4	6.2-8.2	
G	633	362.9	9,970	369	2,735	3	5	
I	634	361.2-365.2	91,506	3,389	21,033	23/46	5.8-7.8	
E	636	366.3	9,163	339	4,488	5	2	
D	637	365.6	8,158	302	2,548	3	4	
F	638	358.2-364.0	21,892	811	3,932	4/6	3-5	
C	639	363.2-365.0	17,222	638	3,546	4/1	3-4.8	
B	640	364.3	4,883	181	2,127	2	3	
A	643	363	13,979	518	2,539	3/3	4	
	Total		434,742	16,102	94,403	103/100		

NORTH LANDFILL

SEVENTH NORTH STREET

WETLAND A

STREAM A

PYRAMID STONE SEDIMENT TRAP (14" MINUS ANGULAR STONE AND 4" MINUS ROUNDED STONE)

2,264 SQ. FT. CLEAN

1,561 SQ. FT. CLEAN

3,227 SQ. FT. CLEAN

EXPLANATION

- EXCAVATION LIMITS
- CLEAN WETLAND CELL - LEAVE IN PLACE - NO EXCAVATION
- NOVEMBER 2012 HOT SPOT EXCAVATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- WA-B-2 — PCB CONFIRMATION SAMPLE
- (0.2 - 364.4') — PCB CONCENTRATION (mg/Kg) AND ELEVATION
- ND — NOT DETECTED
- WA-P-2 — SAMPLE LOCATIONS IN RED (OVER 1 mg/Kg FOR PCBs) DO NOT REQUIRE FURTHER ACTION PER NYSDEC REVIEW OF ADJACENT SAMPLE LOCATION RESULTS

EXCAVATION NOTES:

1. BOTTOM CONFIRMATION SAMPLES COLLECTED FROM THE BACKHOE BUCKET BY THE ENGINEER, AND ANALYZED BY THE ENGINEER USING A 3-DAY LABORATORY TURNAROUND TIME.
2. HORIZONTAL AND VERTICAL EXCAVATION LIMITS WERE VERIFIED AND RECORDED BY COMBINATION OF GPS CONTROLLED EXCAVATOR AND DAILY EXCAVATION LOGS PREPARED BY ON-SITE ENGINEER.
3. WETLAND SEED / NEW ENGLAND CONSERVATION / WILDLIFE MIX WAS HAND BROADCASTED ALONG EXPOSED SLOPE ABOVE WATER'S EDGE WITHIN AND ALONG WETLAND A, TOTAL APPLIED LENGTH = 1,350 FT. WIDTH VARIED, MINIMUM OF 10 FT. BALANCE OF WETLAND IS OPEN WATER.

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

0 50 100 150

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
POST-REMEDIATION SOIL SAMPLE RESULTS - WETLAND A

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202052
DATE	1/11/16

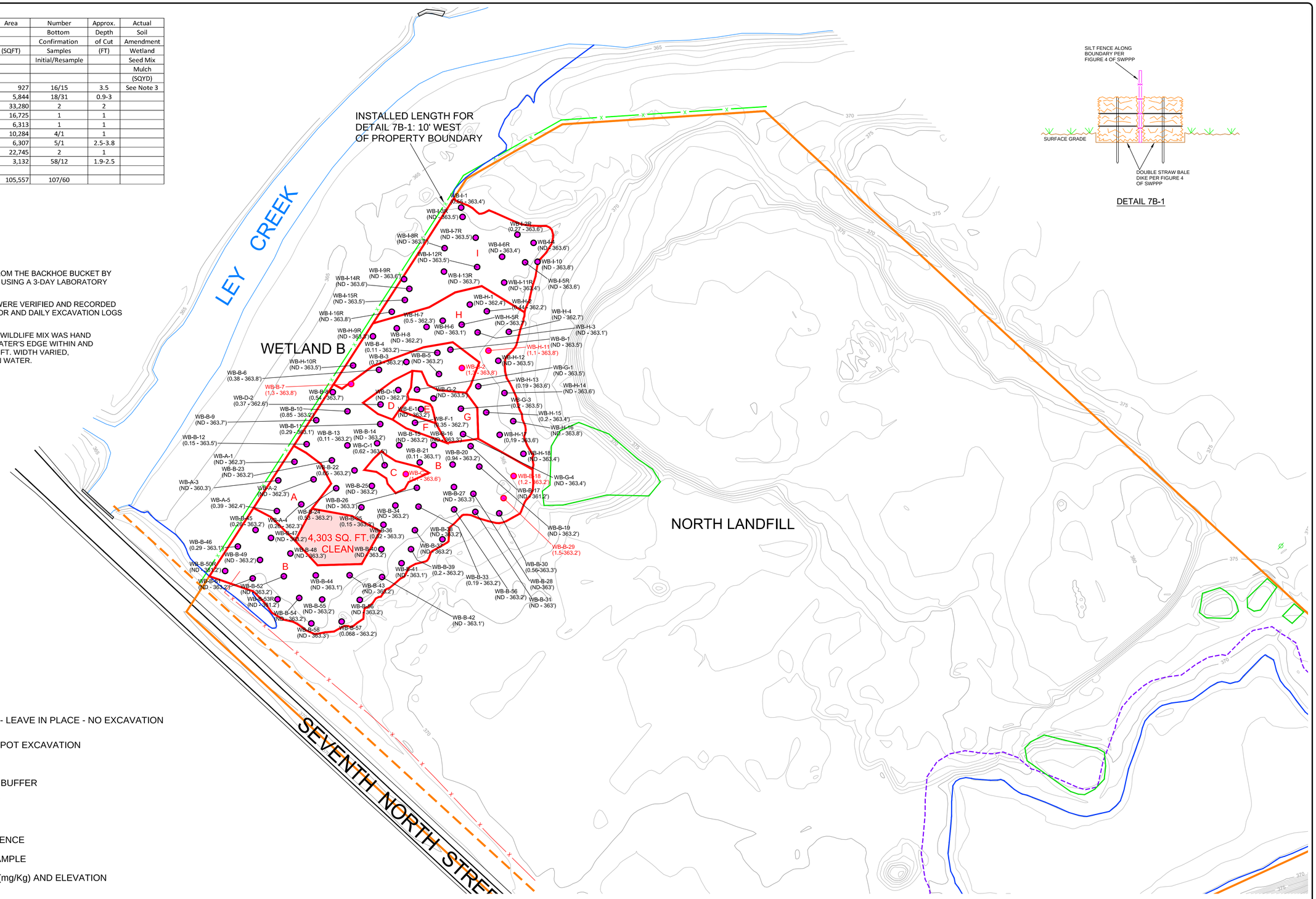
FIGURE: 10

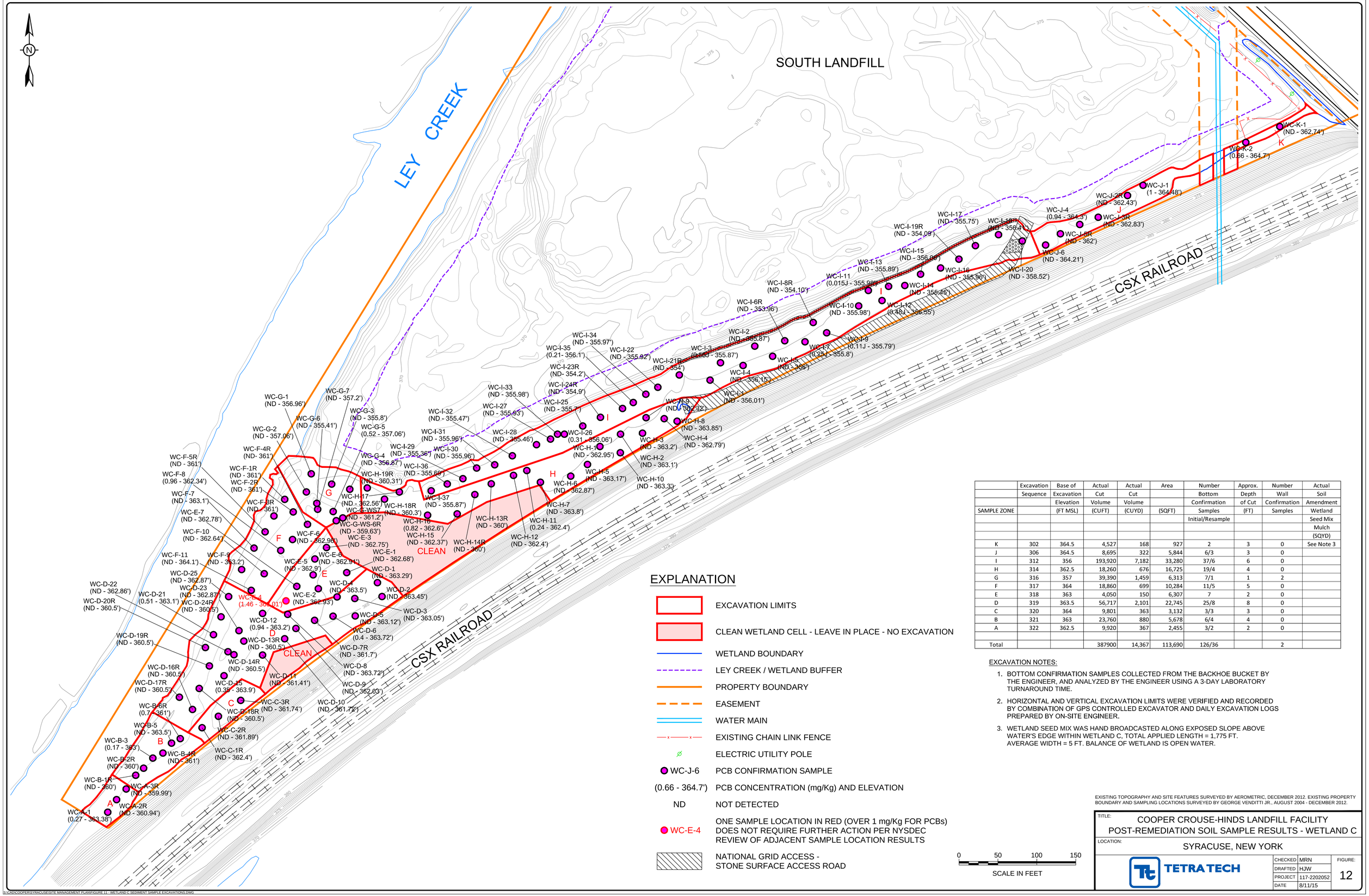
S:\CAD\COOPERSYRACUSE\SITE MANAGEMENT PLAN\FIGURE 9 - WETLAND A SEDIMENT SAMPLE EXCAVATIONS.DWG

	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Actual Cut Volume (CUFT)	Actual Cut Volume (CUYD)	Area (SQFT)	Number Bottom Confirmation Samples Initial/Resample	Approx. Depth of Cut (FT)	Actual Soil Amendment Wetland Seed Mix Mulch (SQYD)
I	713	361.5	51,566	1,910	927	16/15	3.5	See Note 3
H	714	361.5-363.6	38,032	1,409	5,844	18/31	0.9-3	
D	715	362.8	2,691	100	33,280	2	2	
E	716	363.1	624	23	16,725	1	1	
F	717	362.6	858	32	6,313	1	1	
G	718	363.6	4,998	185	10,284	4/1	1	
A	719	361-362.3	12,915	478	6,307	5/1	2.5-3.8	
C	720	363.6	1,248	46	22,745	2	1	
B	721	361.5-363.3	70,894	2,626	3,132	58/12	1.9-2.5	
Total			183,826	6,808	105,557	107/60		

EXCAVATION NOTES:

1. BOTTOM CONFIRMATION SAMPLES COLLECTED FROM THE BACKHOE BUCKET BY THE ENGINEER, AND ANALYZED BY THE ENGINEER USING A 3-DAY LABORATORY TURNAROUND TIME.
2. HORIZONTAL AND VERTICAL EXCAVATION LIMITS WERE VERIFIED AND RECORDED BY COMBINATION OF GPS CONTROLLED EXCAVATOR AND DAILY EXCAVATION LOGS PREPARED BY ON-SITE ENGINEER.
3. WETLAND SEED / NEW ENGLAND CONSERVATION / WILDLIFE MIX WAS HAND BROADCASTED ALONG EXPOSED SLOPE ABOVE WATER'S EDGE WITHIN AND ALONG WETLAND B, TOTAL APPLIED LENGTH = 850 FT. WIDTH VARIED, MINIMUM OF 10 FT. BALANCE OF WETLAND IS OPEN WATER.


INSTALLED LENGTH FOR DETAIL 7B-1: 10' WEST OF PROPERTY BOUNDARY
LEY CREEK
WETLAND B
NORTH LANDFILL
SEVENTH NORTH STREET
4,303 SQ. FT. CLEAN
A
B
C
D
E
F
G
H
I
WB-I-1 (0.55 - 363.4')
WB-I-1R (ND - 363.5')
WB-I-2R (0.27 - 363.6')
WB-I-3 (ND - 363.6')
WB-I-4 (ND - 363.6')
WB-I-5R (ND - 363.6')
WB-I-6R (ND - 363.4')
WB-I-7R (ND - 363.5')
WB-I-8R (ND - 363.7')
WB-I-9R (ND - 363.6')
WB-I-10 (ND - 363.8')
WB-I-11R (ND - 363.4')
WB-I-12R (ND - 363.5')
WB-I-13R (ND - 363.7')
WB-I-14R (ND - 363.6')
WB-I-15R (ND - 363.5')
WB-I-16R (ND - 363.8')
WB-H-1 (ND - 362.4')
WB-H-2 (0.44 - 362.2')
WB-H-3 (ND - 363.1')
WB-H-4 (ND - 362.7')
WB-H-5R (ND - 363.2')
WB-H-6 (ND - 363.1')
WB-H-7 (0.5 - 362.3')
WB-H-8 (ND - 362.2')
WB-H-9R (ND - 363.3')
WB-H-10R (ND - 363.5')
WB-H-11 (1.1 - 363.8')
WB-H-12 (ND - 363.5')
WB-H-13 (0.19 - 363.6')
WB-H-14 (ND - 363.6')
WB-H-15 (0.2 - 363.4')
WB-H-16 (ND - 363.8')
WB-H-17 (0.19 - 363.6')
WB-H-18 (ND - 363.4')
WB-B-1 (ND - 363.5')
WB-B-2 (1.3 - 363.8')
WB-B-3 (0.22 - 363.2')
WB-B-4 (0.11 - 363.2')
WB-B-5 (ND - 363.2')
WB-B-6 (0.38 - 363.8')
WB-B-7 (1.3 - 363.8')
WB-B-8 (0.54 - 363.7')
WB-B-9 (ND - 363.7')
WB-B-10 (0.85 - 363.2')
WB-B-11 (0.29 - 363.1')
WB-B-12 (0.15 - 363.5')
WB-B-13 (0.11 - 363.2')
WB-B-14 (ND - 363.2')
WB-B-15 (ND - 363.2')
WB-B-16 (ND - 363.3')
WB-B-17 (ND - 361.2')
WB-B-18 (1.2 - 363.2')
WB-B-19 (ND - 363.2')
WB-B-20 (0.94 - 363.2')
WB-B-21 (0.11 - 363.1')
WB-B-22 (0.65 - 363.2')
WB-B-23 (ND - 363.2')
WB-B-24 (0.53 - 363.2')
WB-B-25 (ND - 363.2')
WB-B-26 (ND - 363.3')
WB-B-27 (ND - 363.3')
WB-B-28 (ND-363')
WB-B-29 (1.5-363.2')
WB-B-30 (0.56-363.3')
WB-B-31 (ND - 363')
WB-B-32 (ND - 363.2')
WB-B-33 (0.19 - 363.2')
WB-B-34 (ND - 363.2')
WB-B-35 (0.15 - 363.2')
WB-B-36 (0.22 - 363.3')
WB-B-37 (ND - 363.2')
WB-B-38 (ND - 363.2')
WB-B-39 (0.2 - 363.2')
WB-B-40 (ND - 363.2')
WB-B-41 (ND - 363.1')
WB-B-42 (ND - 363.1')
WB-B-43 (ND - 363.2')
WB-B-44 (ND - 363.1')
WB-B-45 (0.26 - 363.2')
WB-B-46 (0.29 - 363.1')
WB-B-47 (ND - 363.2')
WB-B-48 (ND - 363.3')
WB-B-49 (ND - 363.2')
WB-B-50 (ND - 363.2')
WB-B-51 (ND - 363.2')
WB-B-52 (ND - 363.2')
WB-B-53R (ND - 361.2')
WB-B-54 (ND - 363.2')
WB-B-55 (ND - 363.2')
WB-B-56 (ND - 363.2')
WB-B-57 (0.068 - 363.2')
WB-B-58 (ND - 363.3')
WA-A-1 (0.26 - 362.3')
WA-A-2 (ND - 362.3')
WA-A-3 (ND - 360.3')
WA-A-5 (0.39 - 362.4')
WB-A-1 (ND - 362.3')
WB-A-23 (ND - 363.2')
WB-C-1 (0.62 - 363.5')
WB-C-2 (1.2 - 363.6')
WB-D-1 (ND - 362.7')
WB-D-2 (0.37 - 362.6')
WB-E-1 (ND - 363.2')
WB-F-1 (0.35 - 362.7')
WB-G-1 (ND - 363.5')
WB-G-2 (ND - 363.5')
WB-G-3 (0.2 - 363.5')
WB-G-4 (ND - 363.4')
WB-I-R (ND - 363.6')
WB-I-R (ND - 363.6')
WB-I-R (ND - 363.6



EXPLANATION

- EXCAVATION LIMITS
- CLEAN WETLAND CELL - LEAVE IN PLACE - NO EXCAVATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- WC-J-6 — PCB CONFIRMATION SAMPLE
- (0.66 - 364.7') — PCB CONCENTRATION (mg/Kg) AND ELEVATION
- ND — NOT DETECTED
- WC-E-4 — ONE SAMPLE LOCATION IN RED (OVER 1 mg/Kg FOR PCBs) DOES NOT REQUIRE FURTHER ACTION PER NYSDEC REVIEW OF ADJACENT SAMPLE LOCATION RESULTS
- NATIONAL GRID ACCESS - STONE SURFACE ACCESS ROAD

0 50 100 150

SCALE IN FEET

	Excavation Sequence	Base of Excavation Elevation	Actual Cut Volume	Actual Cut Volume	Area	Number Bottom Confirmation Samples	Approx. Depth of Cut	Number Wall Confirmation Samples	Actual Soil Amendment
SAMPLE ZONE		(FT MSL)	(CUFT)	(CUYD)	(SQFT)		(FT)		Wetland
						Initial/Resample			Seed Mix
									Mulch
									(SQYD)
K	302	364.5	4,527	168	927	2	3	0	See Note 3
J	306	364.5	8,695	322	5,844	6/3	3	0	
I	312	356	193,920	7,182	33,280	37/6	6	0	
H	314	362.5	18,260	676	16,725	19/4	4	0	
G	316	357	39,390	1,459	6,313	7/1	1	2	
F	317	364	18,860	699	10,284	11/5	5	0	
E	318	363	4,050	150	6,307	7	2	0	
D	319	363.5	56,717	2,101	22,745	25/8	8	0	
C	320	364	9,801	363	3,132	3/3	3	0	
B	321	363	23,760	880	5,678	6/4	4	0	
A	322	362.5	9,920	367	2,455	3/2	2	0	
Total			387900	14,367	113,690	126/36		2	

EXCAVATION NOTES:

1. BOTTOM CONFIRMATION SAMPLES COLLECTED FROM THE BACKHOE BUCKET BY THE ENGINEER, AND ANALYZED BY THE ENGINEER USING A 3-DAY LABORATORY TURNAROUND TIME.
2. HORIZONTAL AND VERTICAL EXCAVATION LIMITS WERE VERIFIED AND RECORDED BY COMBINATION OF GPS CONTROLLED EXCAVATOR AND DAILY EXCAVATION LOGS PREPARED BY ON-SITE ENGINEER.
3. WETLAND SEED MIX WAS HAND BROADCASTED ALONG EXPOSED SLOPE ABOVE WATER'S EDGE WITHIN WETLAND C, TOTAL APPLIED LENGTH = 1,775 FT. AVERAGE WIDTH = 5 FT. BALANCE OF WETLAND IS OPEN WATER.

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
POST-REMEDIATION SOIL SAMPLE RESULTS - WETLAND C

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202052
DATE	8/11/15

FIGURE: 12

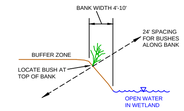
S:\CAD\COOPER\SYRACUSE\SITE MANAGEMENT PLAN\FIGURE 11 - WETLAND C SEDIMENT SAMPLE EXCAVATIONS.DWG

Voluntary Wetland Plantings Program
CCH South Landfill

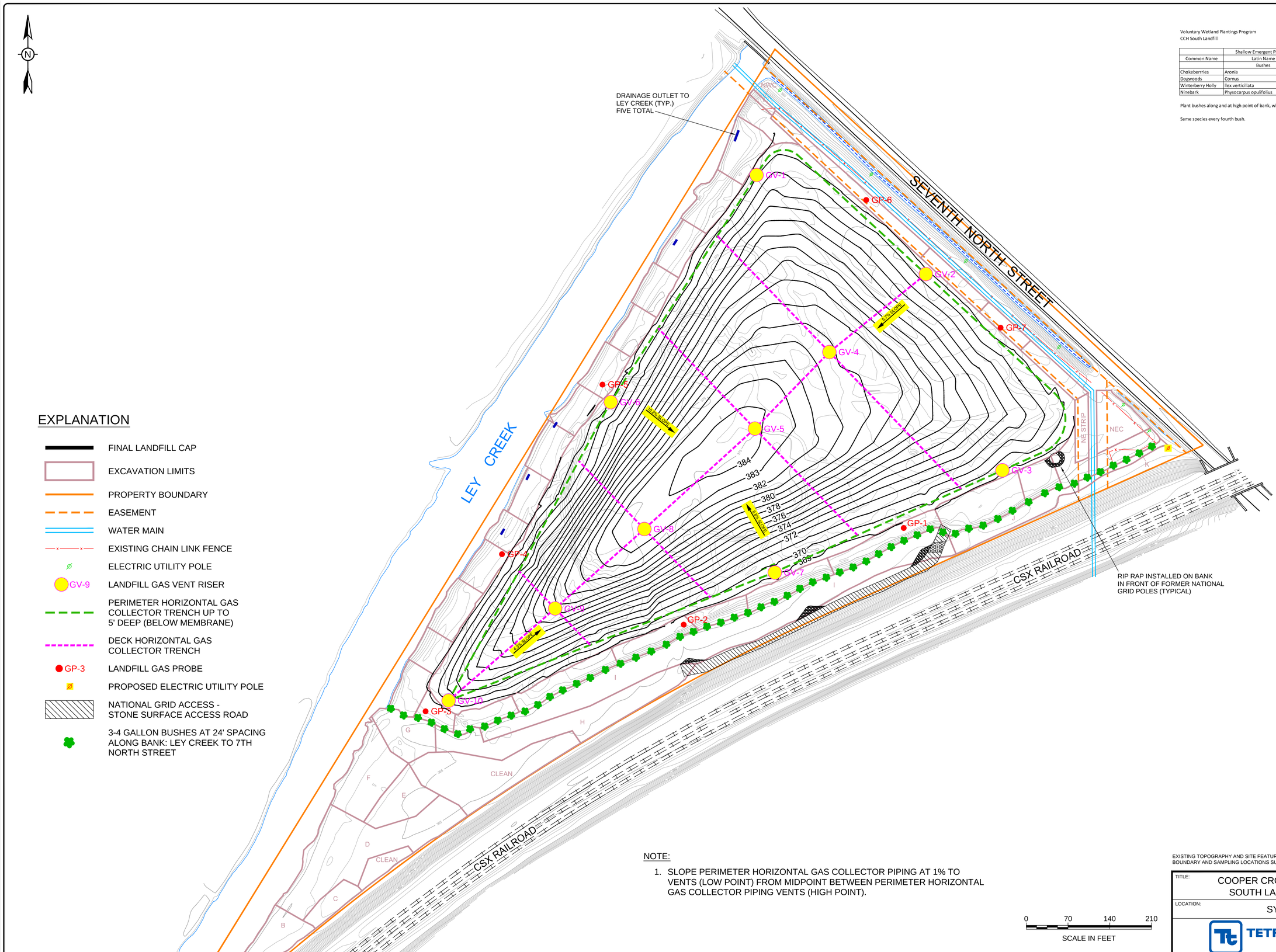
	Shallow Emergent Plantings				Total	For
Common Name	Latin Name	Stock Type	Percent	Spacing (ft)	Plants per acre	.23 Acres
	Bushes					
Chokeberrries	Aronia	3-4 gallon	25	24	250	14
Dogwoods	Cornus	3-4 gallon	25	24	250	15
Winterberry Holly	Ilex verticillata	3-4 gallon	25	24	250	14
Ninebark	Physocarpus opulifolius	3-4 gallon	25	24	250	14

Plant bushes along and at high point of bank, where bank meets buffer zone, to avoid drowning of roots.

Same species every fourth bush.



TYPICAL BUSH PLANTING



EXPLANATION

- FINAL LANDFILL CAP
- EXCAVATION LIMITS
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- GV-9 LANDFILL GAS VENT RISER
- PERIMETER HORIZONTAL GAS COLLECTOR TRENCH UP TO 5' DEEP (BELOW MEMBRANE)
- DECK HORIZONTAL GAS COLLECTOR TRENCH
- GP-3 LANDFILL GAS PROBE
- PROPOSED ELECTRIC UTILITY POLE
- NATIONAL GRID ACCESS - STONE SURFACE ACCESS ROAD
- 3-4 GALLON BUSHES AT 24' SPACING ALONG BANK: LEY CREEK TO 7TH NORTH STREET

NOTE:

1. SLOPE PERIMETER HORIZONTAL GAS COLLECTOR PIPING AT 1% TO VENTS (LOW POINT) FROM MIDPOINT BETWEEN PERIMETER HORIZONTAL GAS COLLECTOR PIPING VENTS (HIGH POINT).

0 70 140 210

SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
SOUTH LANDFILL FINAL SURFACE PLAN

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202052
DATE	1/14/16

FIGURE: 13

S:\CAD\COOPER\SYRACUSE\SITE MANAGEMENT PLAN\FIGURE 12 - SOUTH LANDFILL FINAL SURFACE PLAN.DWG

NOTE:

1. SLOPE PERIMETER HORIZONTAL GAS COLLECTOR PIPING AT 1% TO VENTS (LOW POINT) FROM MIDPOINT BETWEEN PERIMETER HORIZONTAL GAS COLLECTOR PIPING VENTS (HIGH POINT).

EXPLANATION

- FINAL LANDFILL CAP
- EXCAVATION LIMITS
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- GV-1 LANDFILL GAS VENT RISER
- PERIMETER HORIZONTAL GAS COLLECTOR TRENCH UP TO 5' DEEP (BELOW MEMBRANE)
- DECK HORIZONTAL GAS COLLECTOR TRENCH
- GP-1 LANDFILL GAS PROBE
- MW-2 GROUNDWATER MONITORING WELL
- 3-4 GALLON BUSHES AT INDICATED SPACING ALONG BANK

LEY CREEK

SEVENTH NORTH STREET

GV-1 GV-2 GV-3 GV-4 GV-5 GV-6 GV-7 GV-8 GV-9

GP-1 GP-2 GP-3 GP-4 GP-5 GP-6

MW-1 MW-2 MW-3 MW-4

4.1% SLOPE

4.1% SLOPE

4.1% SLOPE

4.1% SLOPE

4.1% SLOPE

CLEAN

A B C D E F G H I J K L M N O P Q R S T U V

386 384 382 380 378 376 374 372 370

Voluntary Wetland Plantings Program
CCH North Landfill Wetland A and Stream A

	Shallow Emergent Plantings				
Common Name	Latin Name	Stock Type	Percent	Spacing (ft)	Total Plants
	Bushes				
Chokeberrries	Aronia	3-4 gallon	25	8	22
Dogwoods	Cornus	3-4 gallon	25	8	23
Winterberry Holly	Ilex verticillata	3-4 gallon	25	8	22
Ninebark	Physocarpus opulifolius	3-4 gallon	25	8	23

Plant bushes along and at high point of bank, where bank meets buffer zone, to avoid drowning of roots.

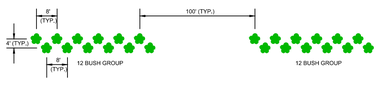
Same species every fourth bush.

Voluntary Wetland Plantings Program
CCH North Landfill Wetland B

	Shallow Emergent Plantings				
Common Name	Latin Name	Stock Type	Percent	Spacing (ft)	Total Plants
	Bushes				
Chokeberrries	Aronia	3-4 gallon	25	8	27
Dogwoods	Cornus	3-4 gallon	25	8	27
Winterberry Holly	Ilex verticillata	3-4 gallon	25	8	27
Ninebark	Physocarpus opulifolius	3-4 gallon	25	8	27

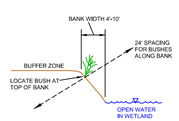
Plant bushes along and at high point of bank, where bank meets buffer zone, to avoid drowning of roots.

Same species every fourth bush.



NOTE: ADJUST ROW SPACING IN FIELD TO MATCH BANK WIDTH TO ASSURE PLANT SURVIVAL.

TYPICAL BUSH PLANTING PLAN



TYPICAL BUSH PLANTING

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

0 70 140 210

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
NORTH LANDFILL FINAL SURFACE PLAN

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202052
DATE	1/15/16

FIGURE: 14

S:\CAD\COOPERSYRACUSE\SITE MANAGEMENT PLAN\FIGURE 13 - NORTH LANDFILL FINAL SURFACE PLAN.DWG

LOCATION	ELEVATION	REMARKS (July 2008)
Test Pit 59	368.1	
Test Pit 60	367.9	
Test Pit 61	368.1	
Test Pit 62	367.1	
Test Pit 63	367.6	
Test Pit 64	369.0	
Test Pit 65	370.1	
Test Pit 66	368.7	
Test Pit 67	366.4	
Test Pit 68	366.4	
Test Pit 69A	368.9	
Test Pit 69B	369.9	
Test Pit 69C	371.8	
Test Pit 69D	369.8	
Test Pit 70	367.7	
Test Pit 71	367.8	
Test Pit 72	367.0	
Test Pit 73A	368.2	Front
Test Pit 73A	369.4	End same as TP-73B front
Test Pit 73B	369.4	Front
Test Pit 73B	369.9	End
Test Pit 74	367.8	
Test Pit 75	367.2	
Test Pit 76	367.5	
Test Pit 77	376.5	
Test Pit 78	369.5	
Test Pit 79	379.4	
Test Pit 80	371.0	
Test Pit 81	377.6	
Test Pit 82	373.8	
Test Pit 83	371.5	
Test Pit 84	376.9	
Test Pit 85	377.5	
Test Pit 86	376.3	
Test Pit 87	372.8	
Test Pit 88	372.6	
Test Pit 89	371.2	
Test Pit 90	373.9	
Test Pit 91	373.1	
Test Pit 92	372.2	
Test Pit 93	382.8	
Test Pit 94	379.9	
Test Pit 95	381.5	
Test Pit 96	378.7	

JULY 2008

LOCATION	ELEVATION
SED 10	367.6
SED 11	366.7
SED 12	365.8
SED 40	367.0
SED 41	366.5
SED 60	366.9
SED 61	366.7
SED 62	366.9
SED 63	366.6
SED 64	367.0
SED 65	366.5
SED 66	366.7
SED 67	366.6
SED 68	366.5
SED 69	366.7
SED 70	366.9
SED 71	366.7
SED 72	366.6
SED 73	366.7
SED 74	367.1
SED 75	368.6
SED 76	367.1
SED 77	367.6
SED 78	367.0
SED 79	367.5
SED 80	368.6
SED 81	367.5
SED 82	366.4
SED 83	367.2
SED 84	368.2
SED 85	366.2
SED 86	367.1
SED 87	366.5
SED 88	366.4
SED 89	366.6
SED 90	365.8
SED 91	365.9
SED 92	366.5
SED 93	366.8
SED 94	365.9

JULY 2008

LOCATION	ELEVATION
T1–0'	367.7
T2–0'	367.6
T3–0'	367.4
T4–0'	367.8
T4–160'	367.0
T5–0'	368.0
T5–210'	367.0
T6	370.6
T6–10'	368.7
T6–170'	367.1
T7	372.1
T7–65'	369.5
T8	372.7

LOCATION	ELEVATION	REMARKS
Test Pit 20	372.2	
Test Pit 21	370.6	
Test Pit 22	371.1	
Test Pit 23	369.8	
Test Pit 24	368.4	
Test Pit 25	367.5	
Test Pit 26	368.0	
Test Pit 27	368.4	
Test Pit 28	372.6	
Test Pit 29	371.4	
Test Pit 30	375.4	
Test Pit 31	377.9	
Test Pit 32	376.5	
Test Pit 33	370.5	
Test Pit 34	370.7	
Test Pit 35	369.1	
Test Pit 36	370.8	
Test Pit 37	371.8	
Test Pit OW–1	368.3	
Test Pit OW–2	368.7	
SW15/SED15	369.6	Water level (1.1' to bottom)
SW16/SED16	369.6	Water level (1.9' to bottom)
SW17/SED17	369.6	Water level (2.0' to bottom)
SW18/SED18	369.6	Water level (1.3' to bottom)
SW19/SED19	369.3	Water level (1.4' to bottom)
MW–5	374.4 Ground	New Well Location 2005
	376.27 Top PVC pipe	
OW–1	372.7 Ground	
	375.87 Top PVC pipe	
OW–2	372.6 Ground	
	375.78 Top PVC pipe	
OW–3	373.2 Ground	
	376.67 Top PVC pipe	
OW–4	372.5 Ground	
	375.81 Top PVC pipe	
MW 12–A	375.9 Ground	Location per proposed
	378.03 Top pvc pipe	sample map
MW 12–B	376.1 Ground	Well caps reversed
	378.23 Top pvc pipe	
MW 13	379.4 Ground	
	382.14 Top pvc pipe	
MW 14	373.6 Ground	
	376.35 Top pvc pipe	
MW 1SD	372.7 Ground	New Well Location
	375.38 Top pvc pipe	1/24/2008
MW 2SD	374.4 Ground	
	376.99 Top pvc pipe	
MW 3SD	371.9 Ground	
	374.05 Top pvc pipe	

LOCATION	ELEVATION	REMARKS
Test Pit 38	372.2	
Test Pit 39	374.6	
Test Pit 40	372.6	
Test Pit 41	370.8	
Test Pit 42	371.7	
Test Pit 43	370.2	
Test Pit 44	367.8	
Test Pit 45	367.8	
Test Pit 46	368.2	
Test Pit 47	368.0	
Test Pit 48	368.2	
Test Pit 49	366.9	
Test Pit 50	367.3	
Test Pit 51	365.8	
Test Pit 52	366.0	
Test Pit 53	366.4	
Test Pit 54	366.4	
Test Pit 55	367.9	
Test Pit 56	367.9	
Test Pit 57	368.8	
Test Pit 58	369.7	
SW10/SED10	367.2	Water level (0.2' to bottom)
SW11/SED11	366.8	Water level (0.2' to bottom)
SW12/SED12	366.2	Water level (0.2' to bottom)
SW13/SED13	366.0	Water level (0.0' to bottom)
SW14/SED14	365.9	Water level (0.3' to bottom)

Notes:
1. Elevations based on USGS Datum
2. Boundaries on south side of Seventh North Street based on City of Syracuse street monumentation as shown on City Engineering Plate 571.
3. Boundaries on north side of Seventh North Street based on concrete monuments found

LEGEND:

Test Pit TP ◇
SW/SED ◇
Monitoring Well ○
Wetland ——

Revision 10. 11/2/12 Revised Boundaries
Revision 9. 9/29/2009 State Plane Coord Datum
Revision 8. 9/12/2008 Test Pits, SED
Revision 7. 2/6/2008 Wells 1SD,2SD,3SD
Revision 6. 7/16/2006 Topography
Revision 5. 3/15/2006 Add MW 13
Revision 4. 2/2/2006 Wells, Test Pits, Etc.
Revision 3. 8/19/2004 Well Locations
Revision 2. 1/23/2004 Boundary to cl.
Revision 1. 1/6/2004 Show Ley Creek

The undersigned surveyor hereby certifies that this is an accurate map of an actual survey completed 12/31/2003. Subject to any state of facts an acurate and up to date abstract of title will show.

SIGNED _____

Drawing: CHTOPO5Aspc.dwg

Project No. 88–012–04

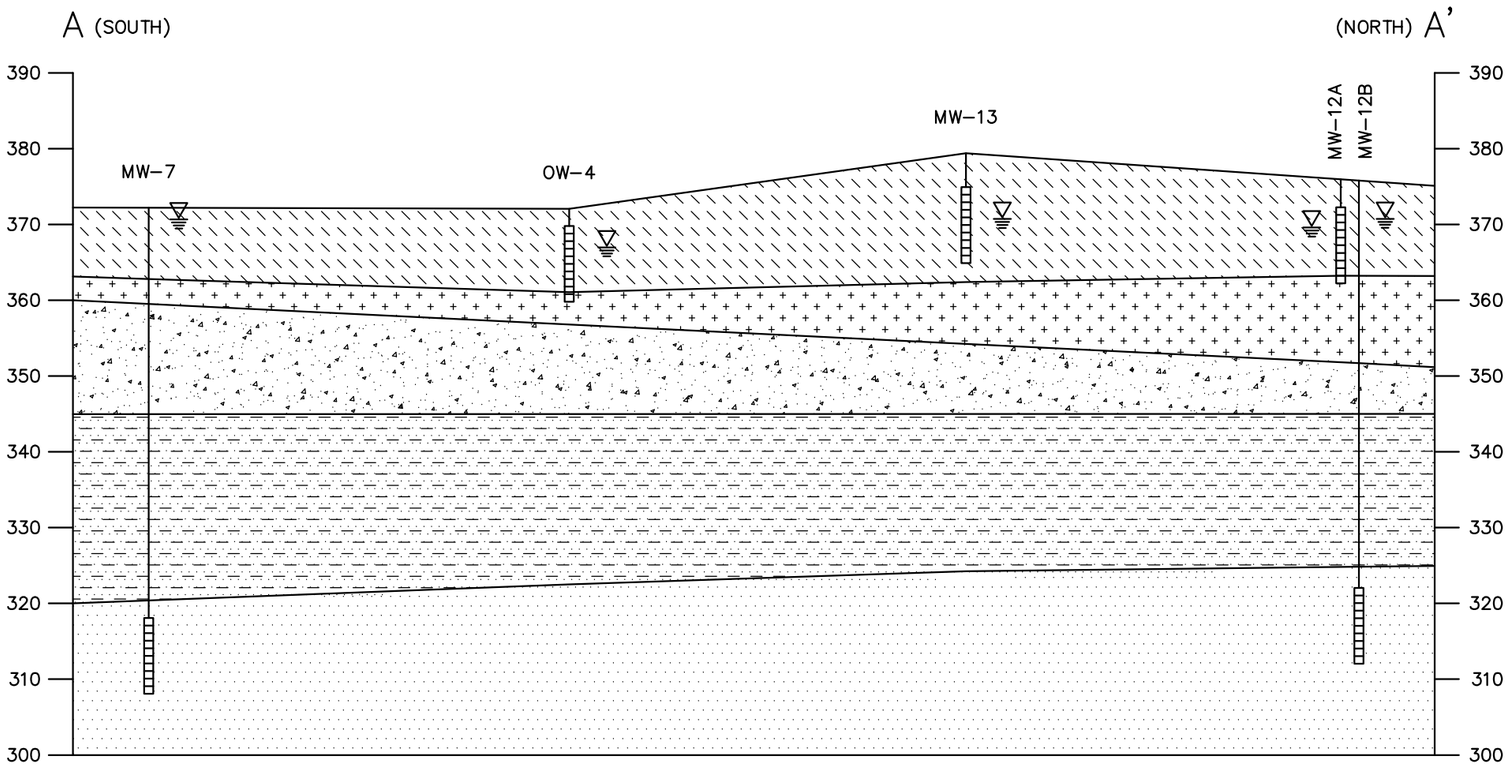
MAP OF: Boundary Survey for a portion of lands of Crouse Hinds showing monitor well locations

Part of lot 27 Town of Salina
Salt Marsh Lots 2,4,6,8 & Reclaimed lot 47
City of Syracuse, County of Onondaga
State of New York
Scale 1" = 100 Feet Date January 5, 2004

George Venditti Jr.
NYS Licensed Land Surveyor
27 Chaucer Circle
Baldwinsville, NY, 13027
Phone: (315) 638–0290

S:\CAD\COOPER\SYRACUSE\3-14-13\SURVEY MAP.DWG

REMEDIAL INVESTIGATION GEOLOGIC CROSS-SECTIONS AND WATER LEVEL MAPS



FILL

PEAT

SAND AND GRAVEL

SILT & CLAY

SAND

LEGEND

CASING

SCREEN

OW–4 MONITORING WELL

GROUNDWATER ELEVATION (SEPTEMBER 10, 2008)

SCALE:

1" = 20'

1" = 100'

NORTH LANDFILL A–A' GEOLOGIC CROSS SECTION

COOPER CROUSE–HINDS LANDFILL FACILITY
SYRACUSE, NY

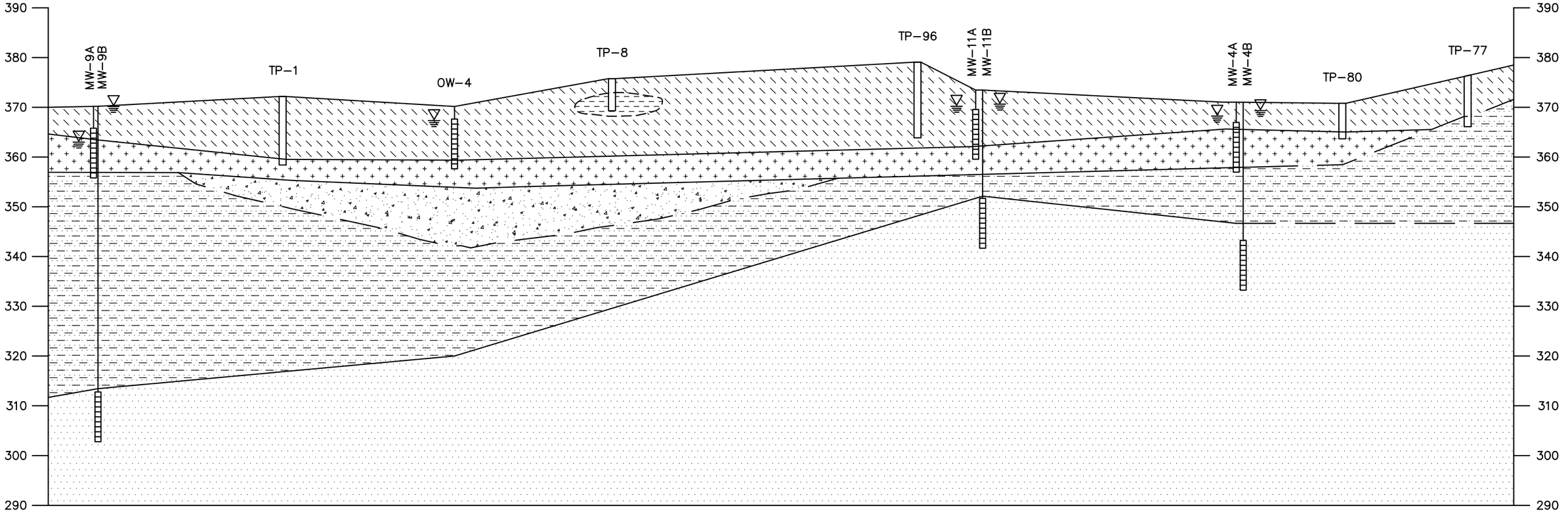
PREPARED FOR: COOPER CROUSE–HINDS

PROJECT NO.	PREPARED BY	DRAWN BY
8E0708524P	MTG	
DATE	REVIEWED BY	FILE NAME
02/10/09		FIGURE 3

DELTA

B (WEST)

(EAST) B'



FILL

CLAY

PEAT

SAND AND GRAVEL

SILT & CLAY

SAND

LEGEND

CASING

SCREEN

TEST PIT

OW-4 MONITORING WELL

GROUNDWATER ELEVATION (SEPTEMBER 10, 2008)

SCALE:

1" = 20'

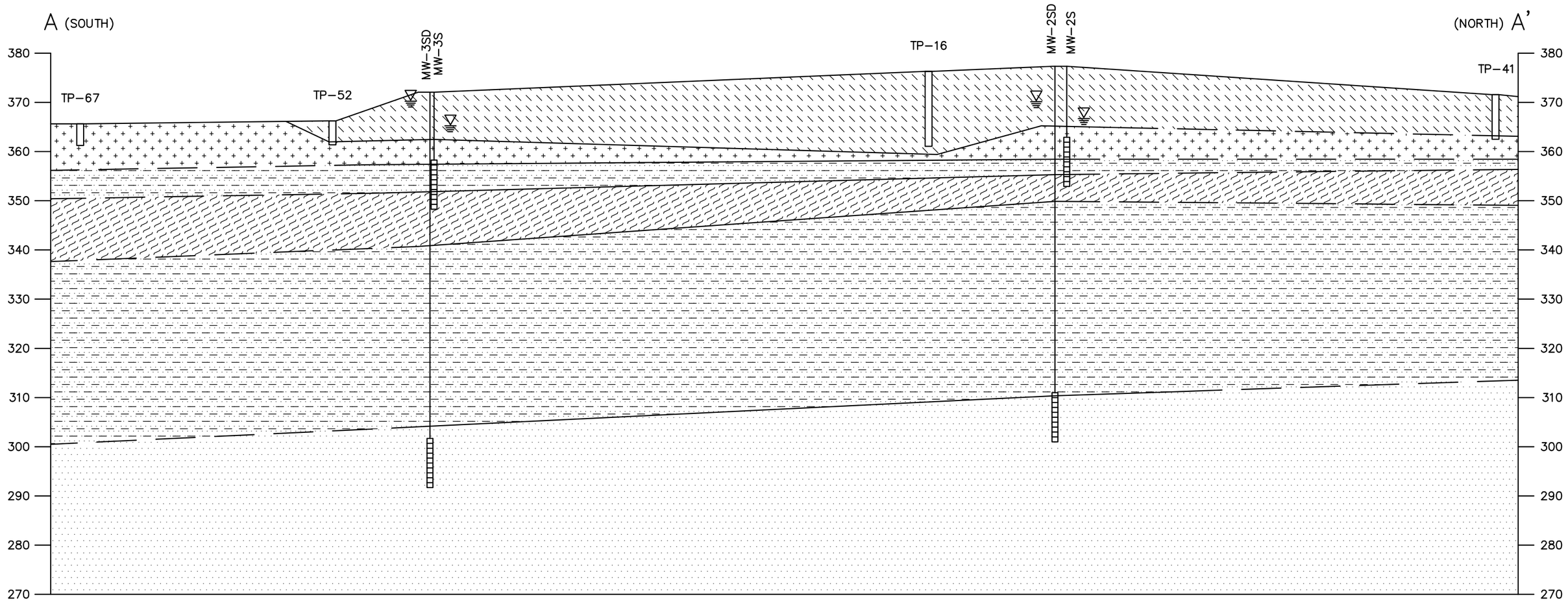
1" = 100'

NORTH LANDFILL B–B' GEOLOGIC CROSS SECTION

COOPER CROUSE–HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE–HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
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DATE	REVIEWED BY	FILE NAME	
02/10/09		FIGURE 4	



FILL

PEAT

SILT & CLAY

SAND

SILT & SAND

LEGEND

CASING

SCREEN

TEST PIT

MW-2SD MONITORING WELL

GROUNDWATER ELEVATION (SEPTEMBER 10, 2008)

SCALE:

1" = 20'

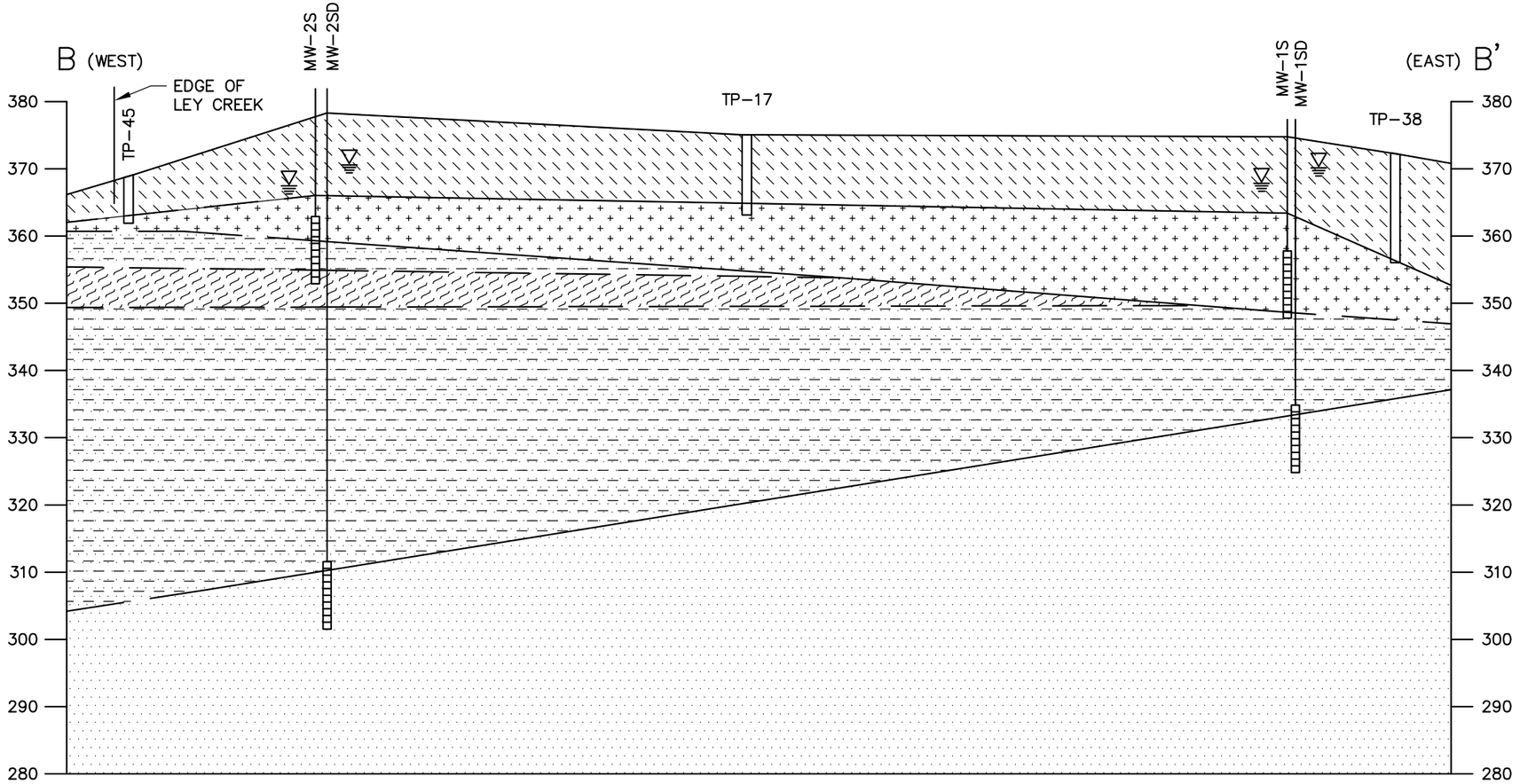
1" = 100'

SOUTH LANDFILL A-A' GEOLOGIC CROSS SECTION

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
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DATE	REVIEWED BY	FILE NAME	
02/10/09		FIGURE 5	



FILL

PEAT

SILT & CLAY

SAND

SILT & SAND

LEGEND

CASING

SCREEN

TEST PIT

MW-2SD MONITORING WELL

GROUNDWATER ELEVATION (SEPTEMBER 10, 2008)

SCALE:

1" = 20'

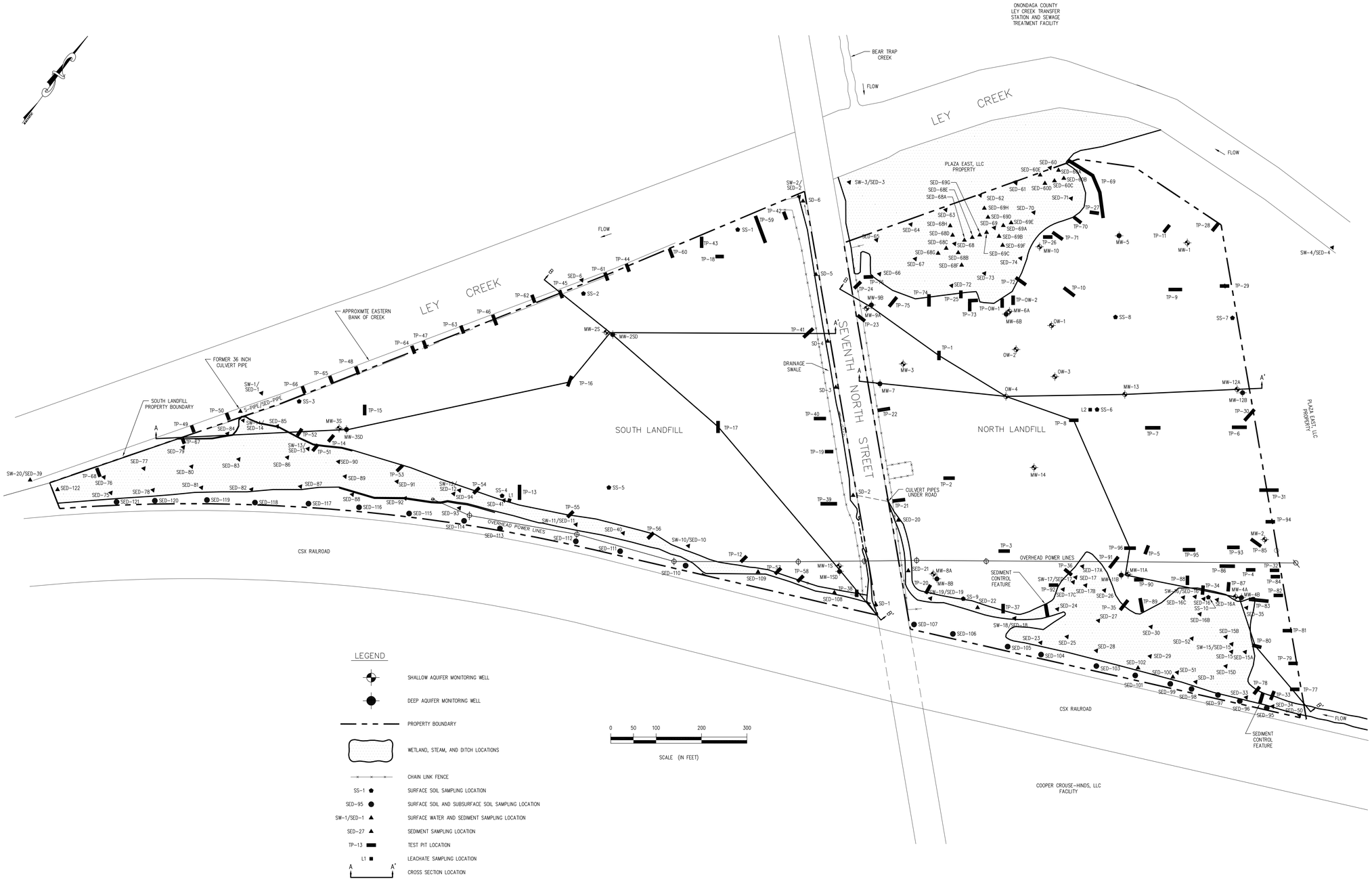
1" = 100'

SOUTH LANDFILL B-B' GEOLOGIC CROSS SECTION

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
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DATE	REVIEWED BY	FILE NAME	
02/10/09		FIGURE 6	

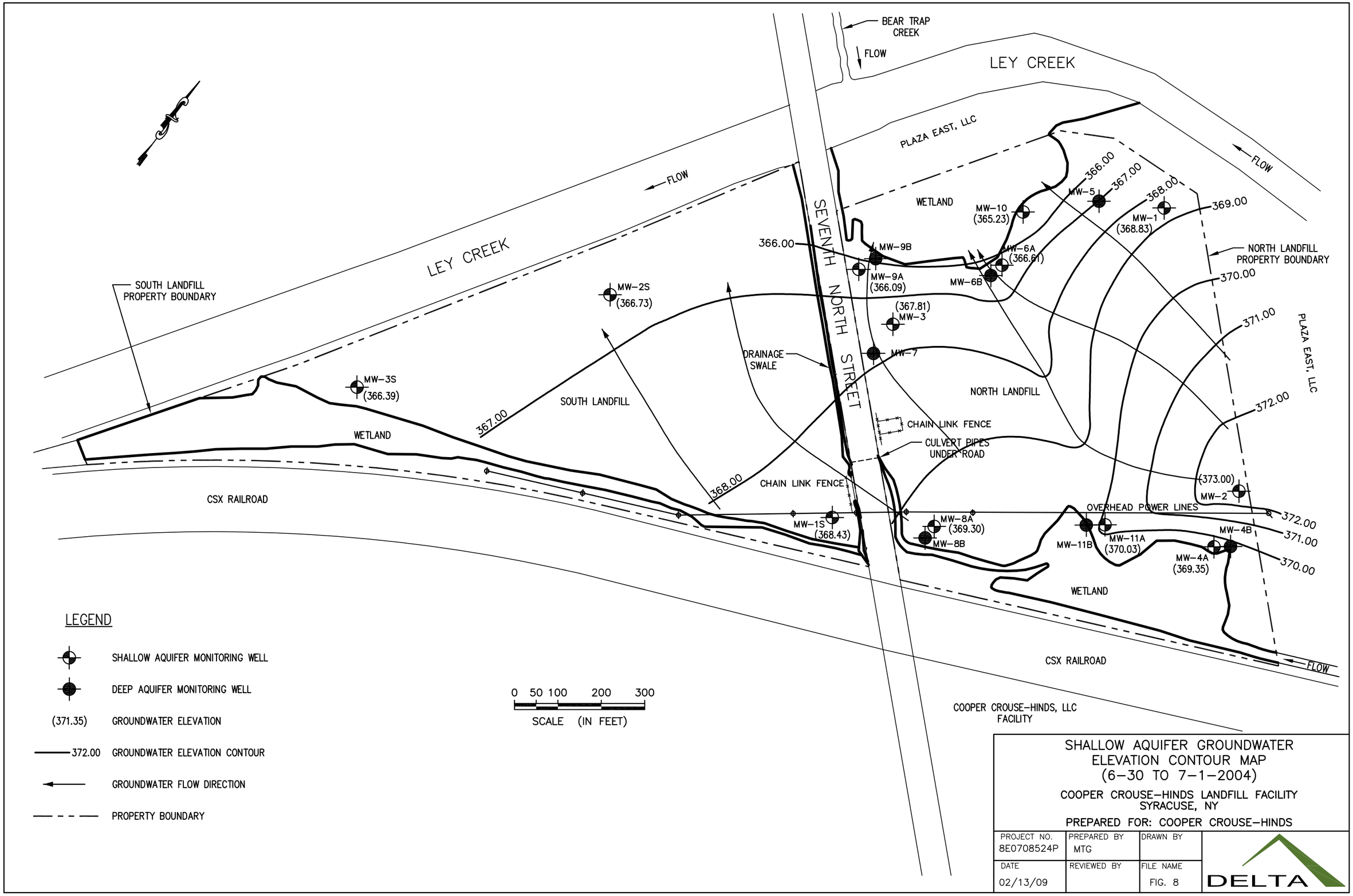


SAMPLE LOCATION MAP

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

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DATE	REVIEWED BY	FILE NAME	
2/10/09		FIGURE 7	DELTA



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

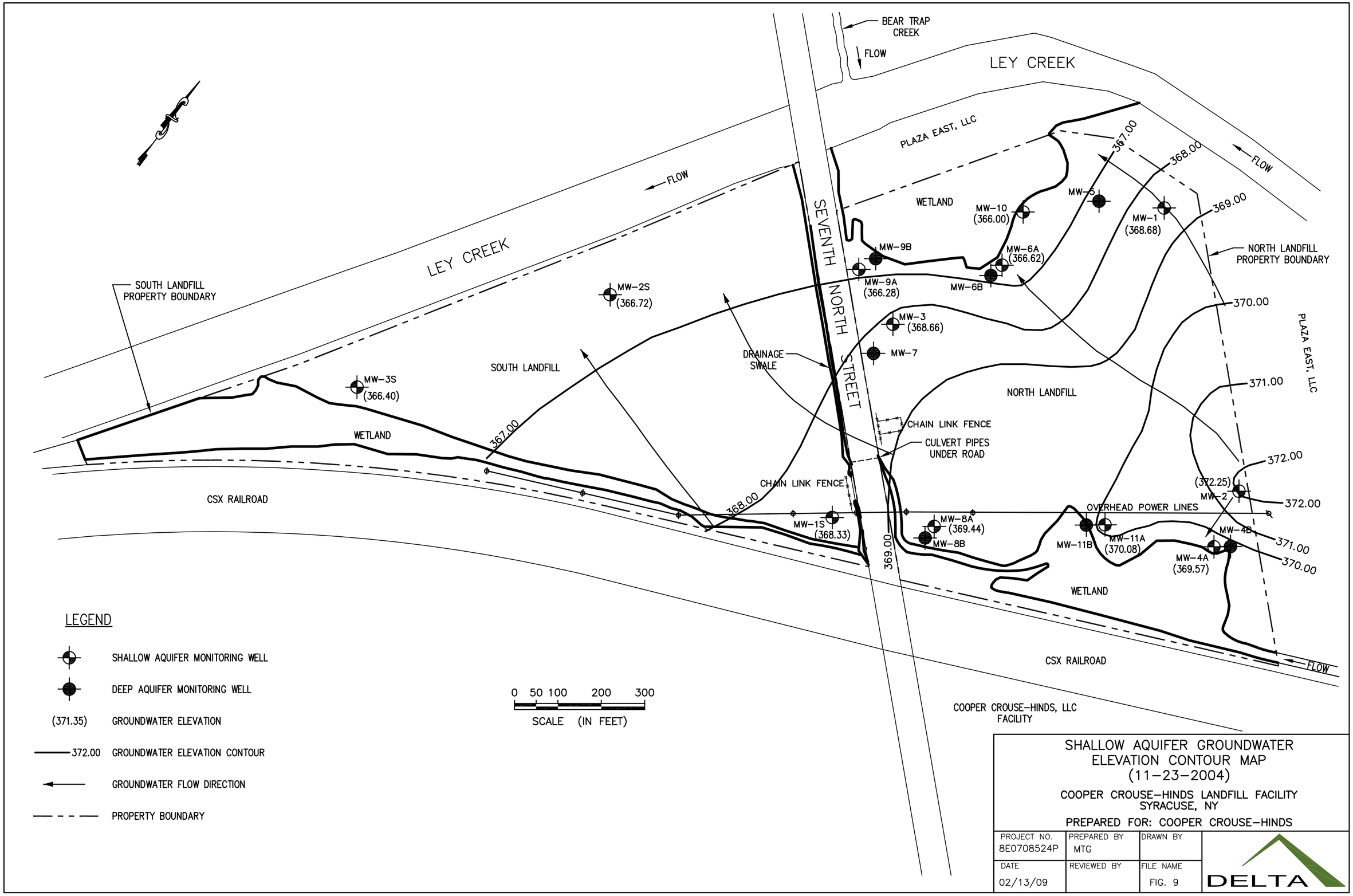
SCALE (IN FEET)

SHALLOW AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (6-30 TO 7-1-2004)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

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8E0708524P	MTG		
DATE	REVIEWED BY	FILE NAME	
02/13/09		FIG. 8	DELTA

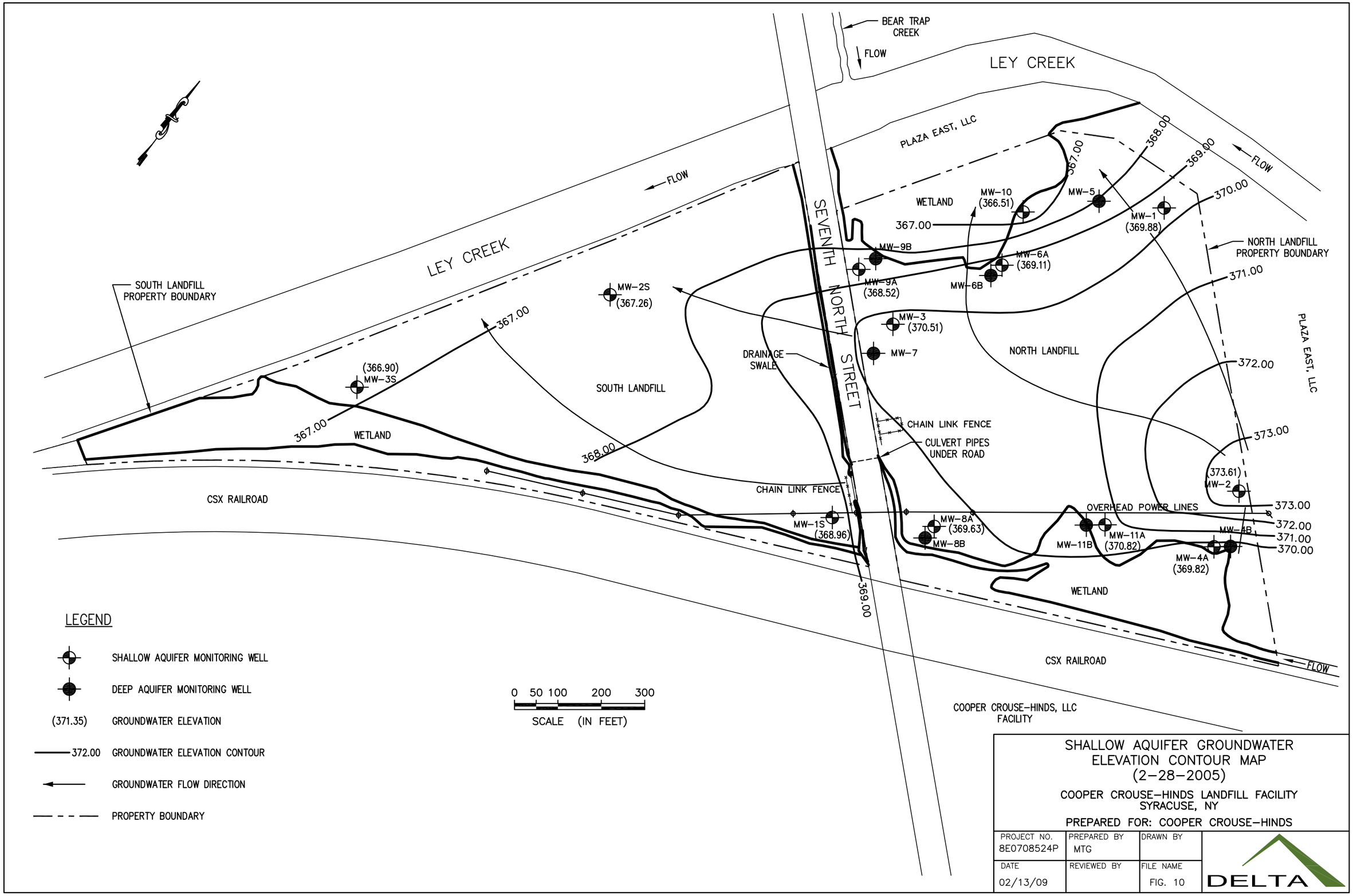


SHALLOW AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (11-23-2004)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
8E0708524P	MTG		DELTA
DATE	REVIEWED BY	FILE NAME	
02/13/09		FIG. 9	



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

SCALE (IN FEET)

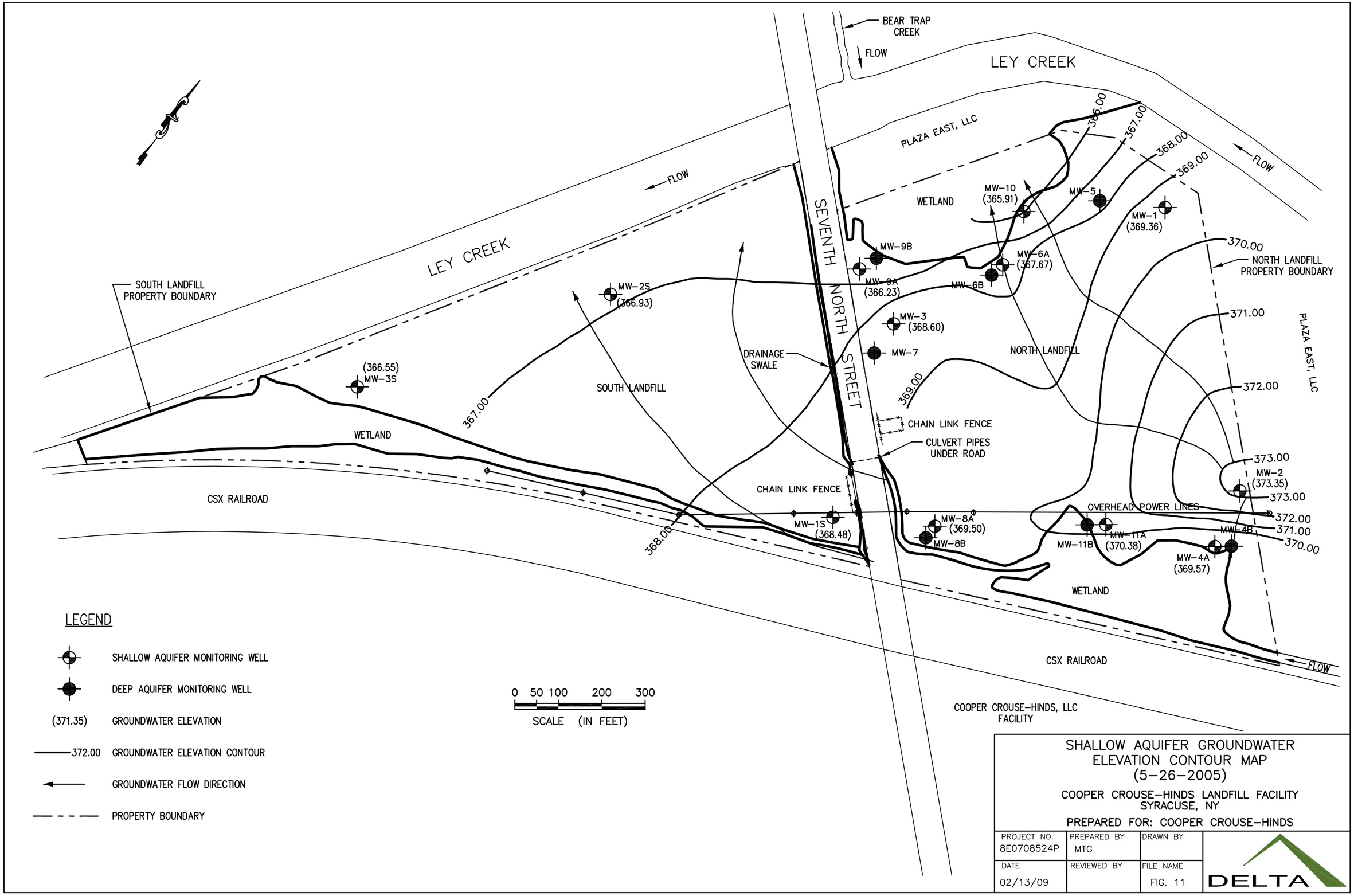
SHALLOW AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (2-28-2005)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY
8E0708524P	MTG	
DATE	REVIEWED BY	FILE NAME
02/13/09		FIG. 10

DELTA



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

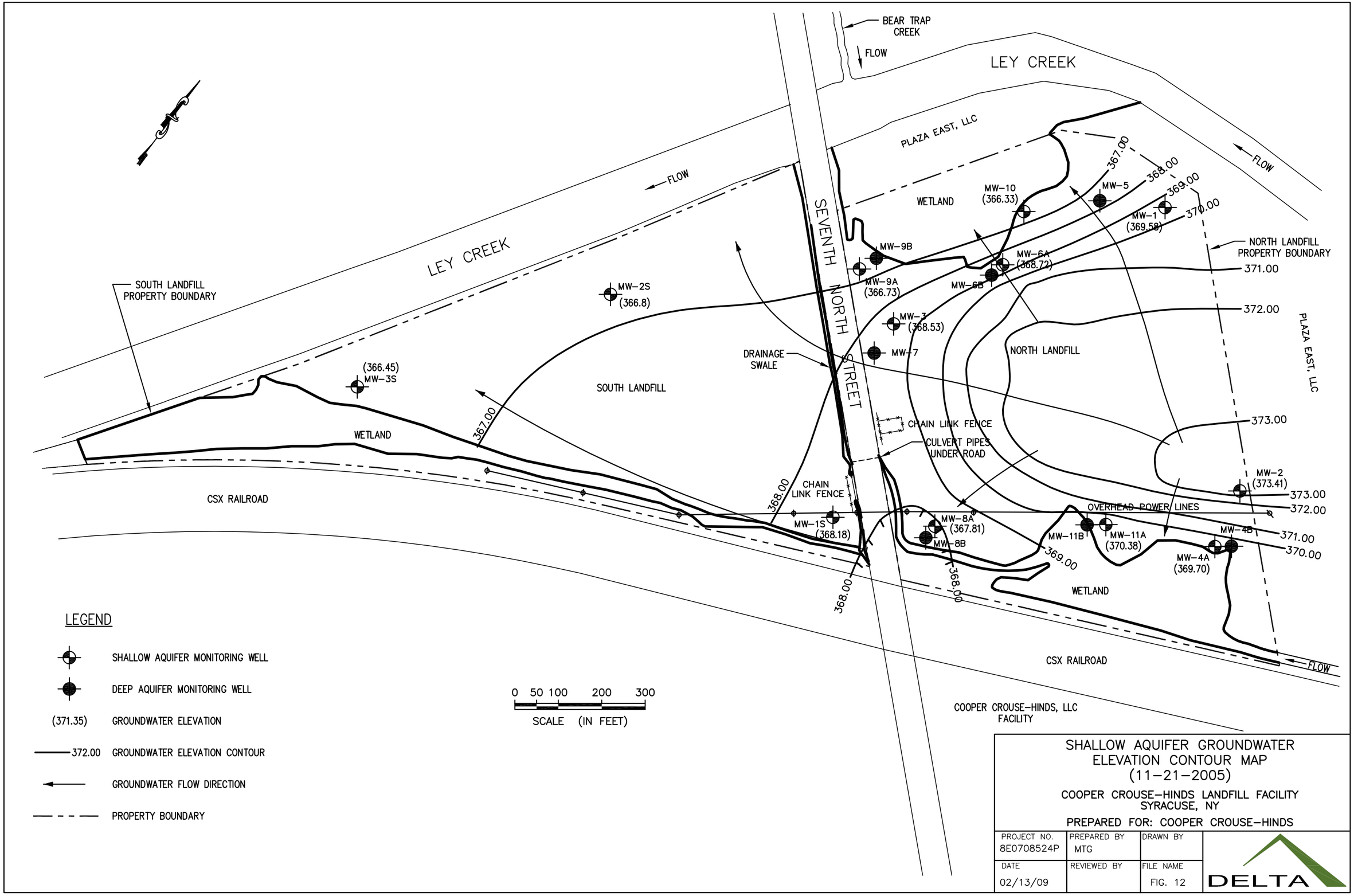
SCALE (IN FEET)

SHALLOW AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (5-26-2005)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
8E0708524P	MTG		
DATE	REVIEWED BY	FILE NAME	
02/13/09		FIG. 11	DELTA



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

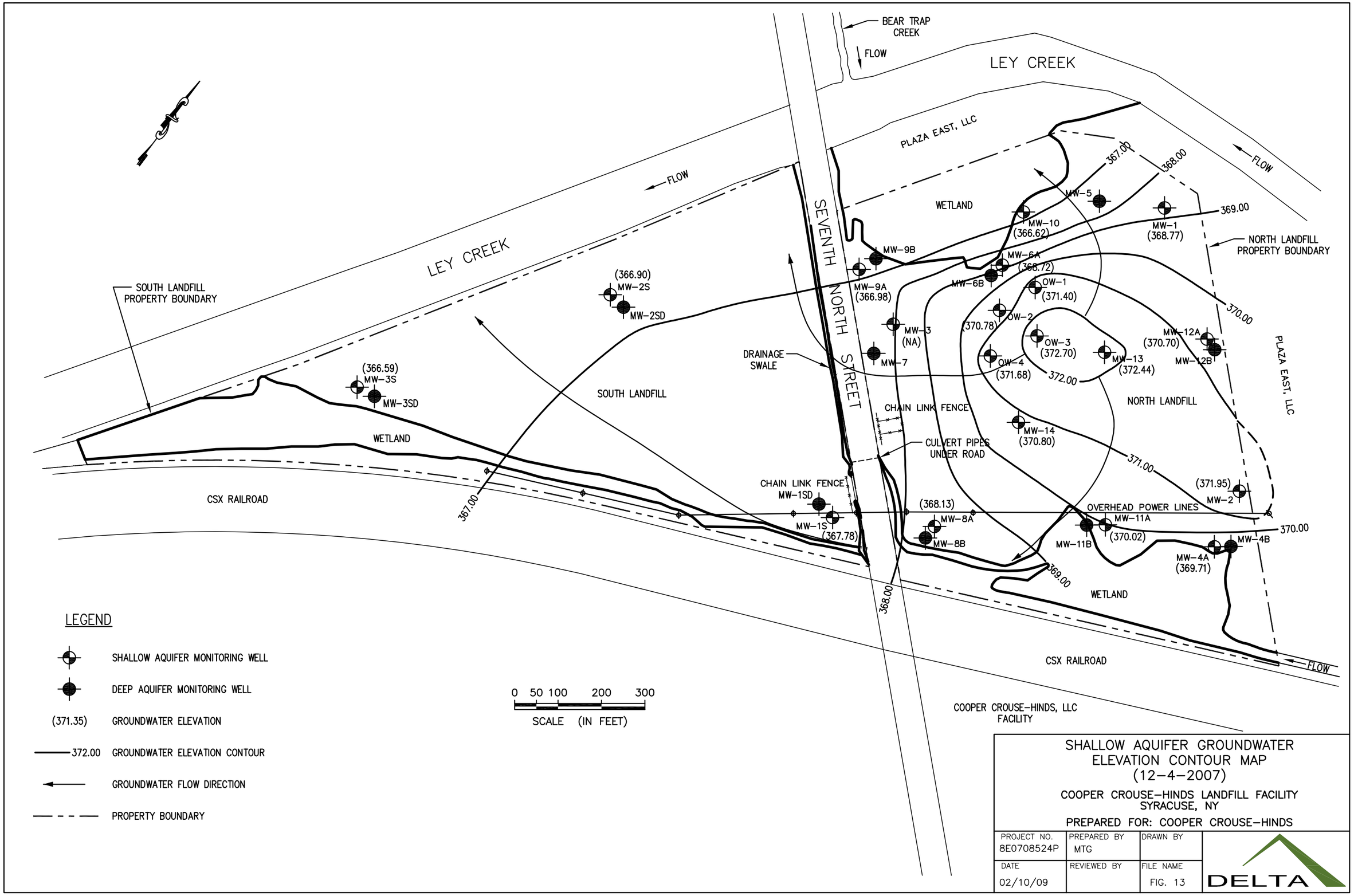
SCALE (IN FEET)

SHALLOW AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (11-21-2005)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

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8E0708524P	MTG		
DATE	REVIEWED BY	FILE NAME	
02/13/09		FIG. 12	DELTA



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

SCALE (IN FEET)

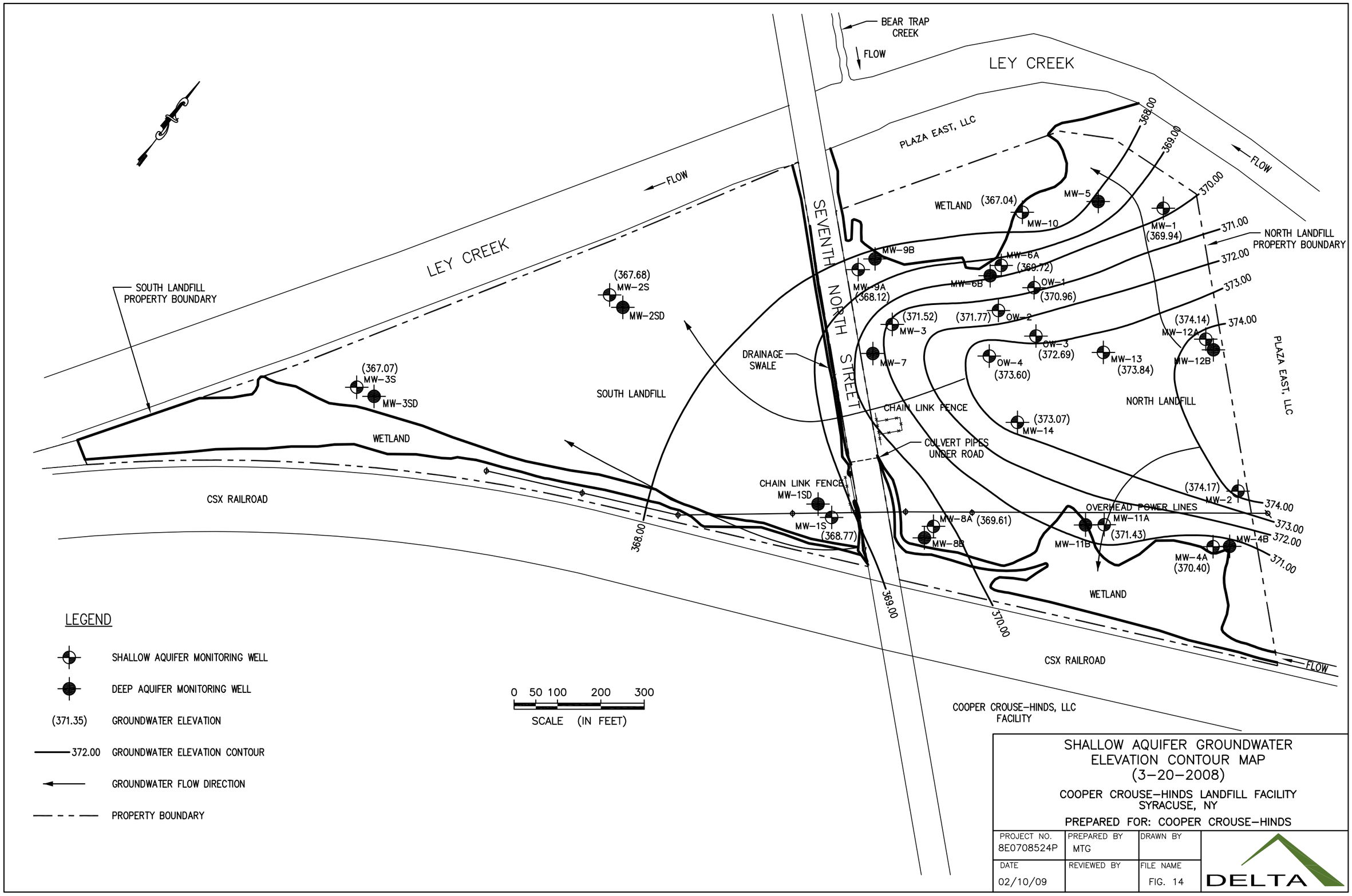
SHALLOW AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (12-4-2007)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY
8E0708524P	MTG	
DATE	REVIEWED BY	FILE NAME
02/10/09		FIG. 13

DELTA

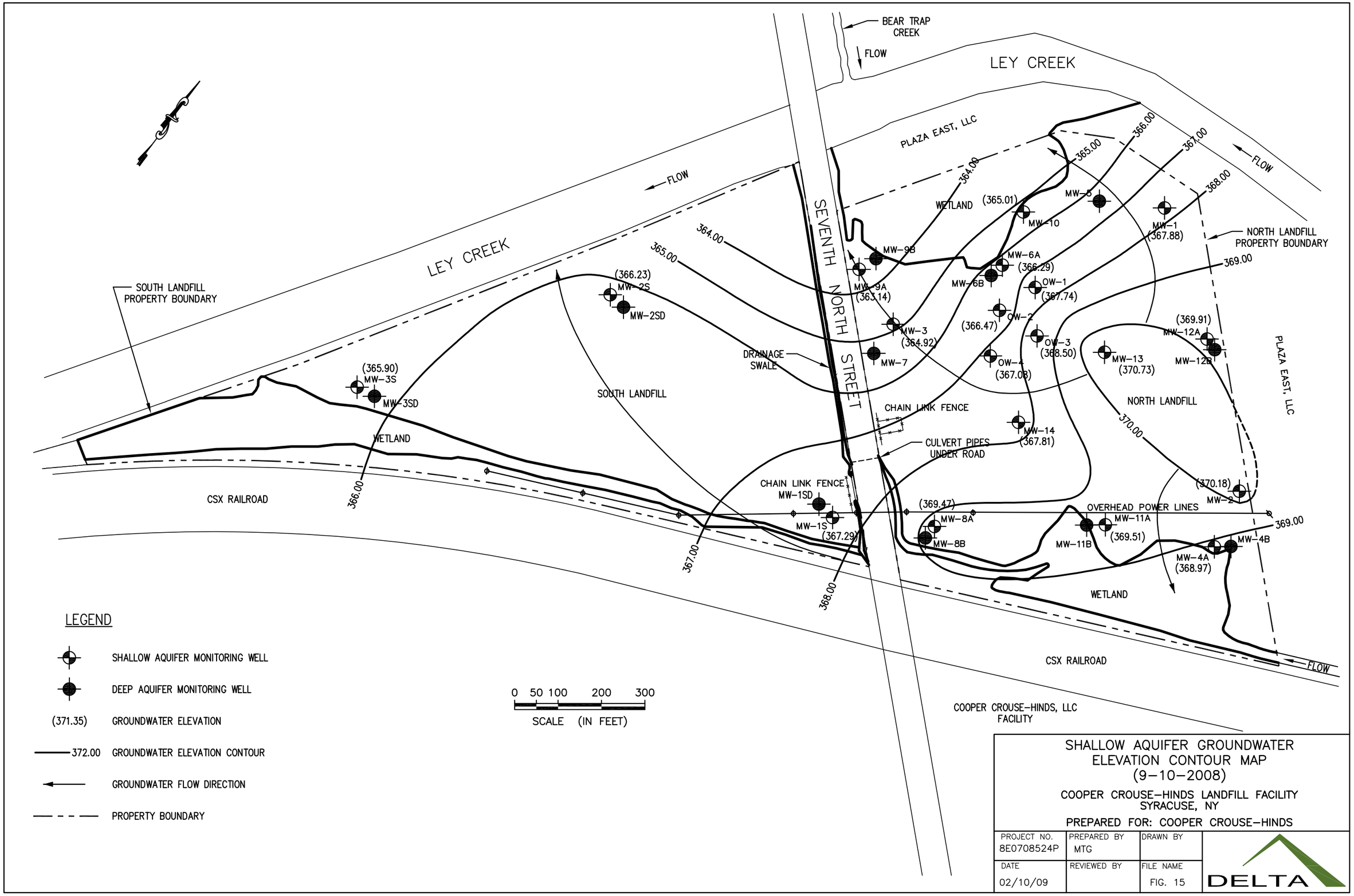


SHALLOW AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (3-20-2008)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
8E0708524P	MTG		
DATE	REVIEWED BY	FILE NAME	
02/10/09		FIG. 14	DELTA



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

SCALE (IN FEET)

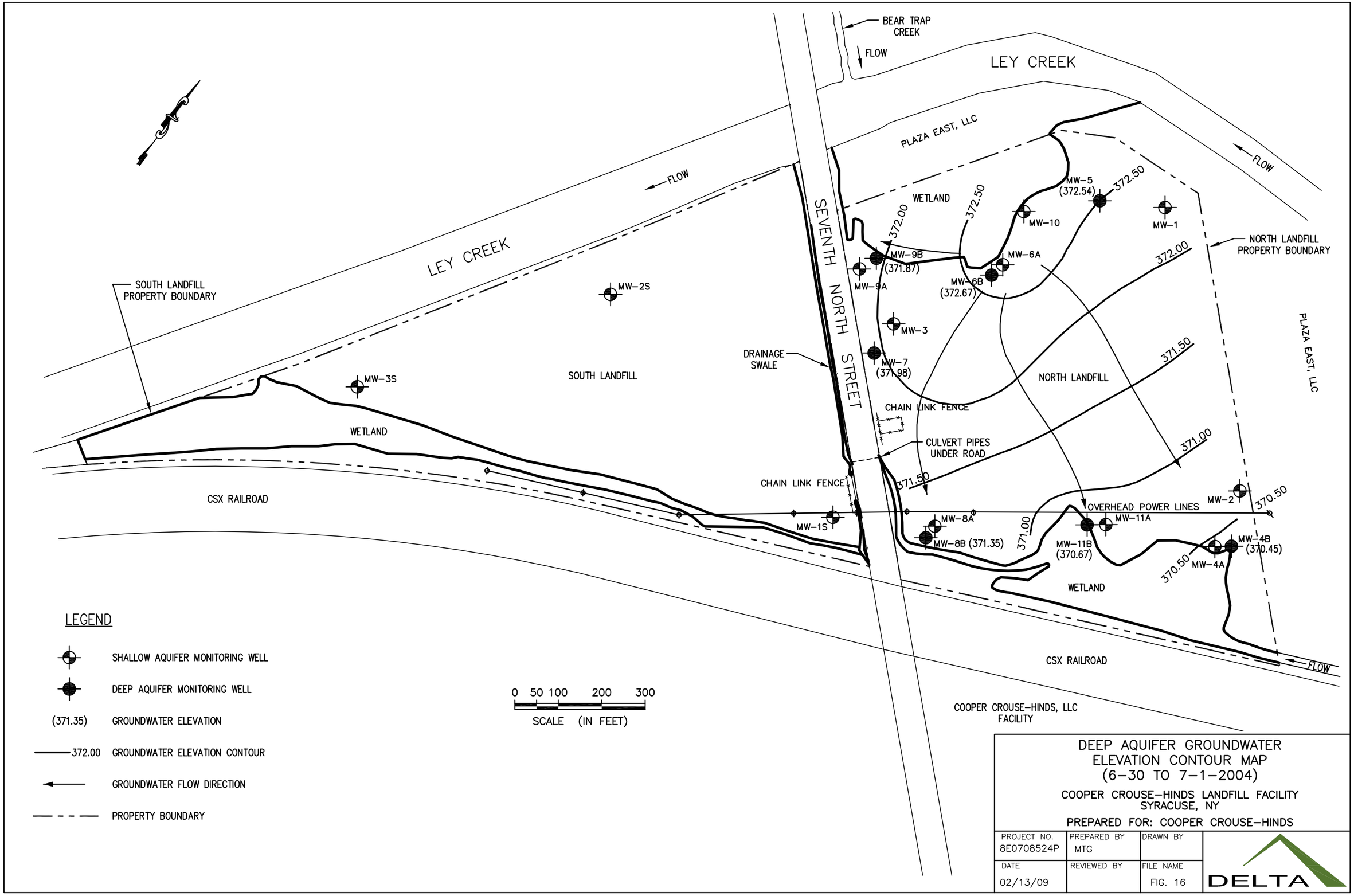
SHALLOW AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (9-10-2008)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY
8E0708524P	MTG	
DATE	REVIEWED BY	FILE NAME
02/10/09		FIG. 15

DELTA

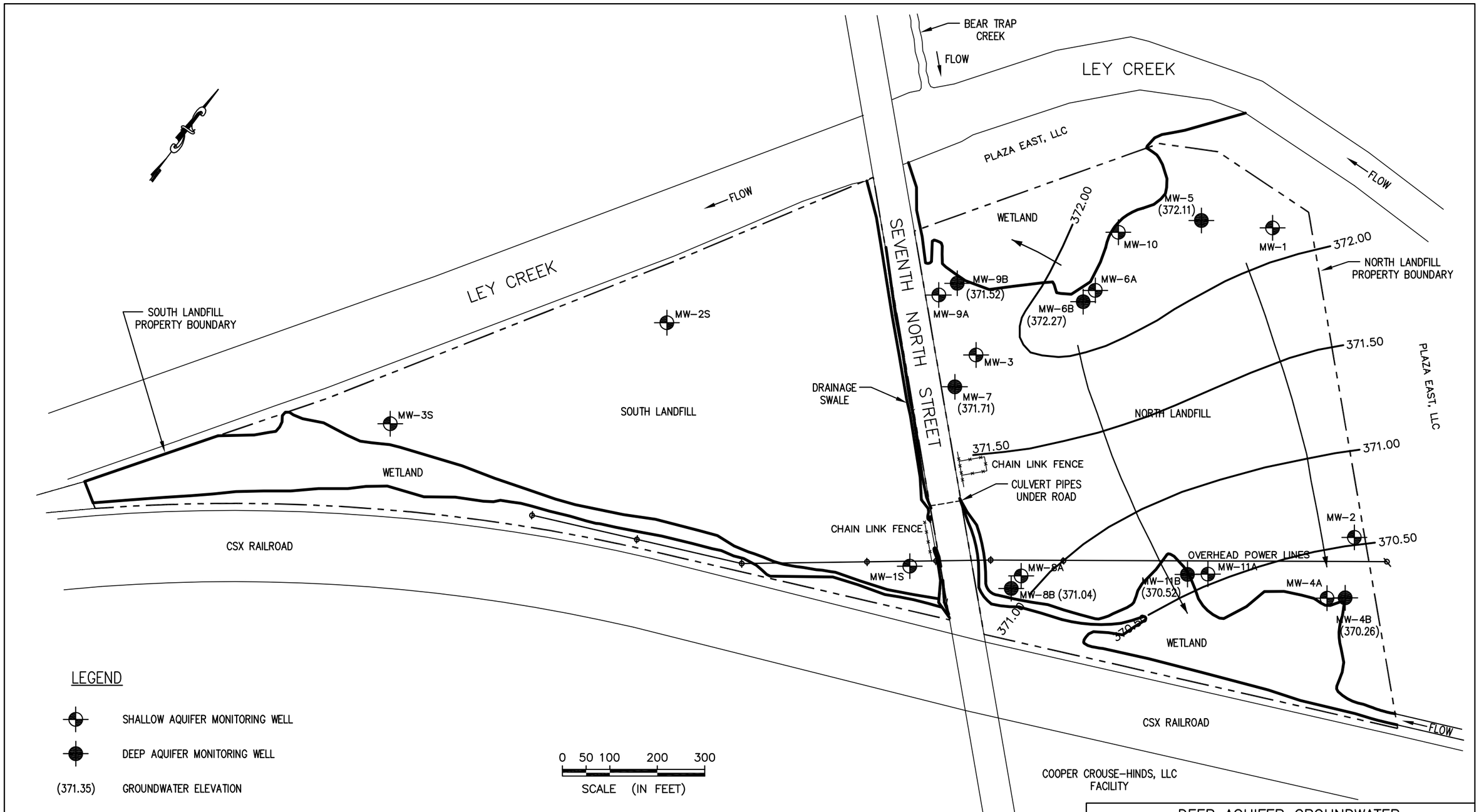


DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (6-30 TO 7-1-2004)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
8E0708524P	MTG		
DATE	REVIEWED BY	FILE NAME	
02/13/09		FIG. 16	DELTA



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

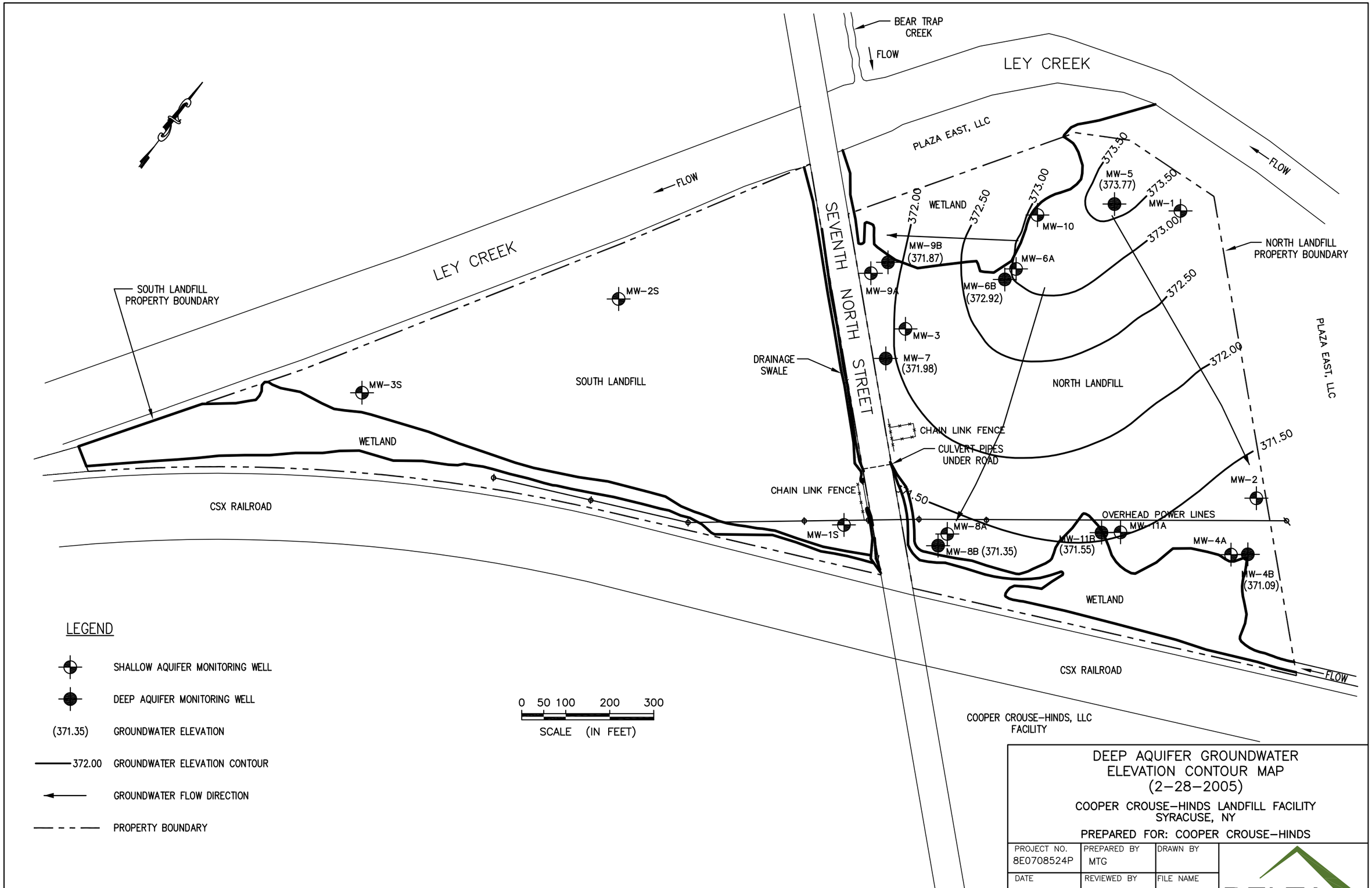
SCALE (IN FEET)

DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (11-23-2004)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
8E0708524P	MTG		DELTA
DATE	REVIEWED BY	FILE NAME	
02/13/09		FIG. 17	



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

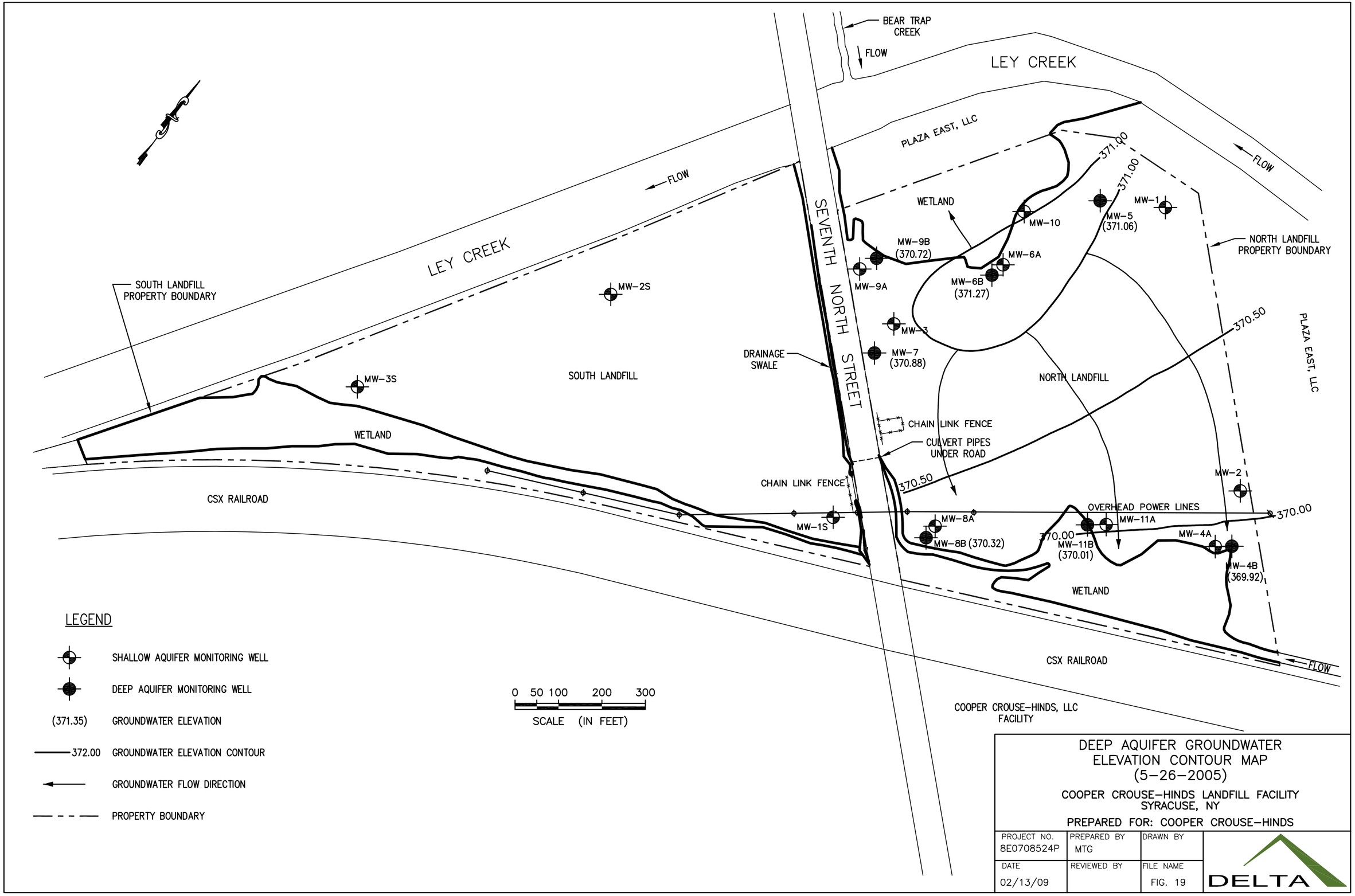
SCALE (IN FEET)

DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (2-28-2005)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
8E0708524P	MTG		DELTA
DATE	REVIEWED BY	FILE NAME	
02/13/09		FIG. 18	



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

SCALE (IN FEET)

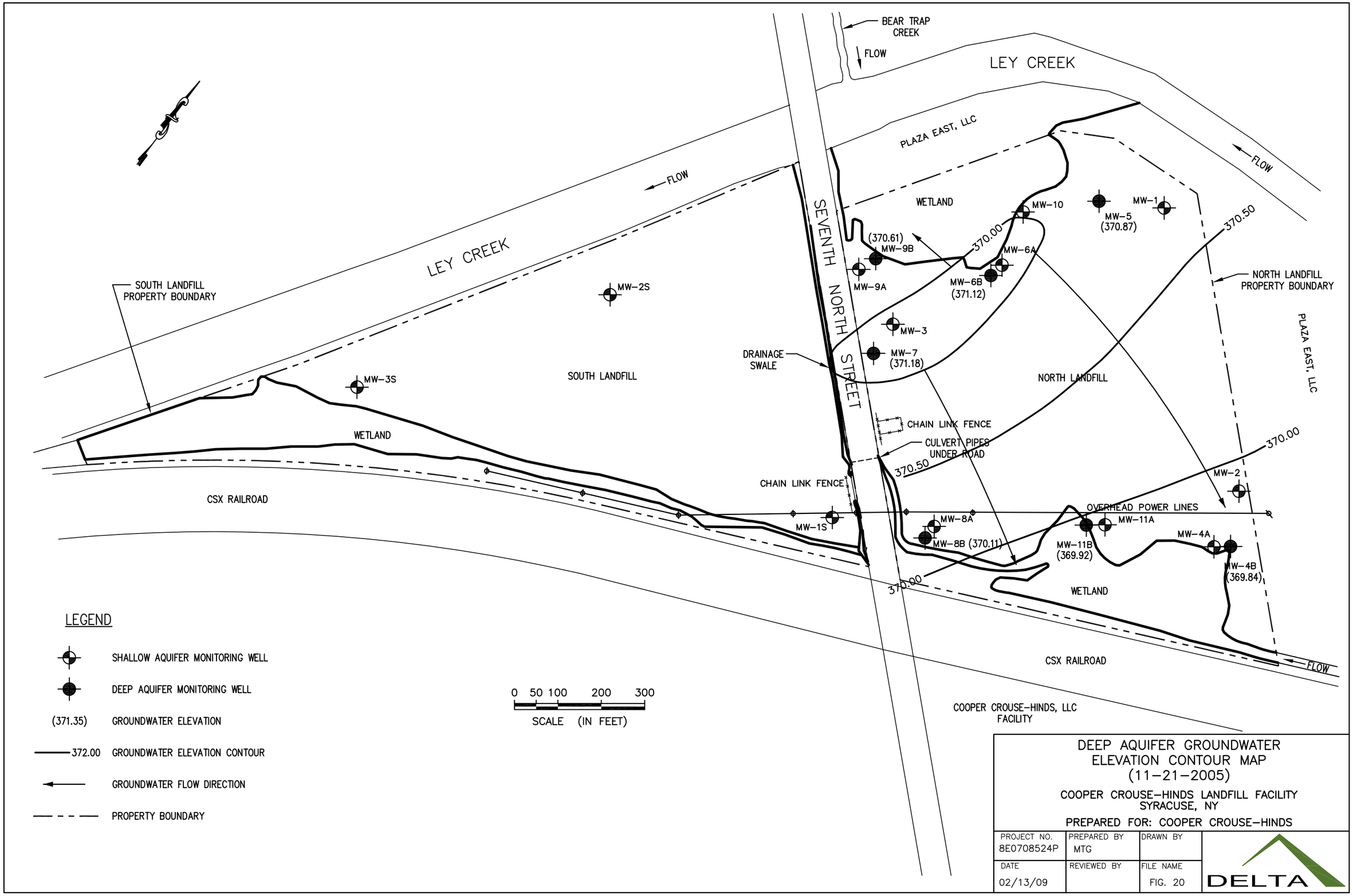
DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (5-26-2005)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY
8E0708524P	MTG	
DATE	REVIEWED BY	FILE NAME
02/13/09		FIG. 19

DELTA



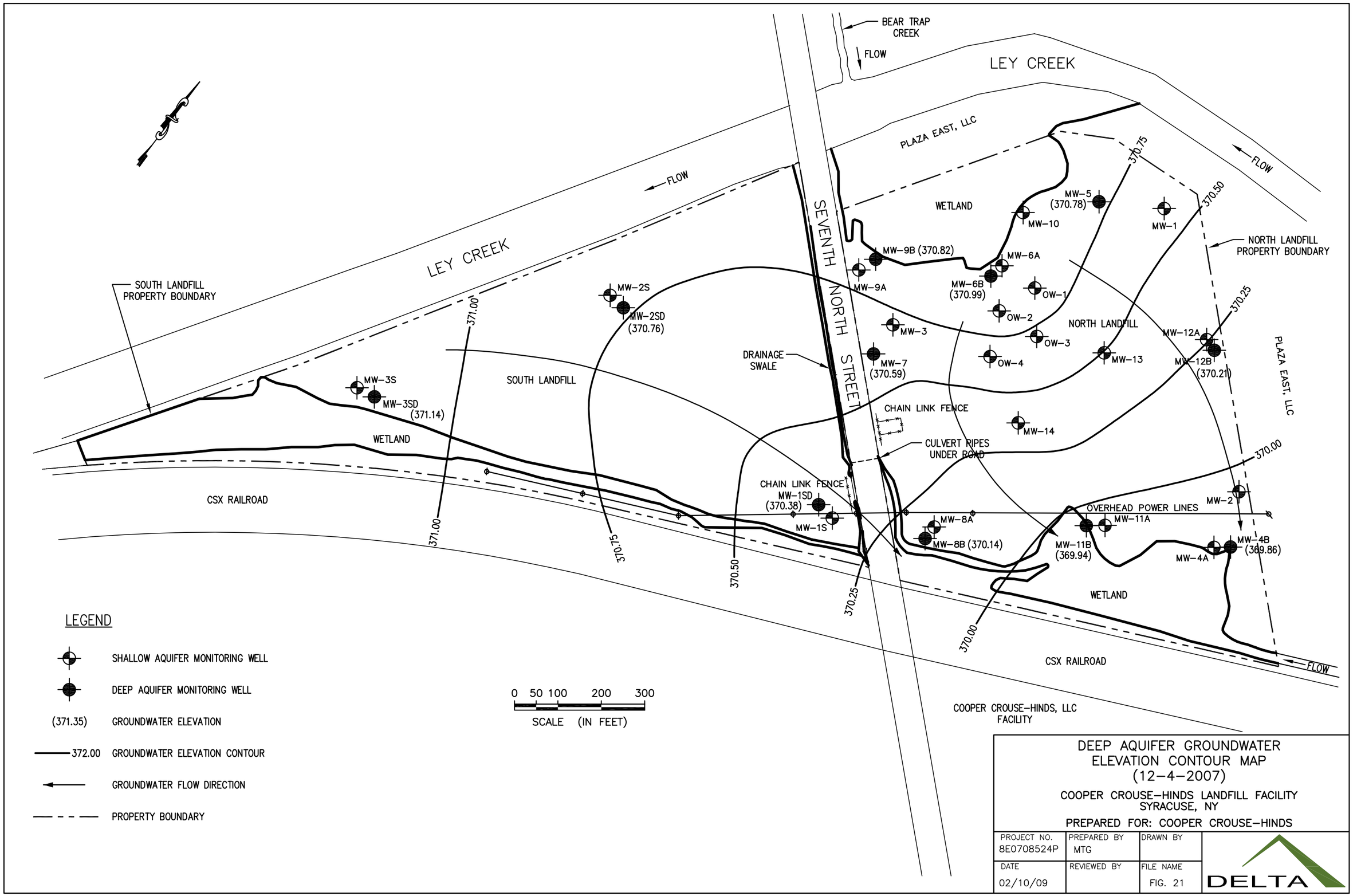
DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (11-21-2005)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY
8E0708524P	MTG	
DATE	REVIEWED BY	FILE NAME
02/13/09		FIG. 20

DELTA



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

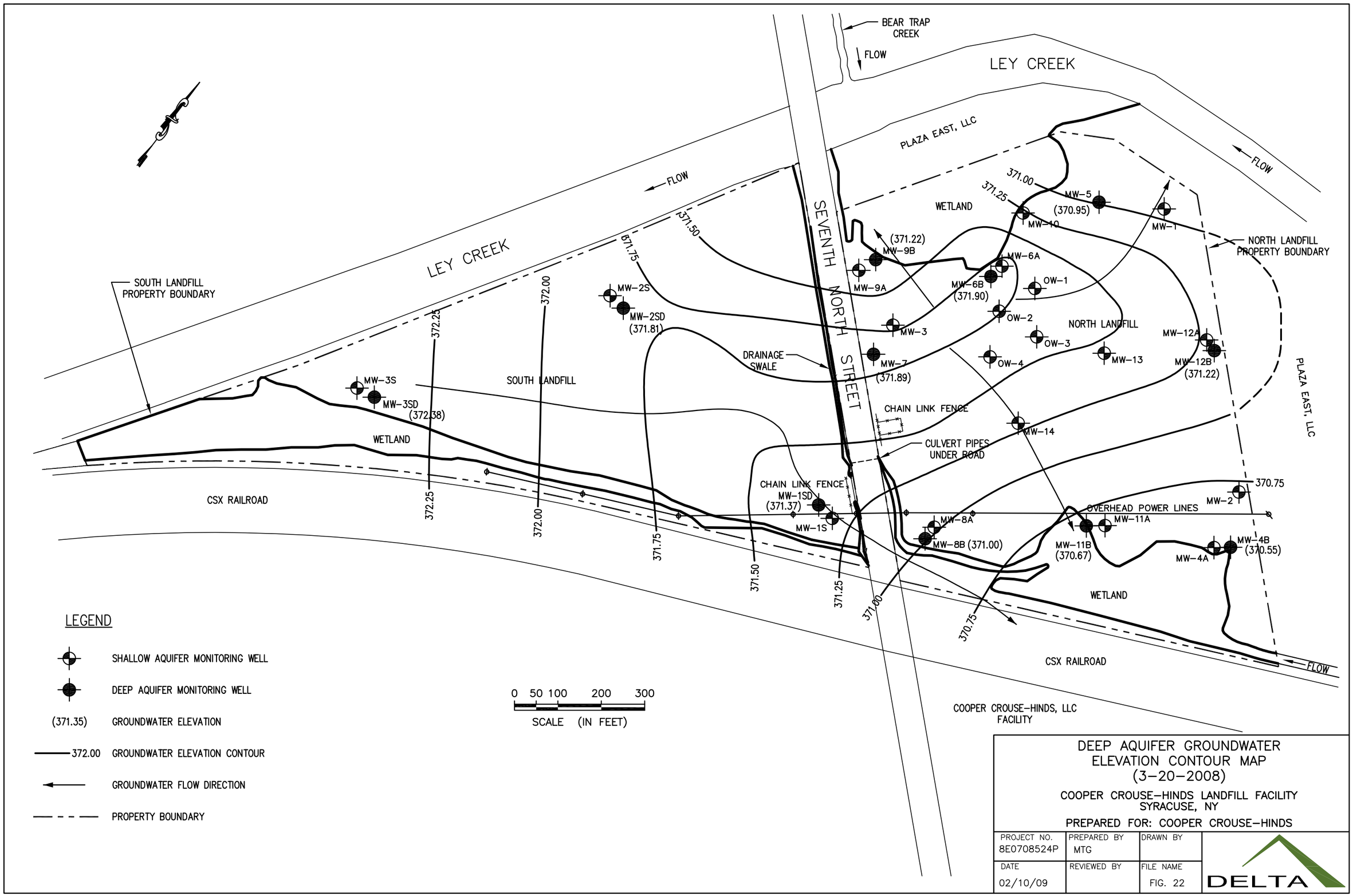
SCALE (IN FEET)

DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (12-4-2007)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
8E0708524P	MTG		DELTA
DATE	REVIEWED BY	FILE NAME	
02/10/09		FIG. 21	



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

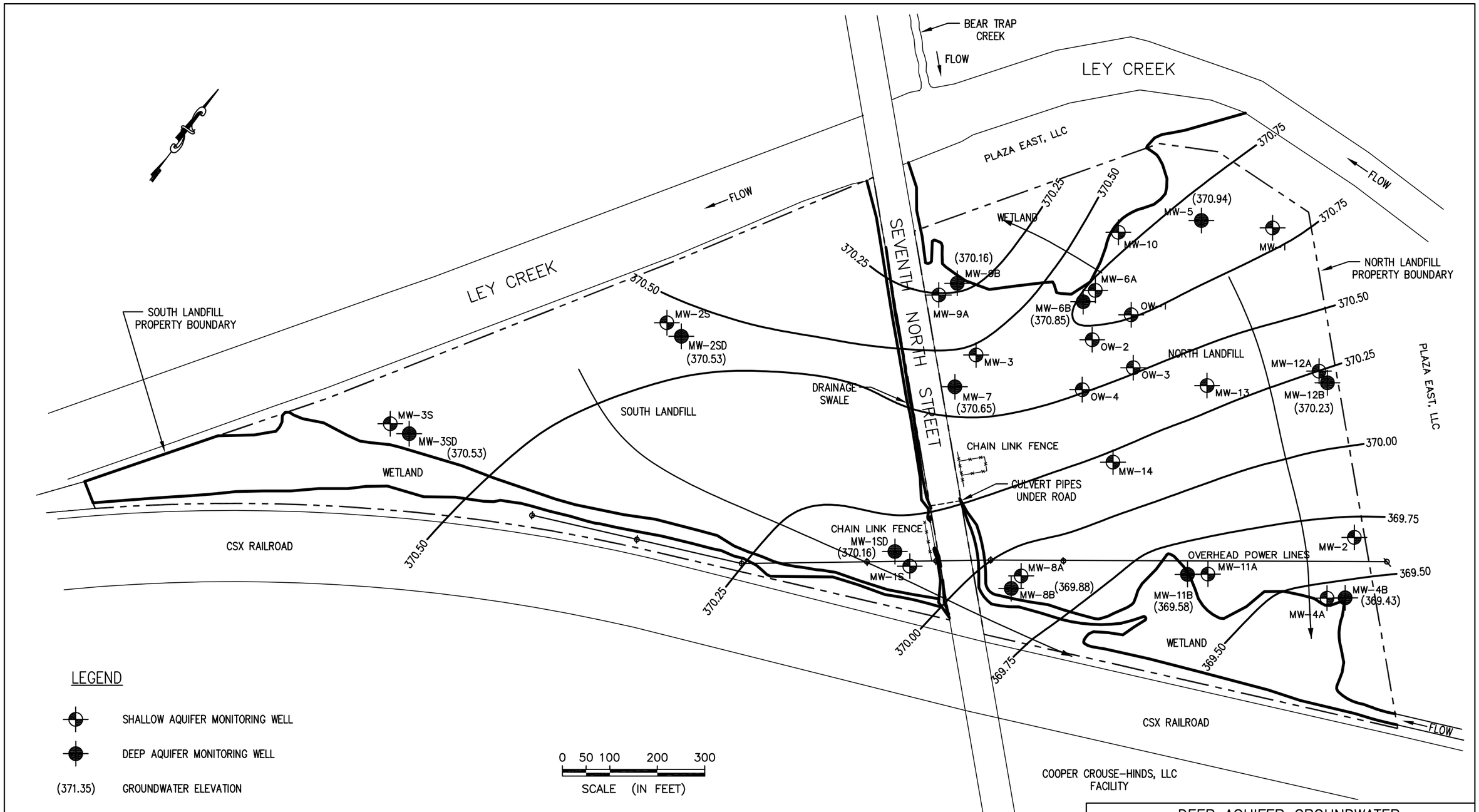
SCALE (IN FEET)

DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (3-20-2008)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
8E0708524P	MTG		DELTA
DATE	REVIEWED BY	FILE NAME	
02/10/09		FIG. 22	



LEGEND

- SHALLOW AQUIFER MONITORING WELL
- DEEP AQUIFER MONITORING WELL
- (371.35) GROUNDWATER ELEVATION
- 372.00 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- PROPERTY BOUNDARY

0 50 100 200 300

SCALE (IN FEET)

DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP (9-10-2008)

COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NY

PREPARED FOR: COOPER CROUSE-HINDS

PROJECT NO.	PREPARED BY	DRAWN BY	
8E0708524P	MTG		DELTA
DATE	REVIEWED BY	FILE NAME	
02/10/09		FIG. 23	

EXCAVATION WORK PLAN

SMP APPENDIX B
EXCAVATION WORK PLAN (EWP)

1.0 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Currently, this notification will be made to:

Mr. Jacky Luo, Assistant Engineer
Division of Environmental Remediation
625 Broadway, Albany, NY 12233-7013 Phone: 518-402-9676

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control,
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work,
- A summary of the applicable components of this EWP,
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120,
- A copy of the contractor's health and safety plan, in electronic format, if it differs from the HASP provided in Appendix C of this document,
- Identification of disposal facilities for potential waste streams,
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

2.0 SOIL SCREENING METHODS

Visual, olfactory and PID instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soil screening for VOCs will be conducted using a PID. The samples screened in the field for VOCs will be placed in 16-ounce glass canning jars. The jars will be half-filled with soil and the top of each jar will be sealed with aluminum foil and a canning jar screw-on metal retaining ring. The headspace in the jars will be allowed to equilibrate for a minimum of 10 minutes at an ambient temperature of at least 55 degrees Fahrenheit to allow any organic compounds to off-gas. The headspace of the container will then be measured for volatile compounds using the PID. The peak PID response and the PID

reading after 15 seconds will be recorded on field PID data sheets. The PID will be calibrated at the start of each work day by the environmental scientist. The PID will be calibrated in accordance with the manufacturer's calibration procedures using 100 parts per million isobutylene calibration gas. The PID calibration results will be recorded on an equipment calibration record form. A PID response greater than 10 instrument units (IUs) above background will be considered an indication of possible contamination.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

3.0 STOCKPILE METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points. Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced. Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC.

4.0 MATERIALS EXCAVATION AND LOAD OUT

The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking. The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

5.0 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used. All trucks will be washed prior to leaving the site. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Truck transport routes are as follows: Exiting the North or South Landfill to the west along 7th North Street and traveling 0.6 miles leads to the I-81 northbound ramp. From that point interstate highways west provide the route to the landfill. No residential streets in Syracuse are on the truck route. Once I-81 is accessed, the trucks will be using normal truck routes to reach the destination landfill. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site. Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development. Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

6.0 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

7.0 MATERIALS REUSE ON-SITE

'Reuse on-site' means reuse of on-site of material that originates at the site and which does not leave the site during the excavation. Chemical criteria for on-site reuse of material have been approved by NYSDEC and are listed in attached Tables 375-6.8(a) and (b), as applicable. Excavated materials will be sampled and analyzed for site-related contaminants to ensure that these criteria are met. The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for re-use on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site may be reused on-site if spread thin.

8.0 FLUIDS MANAGEMENT

All liquids to be removed from the site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, but will be managed off-site.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

9.0 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the Order on Consent. The demarcation layer, consisting of orange snow fencing material or equivalent material will be replaced to provide a visual reference to the top of the 'Remaining Contamination Zone', the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this Site Management Plan. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil or composite cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the

upper surface of the 'Remaining Contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the Site Management Plan.

10.0 BACKFILL FROM OFF-SITE SOURCES

A possible commercial source for imported clean fill material is:

Hanson Aggregates New York LLC
PO Box 513
4800 Jamesville Road
Jamesville, NY 13078

In addition to Hanson Aggregates, the following clean fill material sources are located within a short hauling distance to the site:

Riccelli Enterprises, Inc.
6131 E. Taft Road
Syracuse, NY
(315) 433-5115

Mill Creek Products and Supplies
6414 East Taft Road
East Syracuse, NY
(315) 452-9400

WF Saunders & Sons, Inc.
5126 South Onondaga Road
Nedrow, NY
(315) 469-3217

Van Slyke Trucking, Inc.
5096 South Onondaga Road
Nedrow, NY
(315) 492-8174

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site. Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in attached Tables 375-6.8(a) and (b), as applicable. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

11.0 STORMWATER POLLUTION PREVENTION

For excavations exceeding 1 acre, procedures specified in the Stormwater Pollution Prevention Plan (Appendix H of the Site Management Plan) should be followed.

For any excavation, silt fencing or hay bales will be installed around the entire perimeter of the construction area. Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

12.0 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for full a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 5 of the SMP.

13.0 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) will follow the generic plan provided as Appendix 1A of DER-10. The location of air sampling stations will be based on the generally westerly prevailing wind conditions at the site. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind

and at least two downwind monitoring stations. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

14.0 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

15.0 DUST CONTROL PLAN

Fugitive Dust and Particulate Monitoring will follow the generic plan provided as Appendix 1B of DER-10. A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

16.0 OTHER NUISANCES

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

375-6.8 Soil cleanup objective tables.

(a) Unrestricted use soil cleanup objectives.

Table 375-6.8(a):Unrestricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Unrestricted Use
Metals		
Arsenic	7440-38-2	13 [c]
Barium	7440-39-3	350 [c]
Beryllium	7440-41-7	7.2
Cadmium	7440-43-9	2.5 [c]
Chromium, hexavalent [e]	18540-29-9	1[b]
Chromium, trivalent [e]	16065-83-1	30 [c]
Copper	7440-50-8	50
Total Cyanide [e, f]		27
Lead	7439-92-1	63 [c]
Manganese	7439-96-5	1600 [c]
Total Mercury		0.18 [c]
Nickel	7440-02-0	30
Selenium	7782-49-2	3.9[c]
Silver	7440-22-4	2
Zinc	7440-66-6	109 [c]
PCBs/Pesticides		
2,4,5-TP Acid (Silvex) [f]	93-72-1	3.8
4,4'-DDE	72-55-9	0.0033 [b]
4,4'-DDT	50-29-3	0.0033 [b]
4,4'-DDD	72-54-8	0.0033 [b]
Aldrin	309-00-2	0.005 [c]
alpha-BHC	319-84-6	0.02
beta-BHC	319-85-7	0.036
Chlordane (alpha)	5103-71-9	0.094

Table 375-6.8(a):Unrestricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Unrestricted Use
delta-BHC [g]	319-86-8	0.04
Dibenzofuran [f]	132-64-9	7
Dieldrin	60-57-1	0.005 [c]
Endosulfan I [d, f]	959-98-8	2.4
Endosulfan II [d, f]	33213-65-9	2.4
Endosulfan sulfate [d, f]	1031-07-8	2.4
Endrin	72-20-8	0.014
Heptachlor	76-44-8	0.042
Lindane	58-89-9	0.1
Polychlorinated biphenyls	1336-36-3	0.1
Semivolatile organic compounds		
Acenaphthene	83-32-9	20
Acenapthylene [f]	208-96-8	100 [a]
Anthracene [f]	120-12-7	100 [a]
Benz(a)anthracene [f]	56-55-3	1 [c]
Benzo(a)pyrene	50-32-8	1 [c]
Benzo(b)fluoranthene [f]	205-99-2	1 [c]
Benzo(g,h,i)perylene [f]	191-24-2	100
Benzo(k)fluoranthene [f]	207-08-9	0.8 [c]
Chrysene [f]	218-01-9	1 [c]
Dibenz(a,h)anthracene [f]	53-70-3	0.33 [b]
Fluoranthene [f]	206-44-0	100 [a]
Fluorene	86-73-7	30
Indeno(1,2,3-cd)pyrene [f]	193-39-5	0.5 [c]
m-Cresol [f]	108-39-4	0.33 [b]
Naphthalene [f]	91-20-3	12
o-Cresol [f]	95-48-7	0.33 [b]

Table 375-6.8(a):Unrestricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Unrestricted Use
p-Cresol [f]	106-44-5	0.33 [b]
Pentachlorophenol	87-86-5	0.8 [b]
Phenanthrene [f]	85-01-8	100
Phenol	108-95-2	0.33 [b]
Pyrene [f]	129-00-0	100
Volatile organic compounds		
1,1,1-Trichloroethane [f]	71-55-6	0.68
1,1-Dichloroethane [f]	75-34-3	0.27
1,1-Dichloroethene [f]	75-35-4	0.33
1,2-Dichlorobenzene [f]	95-50-1	1.1
1,2-Dichloroethane	107-06-2	0.02 [c]
cis -1,2-Dichloroethene [f]	156-59-2	0.25
trans-1,2-Dichloroethene [f]	156-60-5	0.19
1,3-Dichlorobenzene [f]	541-73-1	2.4
1,4-Dichlorobenzene	106-46-7	1.8
1,4-Dioxane	123-91-1	0.1 [b]
Acetone	67-64-1	0.05
Benzene	71-43-2	0.06
n-Butylbenzene [f]	104-51-8	12
Carbon tetrachloride [f]	56-23-5	0.76
Chlorobenzene	108-90-7	1.1
Chloroform	67-66-3	0.37
Ethylbenzene [f]	100-41-4	1
Hexachlorobenzene [f]	118-74-1	0.33[b]
Methyl ethyl ketone	78-93-3	0.12
Methyl tert-butyl ether [f]	1634-04-4	0.93
Methylene chloride	75-09-2	0.05

Table 375-6.8(a):Unrestricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Unrestricted Use
n - Propylbenzene [f]	103-65-1	3.9
sec-Butylbenzene [f]	135-98-8	11
tert-Butylbenzene [f]	98-06-6	5.9
Tetrachloroethene	127-18-4	1.3
Toluene	108-88-3	0.7
Trichloroethene	79-01-6	0.47
1,2,4-Trimethylbenzene [f]	95-63-6	3.6
1,3,5-Trimethylbenzene[f]	108-67-8	8.4
Vinyl chloride[f]	75-01-4	0.02
Xylene (mixed)	1330-20-7	0.26

All soil cleanup objectives (SCOs) are in parts per million (ppm).

Footnotes

[a] The SCOs for unrestricted use were capped at a maximum value of 100 ppm. See Technical Support Document (TSD), section 9.3.

[b] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.

[c] For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.

[d] SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.

[e] The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

[f] Protection of ecological resources SCOs were not developed for contaminants identified in Table 375-6.8(b) with “NS”. Where such contaminants appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources SCO according to the TSD.

(b) Restricted use soil cleanup objectives.

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
Metals							
Arsenic	7440-38-2	16[f]	16[f]	16[f]	16[f]	13[f]	16[f]
Barium	7440-39-3	350[f]	400	400	10,000 [d]	433	820
Beryllium	7440-41-7	14	72	590	2,700	10	47
Cadmium	7440-43-9	2.5[f]	4.3	9.3	60	4	7.5
Chromium, hexavalent [h]	18540-29-9	22	110	400	800	1[e]	19
Chromium, trivalent [h]	16065-83-1	36	180	1,500	6,800	41	NS
Copper	7440-50-8	270	270	270	10,000 [d]	50	1,720
Total Cyanide [h]		27	27	27	10,000 [d]	NS	40
Lead	7439-92-1	400	400	1,000	3,900	63[f]	450
Manganese	7439-96-5	2,000[f]	2,000[f]	10,000 [d]	10,000 [d]	1600[f]	2,000[f]
Total Mercury		0.81[j]	0.81[j]	2.8[j]	5.7[j]	0.18[f]	0.73
Nickel	7440-02-0	140	310	310	10,000 [d]	30	130
Selenium	7782-49-2	36	180	1,500	6,800	3.9[f]	4[f]
Silver	7440-22-4	36	180	1,500	6,800	2	8.3
Zinc	7440-66-6	2200	10,000 [d]	10,000 [d]	10,000 [d]	109[f]	2,480
PCBs/Pesticides							
2,4,5-TP Acid (Silvex)	93-72-1	58	100[a]	500[b]	1,000[c]	NS	3.8
4,4'-DDE	72-55-9	1.8	8.9	62	120	0.0033 [e]	17
4,4'-DDT	50-29-3	1.7	7.9	47	94	0.0033 [e]	136
4,4'- DDD	72-54-8	2.6	13	92	180	0.0033 [e]	14
Aldrin	309-00-2	0.019	0.097	0.68	1.4	0.14	0.19
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8	0.04[g]	0.02
beta-BHC	319-85-7	0.072	0.36	3	14	0.6	0.09
Chlordane (alpha)	5103-71-9	0.91	4.2	24	47	1.3	2.9

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
delta-BHC	319-86-8	100[a]	100[a]	500[b]	1,000[c]	0.04[g]	0.25
Dibenzofuran	132-64-9	14	59	350	1,000[c]	NS	210
Dieldrin	60-57-1	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	959-98-8	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan II	33213-65-9	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan sulfate	1031-07-8	4.8[i]	24[i]	200[i]	920[i]	NS	1,000[c]
Endrin	72-20-8	2.2	11	89	410	0.014	0.06
Heptachlor	76-44-8	0.42	2.1	15	29	0.14	0.38
Lindane	58-89-9	0.28	1.3	9.2	23	6	0.1
Polychlorinated biphenyls	1336-36-3	1	1	1	25	1	3.2
Semivolatiles							
Acenaphthene	83-32-9	100[a]	100[a]	500[b]	1,000[c]	20	98
Acenapthylene	208-96-8	100[a]	100[a]	500[b]	1,000[c]	NS	107
Anthracene	120-12-7	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benz(a)anthracene	56-55-3	1[f]	1[f]	5.6	11	NS	1[f]
Benzo(a)pyrene	50-32-8	1[f]	1[f]	1[f]	1.1	2.6	22
Benzo(b)fluoranthene	205-99-2	1[f]	1[f]	5.6	11	NS	1.7
Benzo(g,h,i)perylene	191-24-2	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benzo(k)fluoranthene	207-08-9	1	3.9	56	110	NS	1.7
Chrysene	218-01-9	1[f]	3.9	56	110	NS	1[f]
Dibenz(a,h)anthracene	53-70-3	0.33[e]	0.33[e]	0.56	1.1	NS	1,000[c]
Fluoranthene	206-44-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Fluorene	86-73-7	100[a]	100[a]	500[b]	1,000[c]	30	386
Indeno(1,2,3-cd)pyrene	193-39-5	0.5[f]	0.5[f]	5.6	11	NS	8.2
m-Cresol	108-39-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
Naphthalene	91-20-3	100[a]	100[a]	500[b]	1,000[c]	NS	12

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
o-Cresol	95-48-7	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
p-Cresol	106-44-5	34	100[a]	500[b]	1,000[c]	NS	0.33[e]
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55	0.8[e]	0.8[e]
Phenanthrene	85-01-8	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Phenol	108-95-2	100[a]	100[a]	500[b]	1,000[c]	30	0.33[e]
Pyrene	129-00-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Volatiles							
1,1,1-Trichloroethane	71-55-6	100[a]	100[a]	500[b]	1,000[c]	NS	0.68
1,1-Dichloroethane	75-34-3	19	26	240	480	NS	0.27
1,1-Dichloroethene	75-35-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33
1,2-Dichlorobenzene	95-50-1	100[a]	100[a]	500[b]	1,000[c]	NS	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60	10	0.02[f]
cis-1,2-Dichloroethene	156-59-2	59	100[a]	500[b]	1,000[c]	NS	0.25
trans-1,2-Dichloroethene	156-60-5	100[a]	100[a]	500[b]	1,000[c]	NS	0.19
1,3-Dichlorobenzene	541-73-1	17	49	280	560	NS	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250	20	1.8
1,4-Dioxane	123-91-1	9.8	13	130	250	0.1[e]	0.1[e]
Acetone	67-64-1	100[a]	100[b]	500[b]	1,000[c]	2.2	0.05
Benzene	71-43-2	2.9	4.8	44	89	70	0.06
Butylbenzene	104-51-8	100[a]	100[a]	500[b]	1,000[c]	NS	12
Carbon tetrachloride	56-23-5	1.4	2.4	22	44	NS	0.76
Chlorobenzene	108-90-7	100[a]	100[a]	500[b]	1,000[c]	40	1.1
Chloroform	67-66-3	10	49	350	700	12	0.37
Ethylbenzene	100-41-4	30	41	390	780	NS	1
Hexachlorobenzene	118-74-1	0.33[e]	1.2	6	12	NS	3.2
Methyl ethyl ketone	78-93-3	100[a]	100[a]	500[b]	1,000[c]	100[a]	0.12

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
Methyl tert-butyl ether	1634-04-4	62	100[a]	500[b]	1,000[c]	NS	0.93
Methylene chloride	75-09-2	51	100[a]	500[b]	1,000[c]	12	0.05
n-Propylbenzene	103-65-1	100[a]	100[a]	500[b]	1,000[c]	NS	3.9
sec-Butylbenzene	135-98-8	100[a]	100[a]	500[b]	1,000[c]	NS	11
tert-Butylbenzene	98-06-6	100[a]	100[a]	500[b]	1,000[c]	NS	5.9
Tetrachloroethene	127-18-4	5.5	19	150	300	2	1.3
Toluene	108-88-3	100[a]	100[a]	500[b]	1,000[c]	36	0.7
Trichloroethene	79-01-6	10	21	200	400	2	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380	NS	3.6
1,3,5- Trimethylbenzene	108-67-8	47	52	190	380	NS	8.4
Vinyl chloride	75-01-4	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	1330-20-7	100[a]	100[a]	500[b]	1,000[c]	0.26	1.6

All soil cleanup objectives (SCOs) are in parts per million (ppm).
NS=Not specified. See Technical Support Document (TSD).

Footnotes

[a] The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

[b] The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

[c] The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

[d] The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

[e] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.

[f] For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for this use of the site.

[g] This SCO is derived from data on mixed isomers of BHC.

[h] The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

[i] This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.

[j] This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts). See TSD Table 5.6-1.

375-6.9 Development or modification of soil cleanup objectives.

(a) Applicability. This section identifies when and the procedures under which a contaminant-specific soil cleanup objective may be developed or modified.

(1) Soil cleanup objectives for contaminants not included in Tables 375-6.8(a) and (b) may be developed by the remedial party or required by the Department.

(2) Soil cleanup objectives for contaminants included in Tables 375-6.8(a) and (b), may be modified based on site-specific data if desired by the remedial party; as set forth in:

(i) subpart 375-3 for Tracks 3 or 4, as set forth in paragraphs 375-3.8(e)(3) or (4), respectively; or

(ii) subparts 375-2 and 375-4, as set forth in subparagraph 375-2.8(b)(1)(iii) and subparagraph 375-4.8(c)(1)(iii).

(3) Protection of ecological resources soil cleanup objectives were not developed for certain contaminants, which are identified in Table 375-6.8(b) as "NS". Where such contaminants:

(i) appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources soil cleanup objective for the contaminant for use in Track 1 and apply such soil cleanup objective where it is lower than the soil cleanup objective set forth in Table 375-6.8(a); or

(ii) are identified as impacting or threatening an ecological resource for a restricted use remedial program the Department may require a protection of ecological resources soil cleanup objective be developed.

(b) New soil cleanup objectives must:

(1) Be developed utilizing the same methodologies that were used by the Department to develop the respective soil cleanup objective, as provided in the Technical Support Document.

(2) Apply the following caps, as set forth in section 9.3 of the Technical Support Document, on any soil cleanup objective included in Tables 375-6.8(a) and (b), with the exception of metals, as set forth in paragraph (3) below, developed for:

(i) unrestricted use, residential use, restricted-residential use and the protection of ecological resources, a maximum value of 100 ppm;

(ii) commercial use, a maximum value of 500 ppm; and

(iii) industrial use and the protection of groundwater a maximum value of 1000 ppm, and

(3) Apply a cap for metals at a maximum value of 10,000 ppm.

(c) Development of unrestricted use soil cleanup objectives. The unrestricted use soil cleanup objective for a compound will be the lowest of the soil cleanup values, calculated as set forth in appendix E of the Technical Support Document, for the protection of groundwater, protection of ecological resources and protection of public health.

(d) Development of restricted use soil cleanup objectives. The protection of:

(1) Groundwater soil cleanup objective will be the values calculated for the protection of groundwater as set forth in appendix E of the Technical Support Document;

(2) Ecological resources soil cleanup objectives will be the values calculated for the protection of ecological resources as set forth in appendix E of the Technical Support Document; and

(3) Public health cleanup objective will be the values calculated for the protection of public health for the identified use of the site, as set forth in appendix E of the Technical Support Document.

(e) Modification of soil cleanup objectives. The contaminant-specific soil cleanup objectives set forth at Tables 675-6.8(a) and (b)[1] may be modified by site specific data as set forth in this subdivision.

[1] Original should read "Tables 375-6.8(a) and (b)"

(1) Contaminant-specific soil cleanup objectives modified in accordance with this subdivision may be utilized by the remedial party for a site remedial program undertaken pursuant to:

(i) subpart 375-3 in Tracks 3 or 4, as set forth in paragraphs 375-3.8(e)(3) or (4), respectively; or

(ii) subparts 375-2 and 375-4, as set forth in subparagraph 375-2.8(b)(1)(ii) and subparagraph 375-4.8(c)(1)(ii).

(2) For the calculation of a protection of groundwater or ecological resources contaminant -specific soil cleanup objective, the site-specific percentage of total organic carbon in the soil at the site may be substituted in the algorithms provided in appendix E of the Technical Support Document.

(3) For the calculation of a protection of public health contaminant-specific soil cleanup objective, site-specific data may be used to modify two of the five exposure pathways, as follows:

(i) for the particulate inhalation pathway six parameters rely on site-specific data; and

(ii) for the volatile inhalation pathway, four parameters rely on site-specific data.

(4) The algorithms to be used for each protection of public health pathway and details on the parameters which can be substituted are included in appendix E of the Technical Support Document.

(f) Use of soil cleanup objectives developed or modified. Once approved by the Department, contaminant-specific soil cleanup objectives developed or modified as set forth in this section may be utilized by the Department at other sites consistent with paragraphs (1) and (2) below.

(1) Contaminant-specific soil cleanup objectives developed for contaminants not included in Tables 375-6.8(a) and (b), as set forth in subdivision 375-6.9(b) above, will be used as guidance and shall be considered by the Department for inclusion in the Tables in this subpart during any subsequent reevaluation of the soil cleanup objectives, as set forth by ECL 27-1415.

(2) Contaminant-specific soil cleanup objectives modified for site specific parameters, as set forth in subdivision 375-6.9(e) above, may be utilized at sites manifesting similar parameters, if approved by the Department.

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

HEALTH & SAFETY PLAN

Tetra Tech
Site Health and Safety Plan
Project Name: Cooper Crouse-Hinds Landfill
Syracuse, NY
Project # 117-2202046

Prepared for:
Cooper Industries
600 Travis, Suite 5600
Houston, TX 77210

Prepared by:

Tetra Tech
175 N. Corporate Drive, #100
Brookfield, WI 53045

September, 2013
Updated October 29, 2014

TT PROJECT NO. 117-2202046
DATE 09-25-2013

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1.0 INTRODUCTION

A. GENERAL INFORMATION

Site:	North & South Crouse-Hinds Landfills	Project No.	117-2202046
Location/Address:	7th North Street at Wolf Street, Syracuse, NY		
Plan Prepared By:	Daniel Morgan	Date:	10-29-2014
Hazard Assessment Certification:*		Date:	
* This certifies that Tetra Tech has assessed the type, risk level and severity of hazards for this project and has selected appropriate personal protective equipment for site personnel in accordance with OSHA Standard 29CFR1910.132.			
Reviewed by:	Michael Noel	Date:	10-29-2014
Proposed Dates of Work:	10-21-2013 through 12-21-2015		
Owner/Operator Maintains a Site Health and Safety Plan: Yes ___ No X (If yes, attach)			

B. PERSONNEL/RESPONSIBILITIES

Key Personnel		Title/Responsibilities		Signature
Mike Noel		Project Manager		
Dan Morgan		Project Engineer		
Drew Lent* **		Site Manager/ H&S Officer		

* Designated Site Safety Coordinator
** Designated Site Supervisor

C. PROJECT TASKS/ACTIVITIES

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2.0 SITE AND HAZARD CHARACTERISTICS

A. FACILITY DESCRIPTION

(Attach map/sketch; include topography and prevailing winds):

Former landfill located north and south of 7th North Street adjacent to Cooper plant in Syracuse NY. Both landfills are adjacent to Ley Creek, standing water often present North Landfill is 21.5 acres in size, the South Landfill is 19.4 acres in size.

B. SITE ACCESS AND SECURITY

Both landfills are fenced with locked, gated access and signs posted. Gravel driveways at the gates give way to two-track trails from former vehicle traffic. CC-H Security personnel monitor activities at both landfills.

C. UNUSUAL FEATURES

(accessibility, power lines, terrain, etc.):

Care must be taken with vehicles due to water and flooding. Wetlands, drainage swales, ditches, and creeks may cause vehicles to become stuck. Power lines and railroad tracks are evident along the landfill boundaries.

D. STATUS

(active, inactive, unknown):. Both landfills have been inactive for at least 20 years.

E. SUSPECTED NATURE OF CONTAMINATION

(Sources, impacted areas, migration, dispersion pathways)

Source of contamination is predominantly solid wastes (South Landfill) and foundry sand (North Landfill), primarily in top 10 feet. Metals, PCBs, petroleum residues, and spent solvents are present. All solids and liquids should be assumed to be contaminated. Wetlands Sediments are contaminated with PCBs.

F. DESCRIPTION OF ADJOINING PROPERTIES AND SURROUNDING AREA

The landfills are surrounded by other landfills, industrial sites, Ley Creek and CSX Railroad.

G. WASTE CHARACTERISTICS

Hazard Form(s):	Liquid	__X_	Solid	_X_	Sludge	__X_	Gas	__X_
Characteristic(s):	Corrosive	__X_	Ignitable	__X_	Radioactive	_____		
	Volatile	_X_	Toxic	_X_	Reactive	_X_	Other	_____

H. SITE HAZARD INFORMATION

Physical and Safety Hazards:

Heat in summer X Cold in winter X Noise X Vehicles X

Heavy Lifting _____ Slippery/Wet Surfaces X

Buried/Overhead Utilities X Motors/Belts/Pulleys _____

Heavy/Large Equipment X Elevated Surfaces _____

Hot Surfaces _____ Electrical Equipment _____

Power Tools ____ Poisonous Insects/Plants/Animals X

Other Hazards (Specify): Dust

Major Chemical Hazards:

(**NOTE**: Attach material safety data sheets for chemicals brought onto the site)

COMPOUND/DESCRIPTION*		EXPOSURE LIMIT/IDLH**		EXPOSURE ROUTE(S)***		HEALTH EFFECTS
Cutting Oil		See MSDS		Inh, Ing, Abs, Con		See MSDS
PCBs		See MSDS		Inh, Ing, Abs, Con		See MSDS
Ethylbenzene		See MSDS		Inh, Ing, Abs, Con		See MSDS
Methylene Chloride		See MSDS		Inh, Ing, Abs, Con		See MSDS

* Provide physical state and appearance
** Provide OSHA PEL and/or ACGIH TLV. Indicate Immediately Dangerous to Life and Health Concentration (IDLH)
*** Inh = Inhalation; Ing = Ingestion; Abs = Skin absorption; Con = Skin and/or Eye contact
Note: ppm = parts per million; mg/M3 = milligrams per cubic meter

3.0 SITE SAFETY AND HEALTH CHARACTERIZATION

TASK/ACTIVITY

Soil Excavation and Hauling

Soil Sampling

A. HAZARD/RISK EVALUATION

(Note: Standard operating procedures are included as an attachment to this plan)

Task Hazards (List)	Risks From Hazards	Control Methods
Contact with soils and water	Contamination	Gloves and PPE
Rig/Equipment Noise	Hearing Loss	Hearing Protection PPE
Moving Machinery	Entanglement	Safe Distance
Contaminant Vapors	Inhalation	PID Monitoring - Evacuation
Wet Surfaces	Slips and Falls	Verify Stable Work Surface
Dust	Inhalation	Spray water and PPE

B. PERSONAL PROTECTION

(Indicate Initial and Upgrade)

Level of Protection for Task: A _____ B _____ C _____ D initial

(NO UPGRADE INTENDED)

Specific Protective Equipment Types and Materials:

NOTE: *A Respiratory Hazard Assessment (Form RP-2) must be completed for all tasks which may require use of a respirator including disposable dust masks. Attach the completed Form RP-2 to this HASP for documentation of the assessment.*

Respirator: Respirators will not be required. PID will be used to monitor work area, and work area will be vacated until gasses disperse.

Protective Clothing: Long pants and long sleeved shirts.

Hand and Foot Protection: Gloves and steel toe boots

Eye and Head Protection: Safety glasses and hard hats

Hearing Protection: Ear plugs or ear muffs if equipment noise is excessive.

Other: Wear gloves to protect against any contact with soil or water on site.

C. AREA/PERSONNEL MONITORING REQUIREMENTS

Vapors/Gases:

Instruments: PID for monitoring vapors in work area. Dust meter for monitoring work area

Monitoring Location and Frequency: Full time while working on site

Calibration Procedures: Daily using isobutylene for PID

Action Levels for Upgrades: No upgrades – work will stop until vapor concentrations are below Action Levels.

Aerosols/Dusts: No upgrades – Work is being performed in wet soil area. Any dust will be controlled with spraying using on site water.

Flammable Atmospheres/Other (Specify): N/A – No flammable substances present – work is outside any buildings.

4.0 GENERAL SITE REQUIREMENTS

A. FIT TESTING REQUIREMENTS

Not applicable to this site – respirators will not be used.

B. MEDICAL MONITORING REQUIREMENTS

All personnel (including visitors) entering the landfills must have completed appropriate medical monitoring required under OSHA 29 CFR 1910.120(f). Documentation of medical monitoring is the responsibility of each employer.

C. ADDITIONAL MEDICAL MONITORING REQUIRED

(specific to site): NONE.

D. TRAINING REQUIREMENTS

All personnel (including visitors) entering the landfills must have completed training for hazardous waste site work in accordance with OSHA 29 CFR 1910.120, or be qualified by previous training or experience.

E. SPECIAL PROCEDURES OR TASKS

(Attach Appropriate Safe Work Practices)

Confined Space Entry ___ Excavation _X_ Hot Work ___ Electrical Work

NOTE: Excavations are in unpredictable, saturated soils and waste.

HUMAN ENTRY INTO ANY EXCAVATION IS PROHIBITED.

F. SITE RESOURCES

(Location and type)

Water Supply: None on site, available at nearby CC-H plant

Telephone: None on site, use cell phones, landline available at nearby CC-H plant

Bathroom: None on site, use nearby CC-H plant, excavation contractor may provide portable toilet during excavation

Electricity: None on site

Fire Extinguisher: None on site, if contractor does not have on rig/equipment, purchase locally or obtain from CC-H plant

First Aid Supplies: None on site, bring with field equipment

Other:_____

5.0 CONTAMINATION CONTROL

A. WORK ZONE DATA

(Attach map or figures of exclusion zone and decontamination area)

Zone of contamination/exclusion zone: At North landfill, areas for excavations are shown on drawings.

Decontamination zone/area: Equipment decon will take place at location of excavation work. Vehicle/Trailer tire decon will take at decon pads located at site access gate.

B. DECONTAMINATION EQUIPMENT & SUPPLIES

Excavation contractor to furnish drums for spent decon materials and PPE. TSP or Alconox plus potable water from CC-H plant to be used to decon sampling equipment. All vehicle/trailer tires checked before leaving site and spray washed if needed at access gate decon pad.

C. DECONTAMINATION PROCEDURES

(Attach additional procedures, information, if necessary)

Personnel: Dispose of gloves as needed. Remove mud and soils from boots before leaving site.

Equipment: Use decon pad to clean equipment.

Vehicles: Spray wash tires at decon pad at property access gate

D. WASTE DISPOSAL PROCEDURES

Fluids: Transport drums to CC-H plant for liquid disposal through CC-H WWTP.

Solids: Remove trash drum to CC-H plant for disposal in dumpster. Soils and mud to remain on site.

6.0 EMERGENCY RESPONSE PLAN

A. LOCAL RESOURCES

(Names & Phone Numbers)

Ambulance: Call 911

Hospital Emergency Room: St. Joseph's Hospital 315-448-5111

Hospital address is 301 Prospect Avenue, Syracuse, NY 13203, 2.5 miles from the site.

Poison Control Center: Upstate NY – Syracuse 315-464-7078

Police: 911

Fire Department: 911

National Response Center: 1-800-424-8802

State Contact: NYSDEC Spill Hotline 1-800-457-7362

Other:

B. PERSONNEL/ROLES

Designated First Aid/CPR On-Site Provider: Assign on site daily

Designated Emergency Coordinator: The on-site Health & Safety (H&S) Officer has primary responsibility for responding to and correcting emergency situations. All responses will be coordinated with the CC-H facility representative. The individual contractor organizations are responsible for assisting the on-site H&S Officer in his/her mission within the parameters of their scope of work.

C. EMERGENCY CONTACTS/PHONE NUMBERS

1. Project Manager Mike Noel 1-262-792-1282 (office) 1-262-853-4983 (cell)
2. Corporate Health and Safety Michelle Gillie 1-610-337-7660
3. Contractor(s) To be determined
4. _____
5. _____

D. EMERGENCY ROUTES

(give road or other directions; attach map with route highlighted)

Hospital: See attached map

1. Leave site by access gates only, wet conditions do not permit alternates
2. _____
3. _____
4. _____
5. _____

Evacuation Routes/Safe Locations: Review at daily safety meeting on site as evacuation route will depend on work location.

E. SITE COMMUNICATIONS

Emergency Signal (horns, alarms, vocal, etc.): Assign at on-site safety meeting.

Pre-Emergency: A pre-work meeting will be held to discuss the content of this plan, specific site requirements, and responsibilities.

Daily Tail-Gate: Each working day a tail-gate meeting will be held at the start of the work day to review any health and safety questions, to discuss the upcoming day's work, and highlight any particular hazards for that day's work. Immediately after the tail-gate meeting,

the work area for the day will be policed by the crew with all obstacles (protruding steel rebar, concrete chunks, metal debris, tree stumps, etc.) that might endanger workers or equipment being flagged, painted, or staked to provide a warning. A daily log form of the meeting and work area walk will be completed by the on-site Health & Safety Officer.

F. REPORTING PROCEDURES

1. Alert on-site personnel of emergency and response procedures. Move to safe area via evacuation route.
2. Arrange for appropriate emergency response services (fire department, ambulance, police, etc.)
3. Call office and notify of Project Manager of incident and planned response.
4. Contact the offices of any on-site subcontractors if their personnel or equipment are involved in the emergency.

G. EMERGENCY RESPONSE PROCEDURES

Fire: Stop work, shut off equipment, and evacuate to safe distance upwind of fire (company vehicle should be kept at a reasonable distance from work area to prevent endangerment from fire). Contact fire department, notify CC-H site contact, then Tetra Tech office. Keep at a safe distance until emergency services arrive. *Do Not Attempt To Fight Fires Beyond Incipient Fires!! Do Not Attempt to Approach Fires With the Potential for Release of Hazardous Combustion Products!!*

Injury/Illness: Perform first aid, following appropriate blood borne pathogens precautions. Call emergency medical services if injury is serious. Do not unnecessarily move if broken bones are suspected, unless life is endangered. If person is safe to move (minor cuts, burns, etc.), transport the person to designated hospital. If serious, arrange for rescue squad/ambulance

For incidents that are not life-threatening (e.g., muscle strains and sprains and minor lacerations) and if authorized by Corporate Health & Safety (not mandatory), the affected

employee may contact WorkCare Incident Intervention for guidance on first aid and medical treatment. WorkCare may direct the affected employee to a Chartis (workers compensation insurer)-authorized clinic for further evaluation of a work-related injury or illness. **The authorized doctor offices or clinics have agreed to accept workers compensation patients without an appointment.** Information for the clinic nearest to the Site is provided below:

Industrial Medical Associates
961 Canal Street
Syracuse, NY 13210
Tel: 315-478-1977

Over-exposure: Remove employee (only if there is no danger to rescue) from exposure source to a safe location. For skin contact, remove affected clothing and flush the area with water. For inhalation, remove to fresh air. Provide artificial respiration, if necessary. Contact rescue squad/ambulance as necessary. Do not continue work until the source of contamination is found, identified, and controlled. Contact the office for technical assistance.

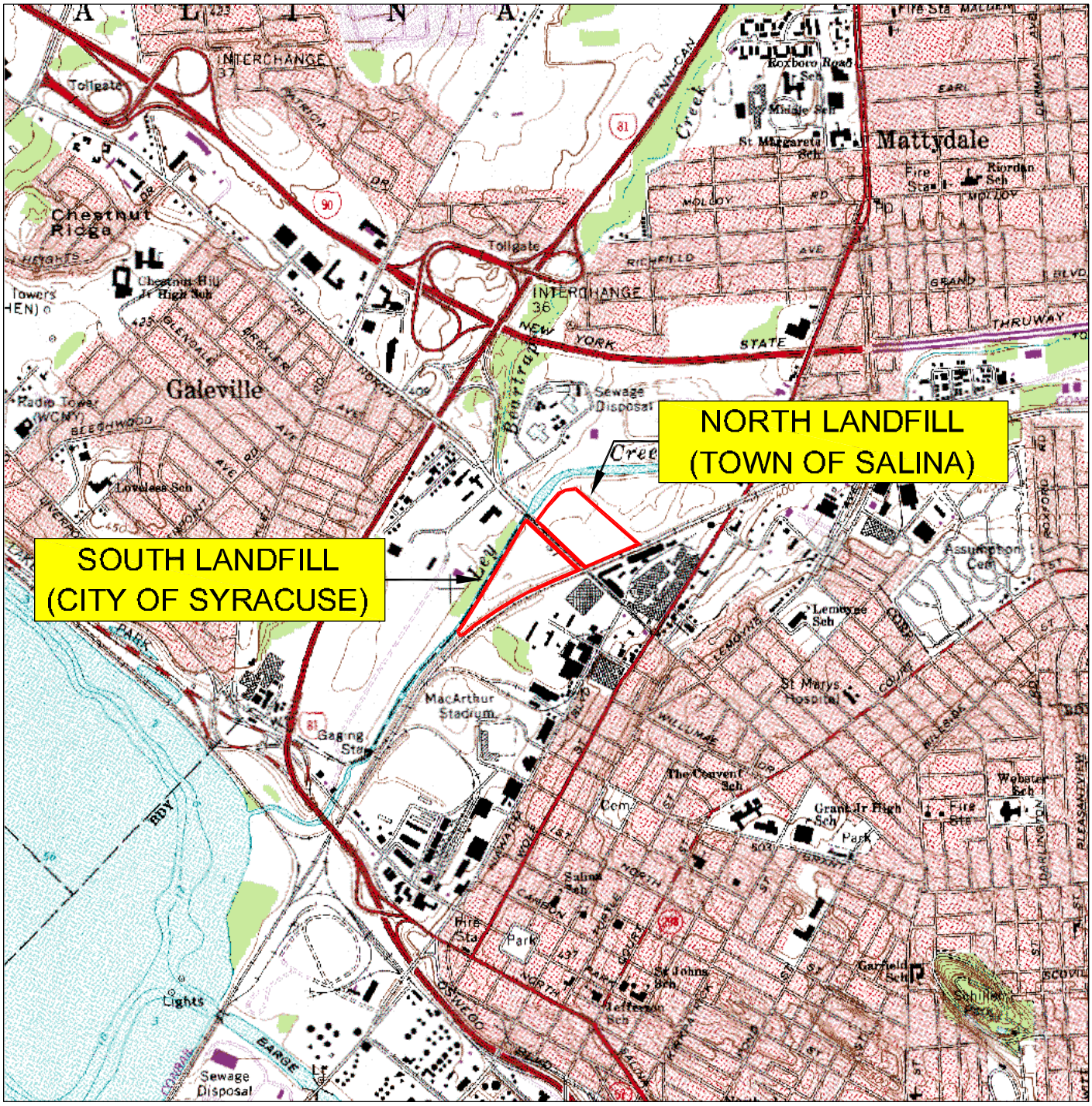
Hazardous Materials

Accident: Stop equipment and work and relocate to a safe distance. To the extent possible, determine nature of incident (utility, gas, pipe, etc.). Contact office for instructions. Do not attempt equipment backout from utility strike without guidance of utility company.

NOTE: All emergency situations must be reported to the office and require a follow-up accident or near-miss investigation report.

HASP ATTACHMENTS

HASP FIGURES

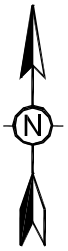


National Geodetic Vertical Datum of 1929
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QUADRANGLE LOCATION



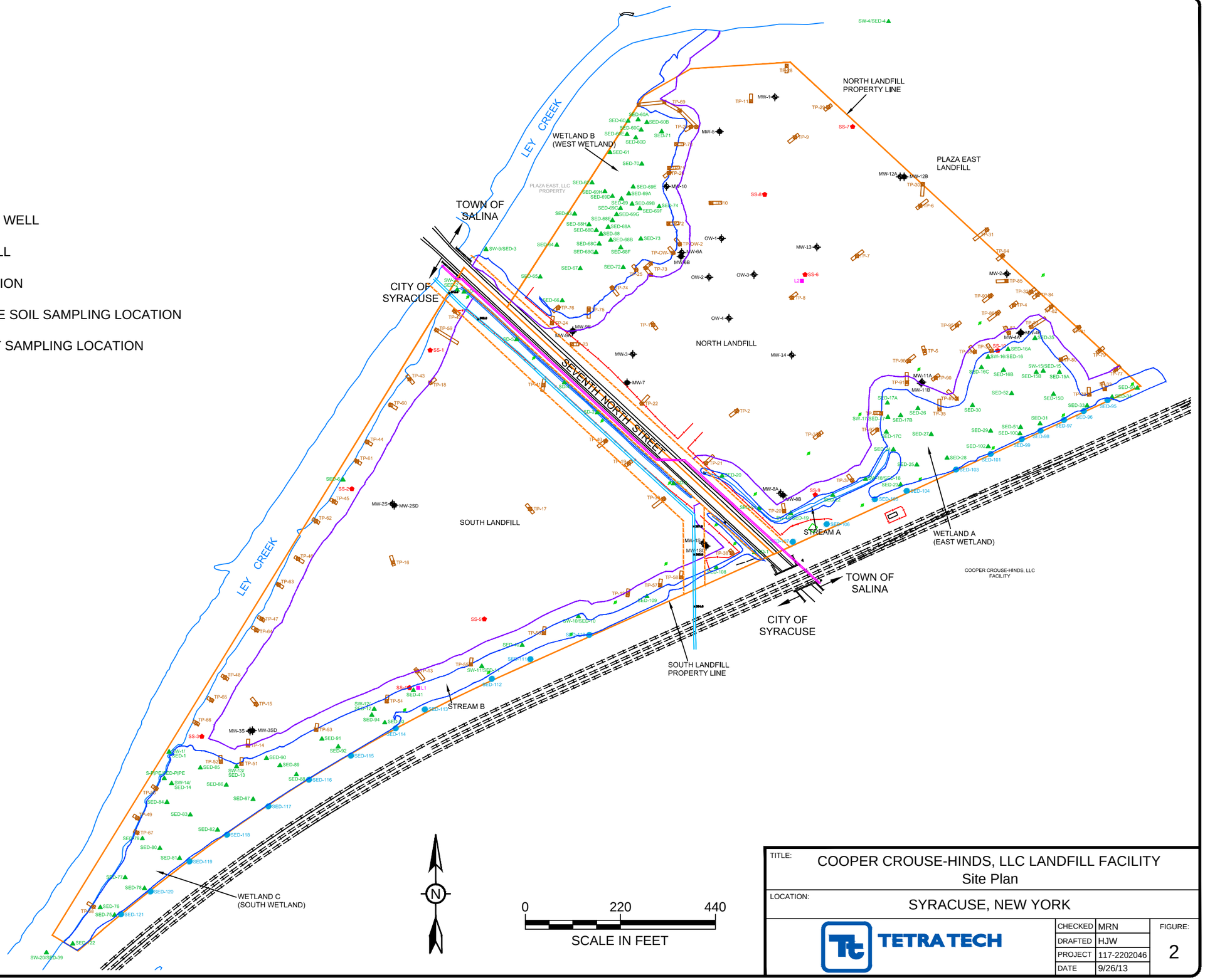
Base map from U.S.G.S. 7.5' SYRACUSE WEST, NEW YORK topographic quadrangle map.

COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SYRACUSE, NEW YORK	DATE: 8/1/12 DESIGNED: HJW CHECKED: MRN APPROVED: MRN DRAWN: HJW PROJ.: 117-2202046
Site Location Map	
TETRA TECH	Figure 1

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG1 - SITE LOCATION MAP.DWG

EXPLANATION

- MW-3S — SHALLOW AQUIFER MONITORING WELL
- MW-3SD — DEEP AQUIFER MONITORING WELL
- SS-1 — SURFACE SOIL SAMPLING LOCATION
- SED-95 — SURFACE SOIL AND SUBSURFACE SOIL SAMPLING LOCATION
- SW-1/SED-1 — SURFACE WATER AND SEDIMENT SAMPLING LOCATION
- SED-27 — SEDIMENT SAMPLING LOCATION
- TP-48 — TEST PIT LOCATION
- L1 — LEACHATE SAMPLING LOCATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- GAS MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE



TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
Site Plan

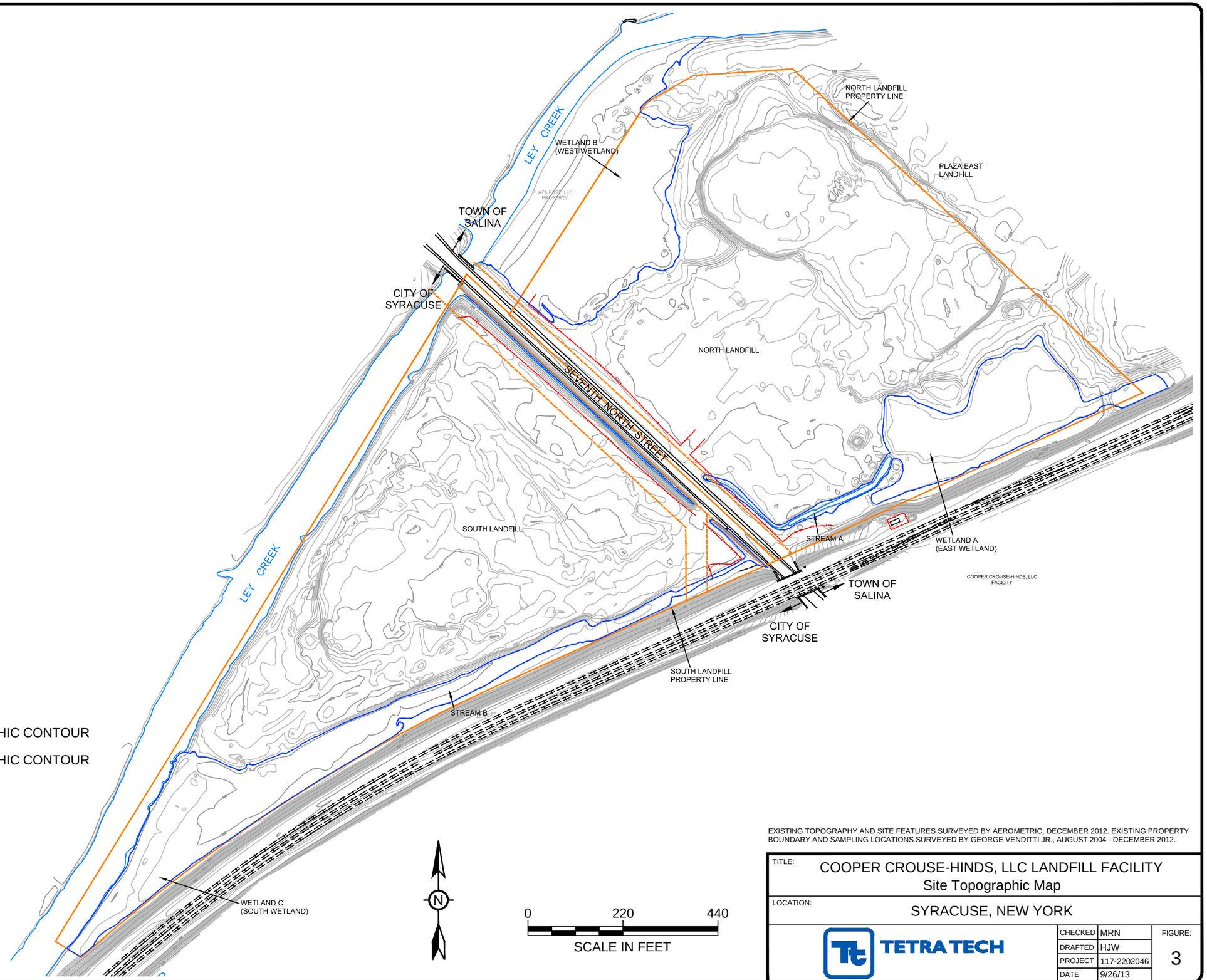
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	9/26/13

FIGURE: 2

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG2 - SITE PLAN.DWG



EXPLANATION

- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- WETLAND BOUNDARY
- 5-FOOT INTERVAL TOPOGRAPHIC CONTOUR
- 1-FOOT INTERVAL TOPOGRAPHIC CONTOUR

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SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
Site Topographic Map

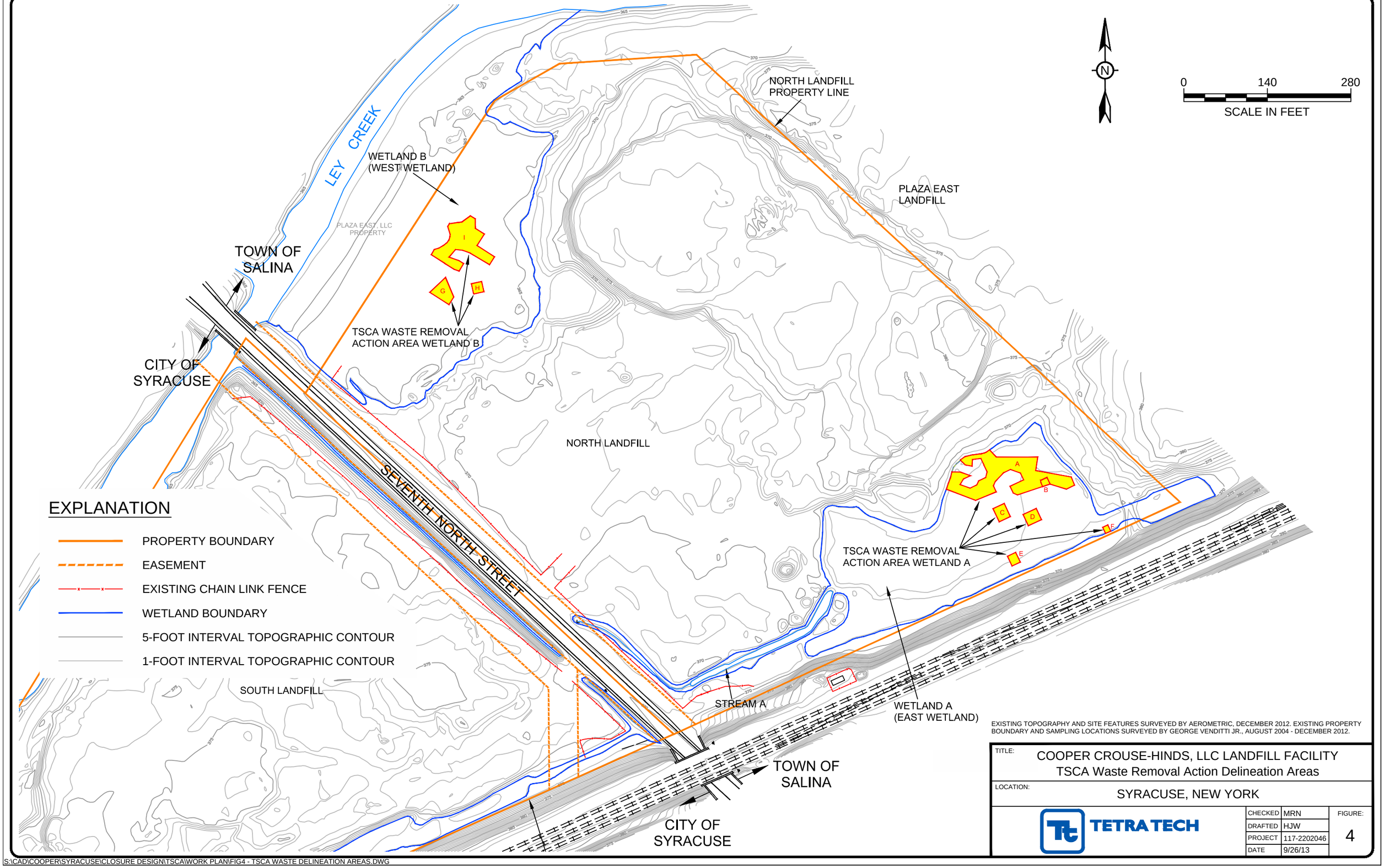
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

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PROJECT	117-2202046
DATE	9/26/13

FIGURE: 3

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG3 - SITE TOPOGRAPHIC MAP.DWG



EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
TSCA Waste Removal Action Delineation Areas

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	9/26/13

FIGURE: 4

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG4 - TSCA WASTE DELINEATION AREAS.DWG

EXPLANATION

- EXCAVATED SOILS TO BE TRANSPORTED OFF-SITE (PCB CONCENTRATIONS EXCEED 50 mg/Kg)
- NOVEMBER 2012 HOT SPOT EXCAVATION
- SED-41 — SEDIMENT SAMPLING LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- WA-33 — ADDITIONAL SAMPLING LOCATION
- 28 — ORIGINAL SAMPLE CONCENTRATION
- 16 — ADDITIONAL SAMPLE CONCENTRATION

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

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SCALE IN FEET

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
Wetland A TSCA Waste Removal Action Location

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

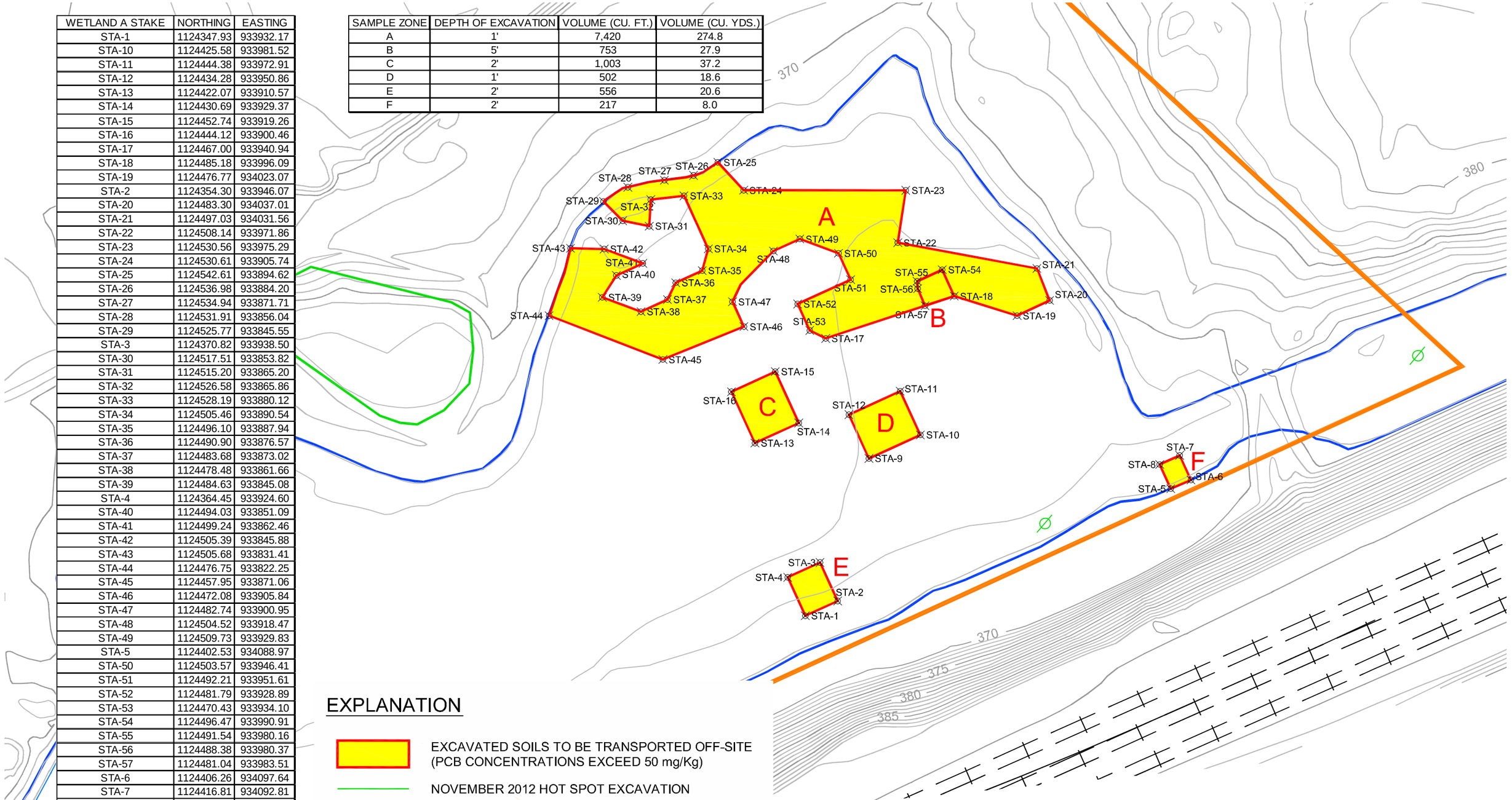
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PROJECT	117-2202046
DATE	9/26/13

FIGURE: 5

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG5 - WETLAND A TSCA WASTE LOCATION.DWG

WETLAND A STAKE	NORTHING	EASTING
STA-1	1124347.93	933932.17
STA-10	1124425.58	933981.52
STA-11	1124444.38	933972.91
STA-12	1124434.28	933950.86
STA-13	1124422.07	933910.57
STA-14	1124430.69	933929.37
STA-15	1124452.74	933919.26
STA-16	1124444.12	933900.46
STA-17	1124467.00	933940.94
STA-18	1124485.18	933996.09
STA-19	1124476.77	934023.07
STA-2	1124354.30	933946.07
STA-20	1124483.30	934037.01
STA-21	1124497.03	934031.56
STA-22	1124508.14	933971.86
STA-23	1124530.56	933975.29
STA-24	1124530.61	933905.74
STA-25	1124542.61	933894.62
STA-26	1124536.98	933884.20
STA-27	1124534.94	933871.71
STA-28	1124531.91	933856.04
STA-29	1124525.77	933845.55
STA-3	1124370.82	933938.50
STA-30	1124517.51	933853.82
STA-31	1124515.20	933865.20
STA-32	1124526.58	933865.86
STA-33	1124528.19	933880.12
STA-34	1124505.46	933890.54
STA-35	1124496.10	933887.94
STA-36	1124490.90	933876.57
STA-37	1124483.68	933873.02
STA-38	1124478.48	933861.66
STA-39	1124484.63	933845.08
STA-4	1124364.45	933924.60
STA-40	1124494.03	933851.09
STA-41	1124499.24	933862.46
STA-42	1124505.39	933845.88
STA-43	1124505.68	933831.41
STA-44	1124476.75	933822.25
STA-45	1124457.95	933871.06
STA-46	1124472.08	933905.84
STA-47	1124482.74	933900.95
STA-48	1124504.52	933918.47
STA-49	1124509.73	933929.83
STA-5	1124402.53	934088.97
STA-50	1124503.57	933946.41
STA-51	1124492.21	933951.61
STA-52	1124481.79	933928.89
STA-53	1124470.43	933934.10
STA-54	1124496.47	933990.91
STA-55	1124491.54	933980.16
STA-56	1124488.38	933980.37
STA-57	1124481.04	933983.51
STA-6	1124406.26	934097.64
STA-7	1124416.81	934092.81
STA-8	1124412.88	934084.23
STA-9	1124415.48	933959.48

SAMPLE ZONE	DEPTH OF EXCAVATION	VOLUME (CU. FT.)	VOLUME (CU. YDS.)
A	1'	7,420	274.8
B	5'	753	27.9
C	2'	1,003	37.2
D	1'	502	18.6
E	2'	556	20.6
F	2'	217	8.0



EXPLANATION

- EXCAVATED SOILS TO BE TRANSPORTED OFF-SITE (PCB CONCENTRATIONS EXCEED 50 mg/Kg)
- NOVEMBER 2012 HOT SPOT EXCAVATION
- WETLAND BOUNDARY
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- STA-1 TSCA WASTE SURVEY STAKE

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SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
Wetland A TSCA Waste Survey Stake Locations

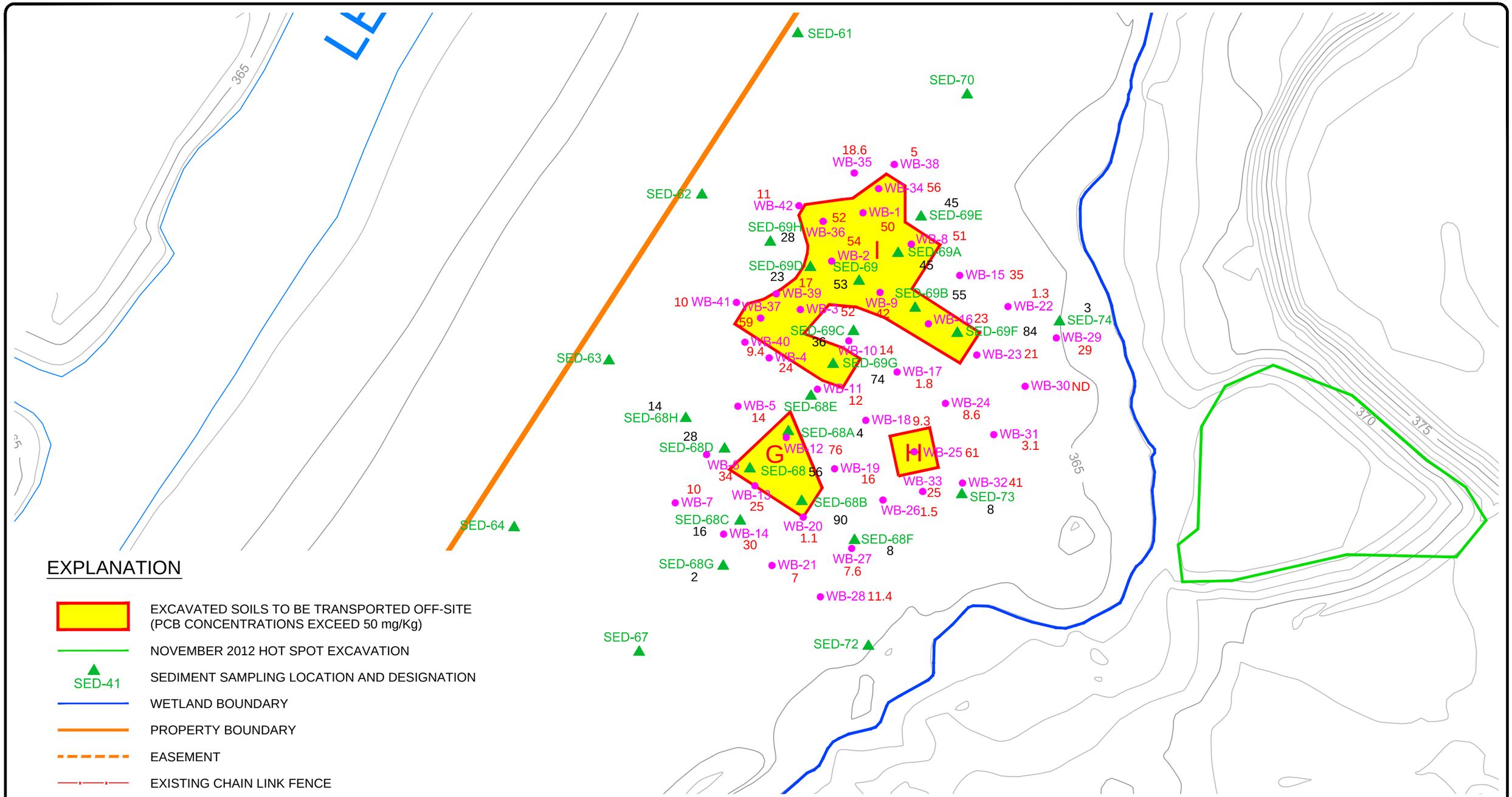
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

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PROJECT	117-2202046
DATE	9/26/13

FIGURE: 5A

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG5A - WETLAND A TSCA SURVEY STAKES.DWG



EXPLANATION

- EXCAVATED SOILS TO BE TRANSPORTED OFF-SITE (PCB CONCENTRATIONS EXCEED 50 mg/Kg)
- NOVEMBER 2012 HOT SPOT EXCAVATION
- SED-41 — SEDIMENT SAMPLING LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- WB-33 — ADDITIONAL SAMPLING LOCATION
- 28 — ORIGINAL SAMPLE CONCENTRATION
- 16 — ADDITIONAL SAMPLE CONCENTRATION

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SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
Wetland B TSCA Waste Removal Action Location

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

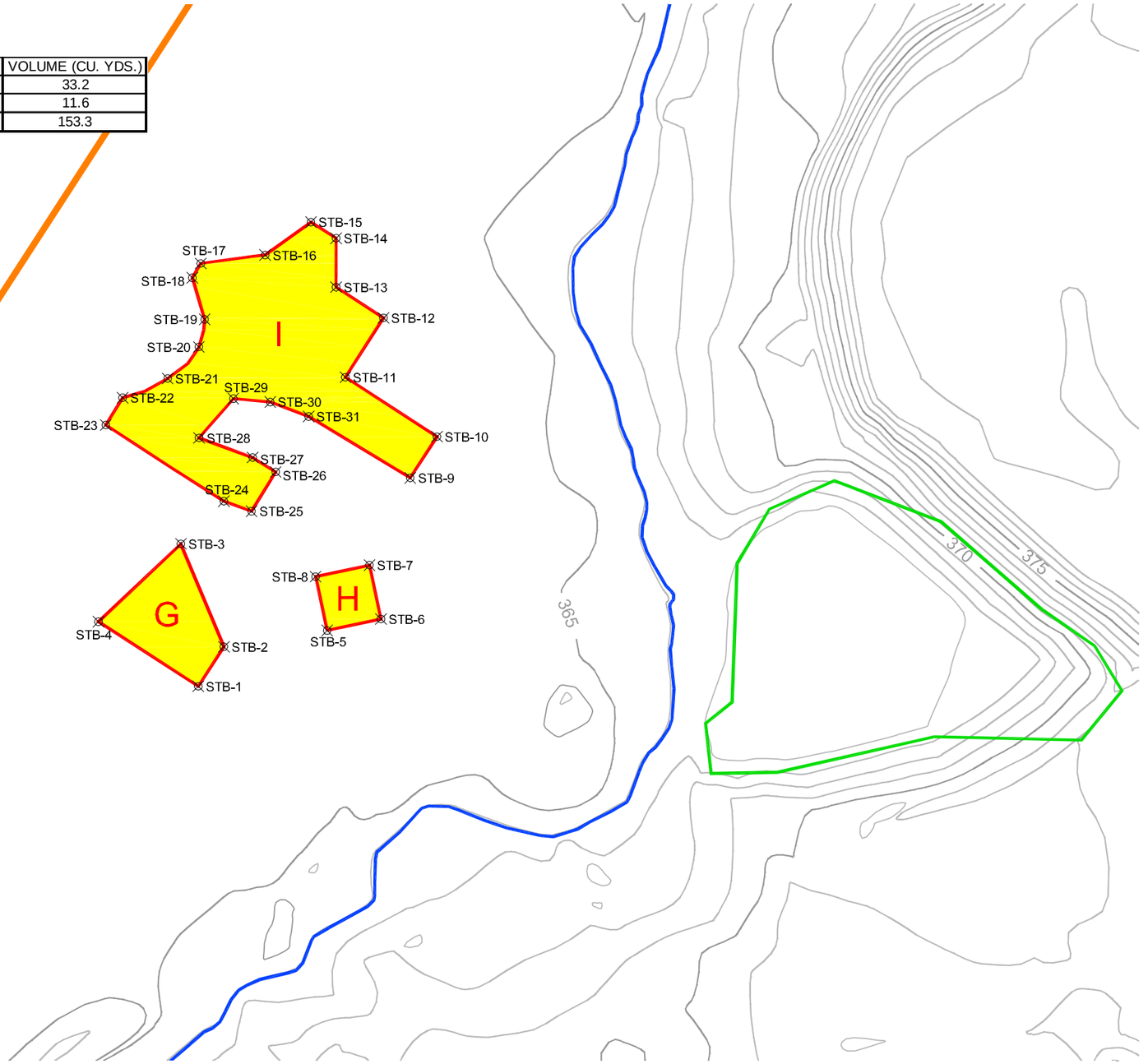
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PROJECT	117-2202046
DATE	9/26/13

FIGURE: 6

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG6 - WETLAND B TSCA WASTE LOCATION.DWG

WETLAND B STAKE	NORTHING	EASTING
STB-1	1124786	932988.37
STB-10	1124866.14	933064.98
STB-11	1124885.21	933035.58
STB-12	1124904.27	933047.82
STB-13	1124914.13	933032.61
STB-14	1124929.84	933032.61
STB-15	1124935	933024.53
STB-16	1124924.45	933009.84
STB-17	1124921.75	932989.18
STB-18	1124917.14	932986.48
STB-19	1124903.79	932990.41
STB-2	1124798.69	932996.58
STB-20	1124894.93	932988.56
STB-21	1124884.82	932978.55
STB-22	1124878.63	932964.09
STB-23	1124869.89	932958.68
STB-24	1124845.42	932996.59
STB-25	1124842.21	933005.48
STB-26	1124854.8	933013.20
STB-27	1124859.45	933005.83
STB-28	1124865.72	932988.62
STB-29	1124878.34	932999.64
STB-3	1124831.71	932982.79
STB-30	1124877.25	933011.47
STB-31	1124872.62	933023.79
STB-4	1124806.72	932956.35
STB-5	1124803.9	933029.74
STB-6	1124807.61	933047.02
STB-7	1124824.89	933043.32
STB-8	1124821.19	933026.03
STB-9	1124852.89	933056.42

SAMPLE ZONE	DEPTH OF EXCAVATION	VOLUME (CU. FT.)	VOLUME (CU. YDS.)
G	1'	897	33.2
H	1'	313	11.6
I	1'	4,139	153.3



EXPLANATION

- EXCAVATED SOILS TO BE TRANSPORTED OFF-SITE (PCB CONCENTRATIONS EXCEED 50 mg/Kg)
- NOVEMBER 2012 HOT SPOT EXCAVATION
- WETLAND BOUNDARY
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- STB-1 TSCA WASTE SURVEY STAKE

N

0 40 80

SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
Wetland B TSCA Waste Survey Stake Locations

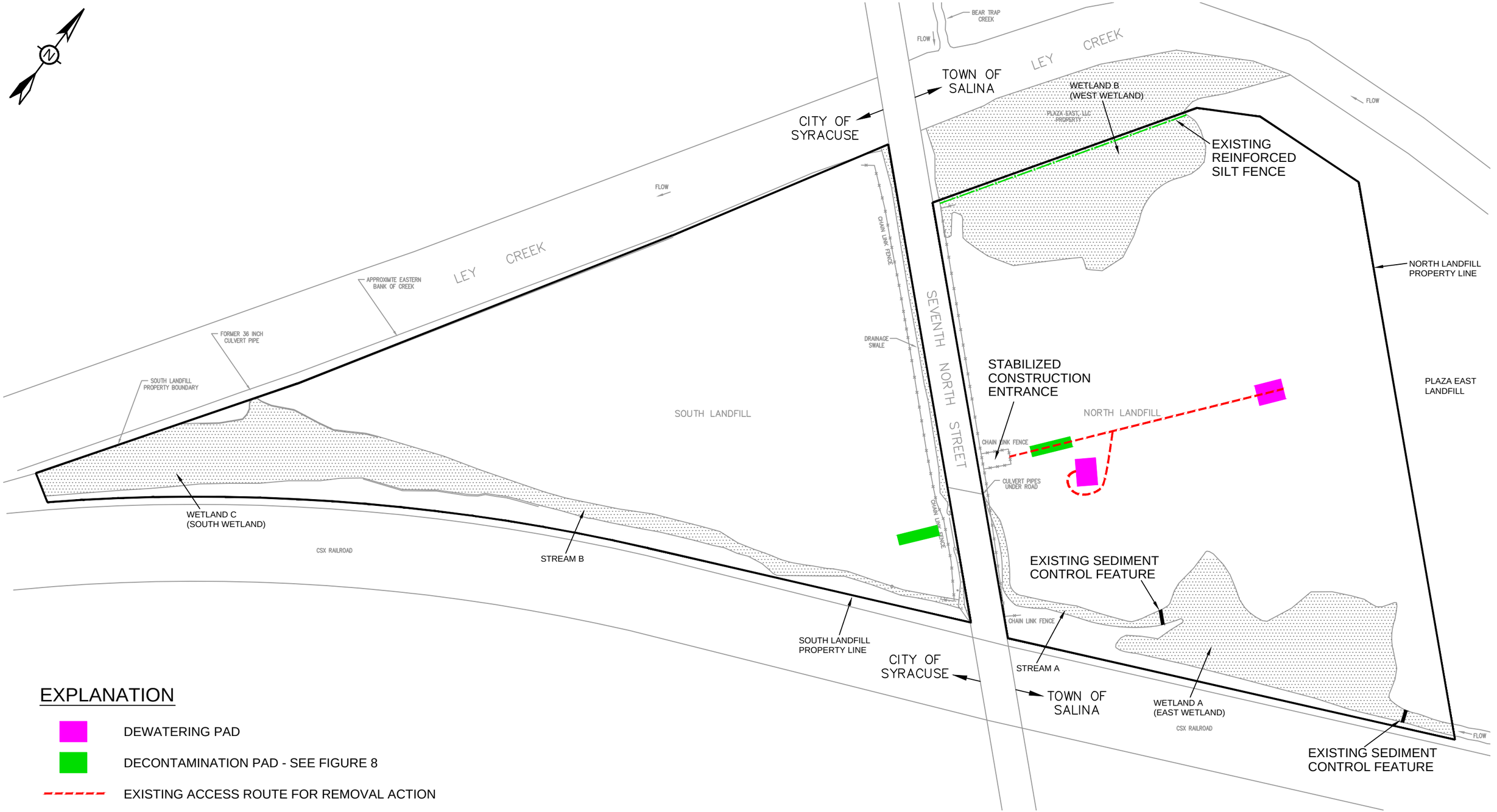
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	9/26/13

FIGURE: 6A

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG6A - WETLAND B TSCA SURVEY STAKES.DWG



EXPLANATION

- DEWATERING PAD
- DECONTAMINATION PAD - SEE FIGURE 8
- EXISTING ACCESS ROUTE FOR REMOVAL ACTION

0 180 360

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
Removal Action Decon and Dewatering Pad Locations

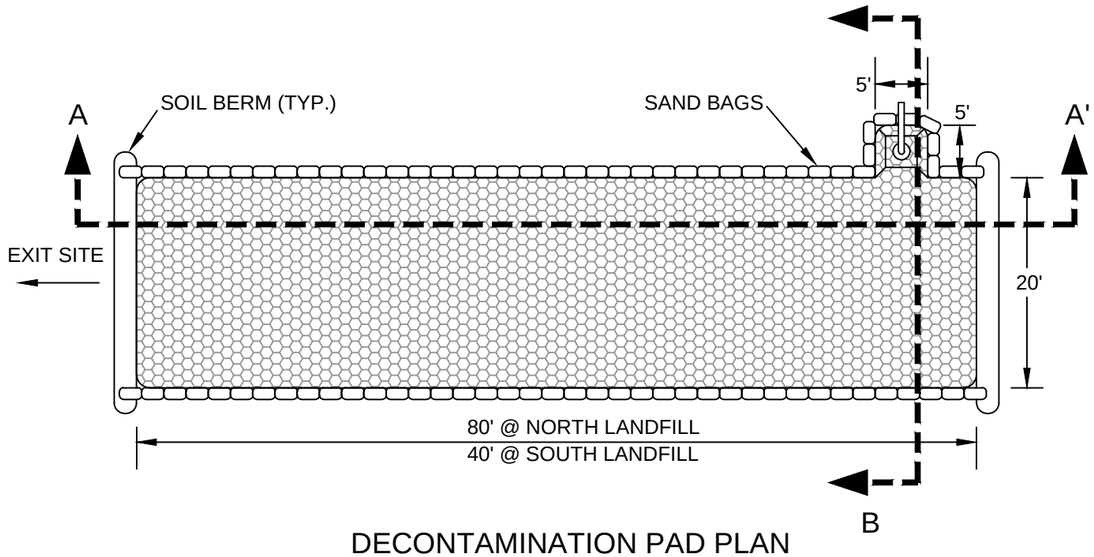
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

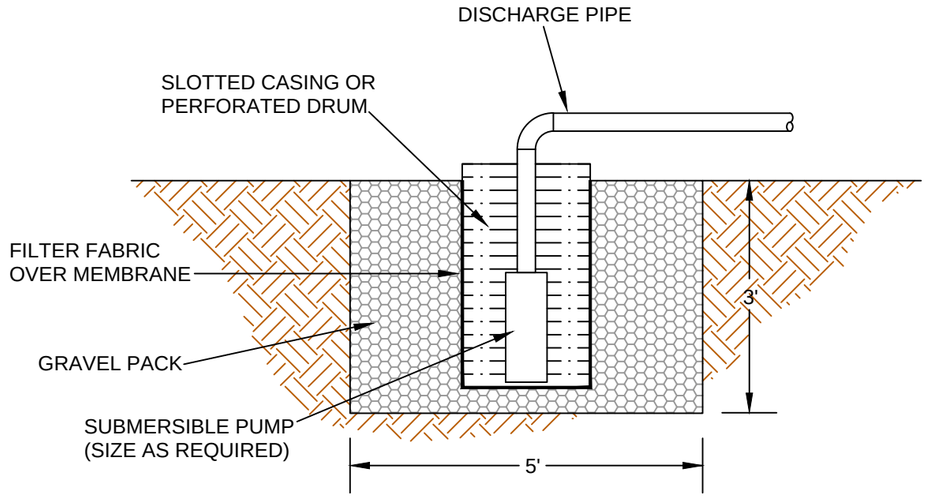
CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	9/25/12

FIGURE: 7

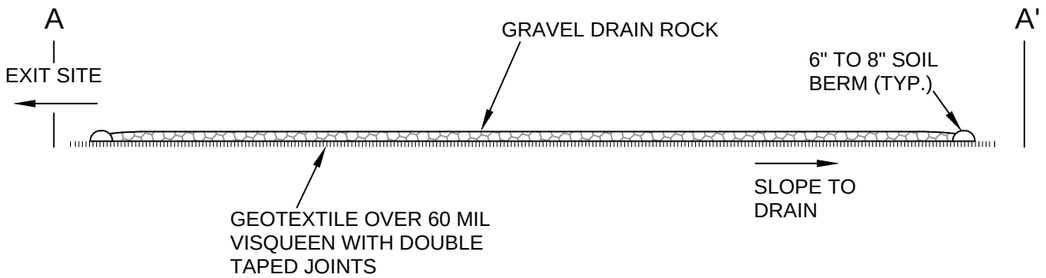
S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG7 - DECON PAD LOCATIONS.DWG



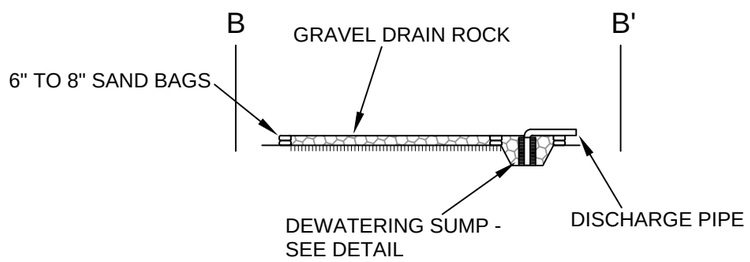
DECONTAMINATION PAD PLAN



DECONTAMINATION PAD SUMP DETAIL



DECONTAMINATION PAD PROFILE



DECONTAMINATION PAD SUMP SECTION

NOTES:

1. GRAVEL TO BE SLIGHTLY CROWNED TO ENCOURAGE SURFACE WATER RUN-OFF.
2. DECONTAMINATION PAD GRAVEL - 100% PASSING 4" SIEVE, 5% PASSING 2" SIEVE, 1% PASSING NO.4 SIEVE.
3. LOCATE SUMP AT PAD LOWEST ELEVATION.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
Decontamination Pad Detail (as-built)

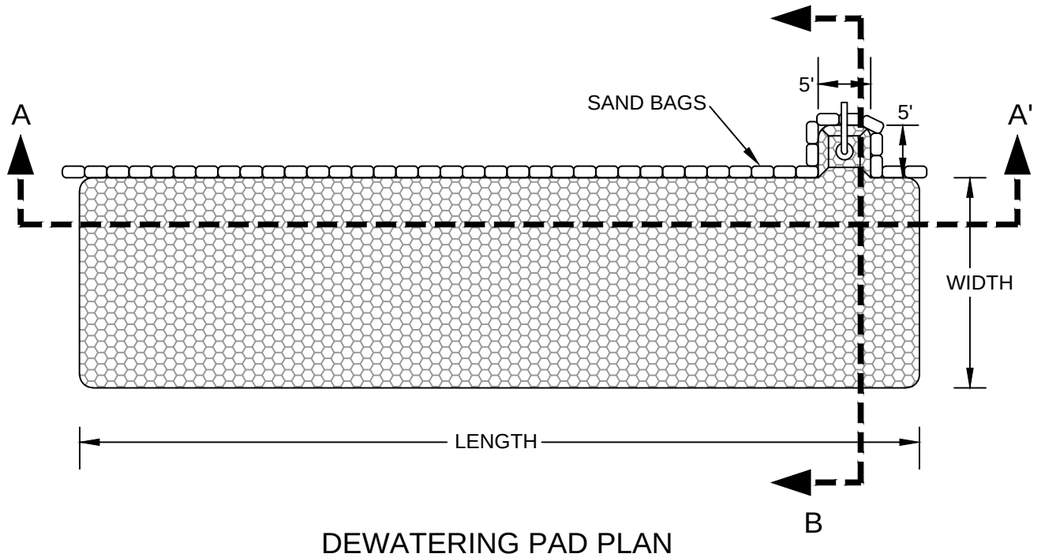
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

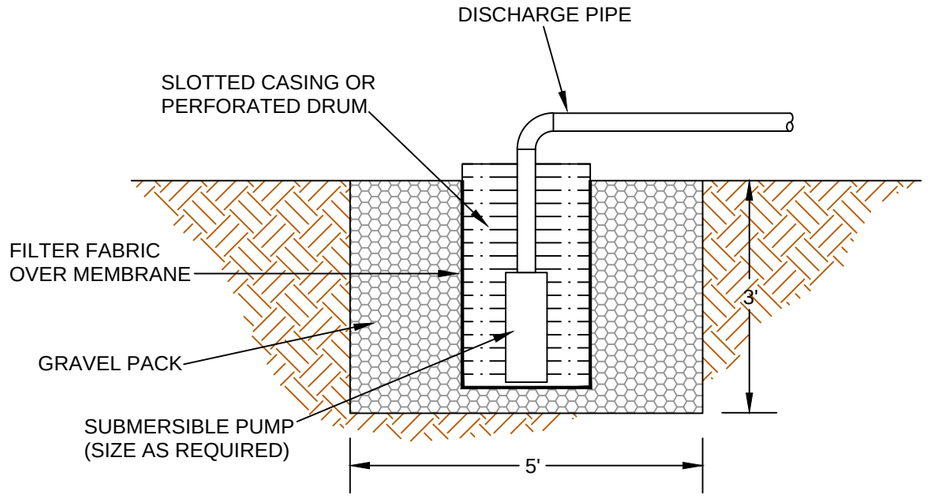
CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	9/25/13

FIGURE: 8

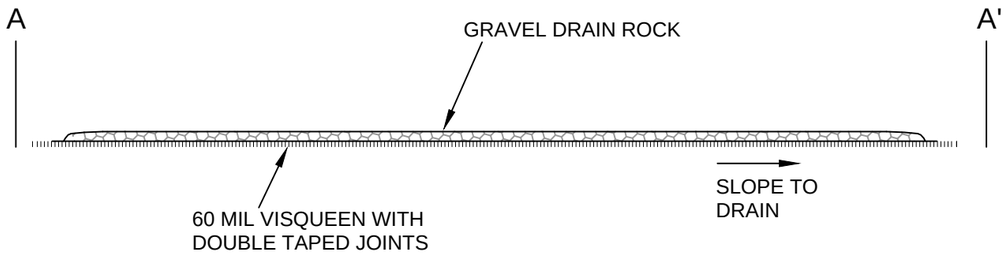
S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG8 - DECON PAD DETAILS.DWG



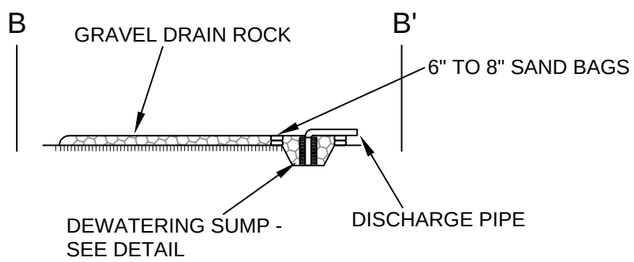
DEWATERING PAD PLAN



DEWATERING PAD SUMP DETAIL



DEWATERING PAD PROFILE



DEWATERING PAD SUMP SECTION

NOTES:

1. GRAVEL TO BE SLIGHTLY CROWNED TO ENCOURAGE SURFACE WATER RUN-OFF.
2. DECONTAMINATION PAD GRAVEL - 100% PASSING 4" SIEVE, 5% PASSING 2" SIEVE, 1% PASSING NO.4 SIEVE.
3. LOCATE SUMP AT PAD LOWEST ELEVATION.
4. USE SANDBAGS IF NECESSARY TO DIRECT FLOW.
5. ADJUST LENGTH AND WIDTH TO SUIT EXCAVATION SIZE AND EQUIPMENT REACH.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
Dewatering Pad Detail (as-built)

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	9/25/13

FIGURE: 9

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG9 - DEWATERING PAD DETAILS.DWG

bing Maps

A **101 7th North St, Liverpool, NY 13088**

Via: US-11 / Wolf St

B **301 Prospect Ave, Syracuse, NY 13203**

Route: **2.9 mi, 9 min**

My Notes

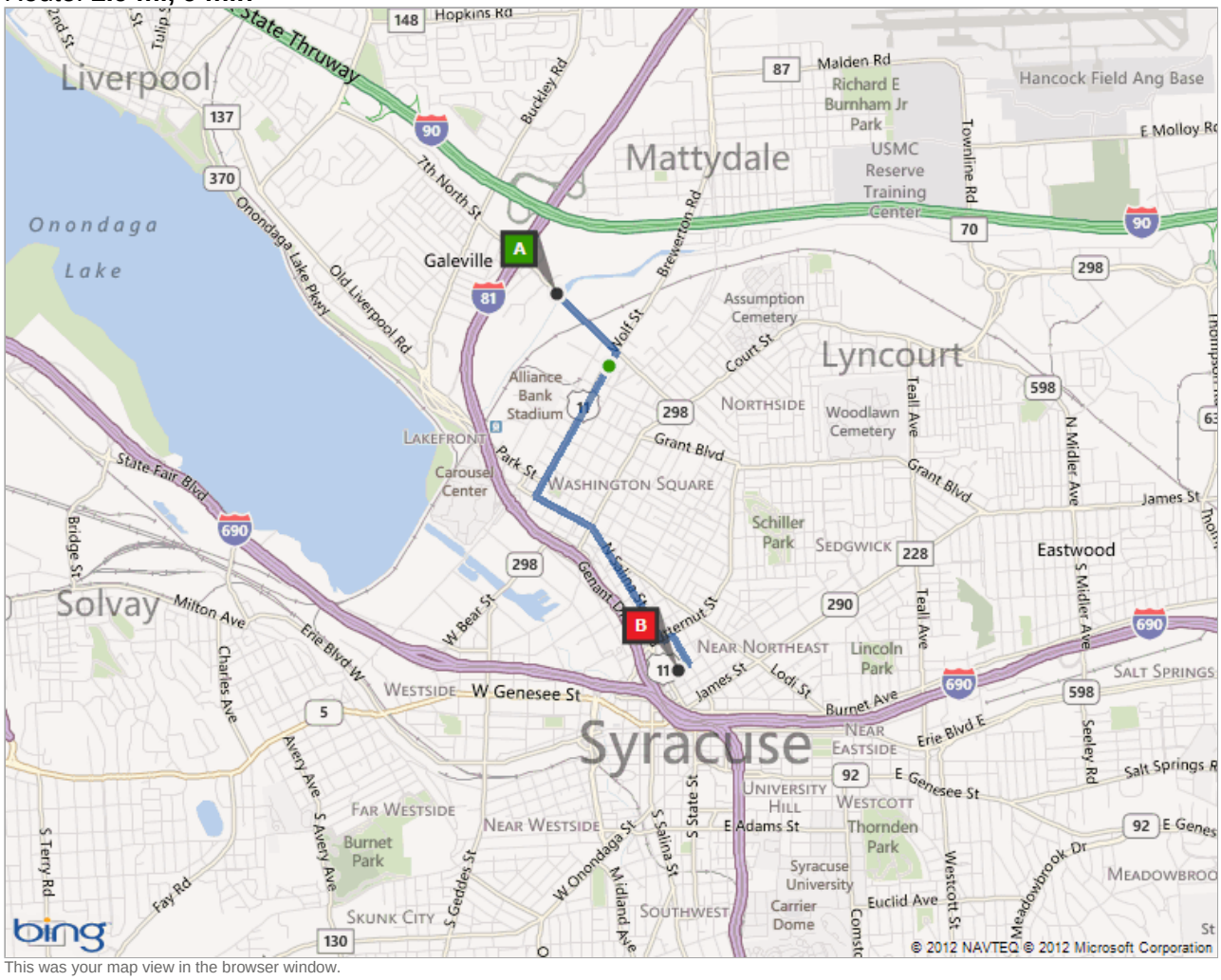
On the go? Use **m.bing.com** to find maps, directions, businesses, and more

A	**101 7th North St, Liverpool, NY 13088**	**A–B: 2.9 mi** 9 min
	1. Depart **7th North St / CR-45** toward Hiawatha Blvd E	0.5 mi
	2. Turn **right** onto **US-11 / Wolf St**	0.9 mi
	3. Turn **left** to stay on **US-11 / N Salina St**	0.4 mi
	4. Keep **right** to stay on **US-11 / N Salina St**	0.7 mi
	5. Keep **left** onto **Prospect Ave**	515 ft
	6. Turn **left** onto **Butternut St**	358 ft
	7. Turn **right** onto **N Townsend St**	0.2 mi
	8. Turn **right** onto **Union Ave**	371 ft
B	9. Arrive at **301 Prospect Ave, Syracuse, NY 13203** *The last intersection is N Townsend St*	

These directions are subject to the Microsoft®: Service Agreement and for informational purposes only. No guarantee is made regarding their completeness or accuracy. Construction projects, traffic, or other events may cause actual conditions to differ from these results. Map and traffic data © 2010 NAVTEQ™.

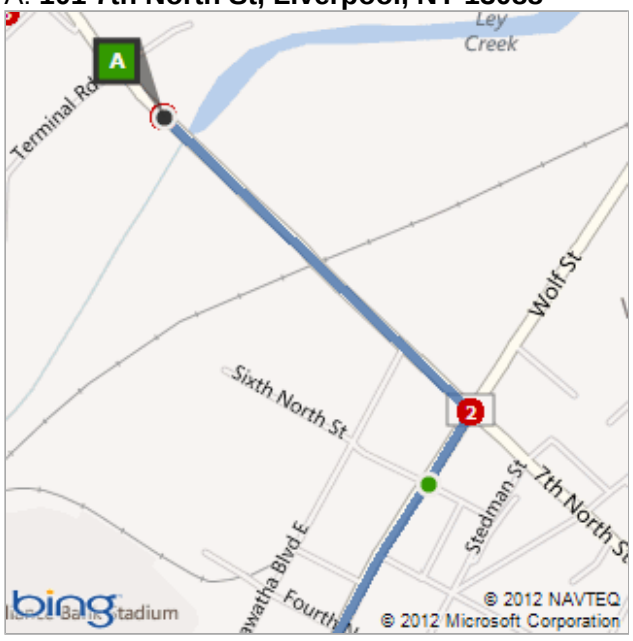
ROUTE TO HOSPITAL

Route: **2.9 mi, 9 min**



This was your map view in the browser window.

A: **101 7th North St, Liverpool, NY 13088**



B: **301 Prospect Ave, Syracuse, NY 13203**



ROUTE TO HOSPITAL

Notes

mapquest

Trip to:
961 Canal St
Syracuse, NY 13210-1203
5.42 miles / 7 minutes

	635 7th North St, Syracuse, NY 13208	**Download Free App**
1.	Start out going **northwest** on **7th North St / County Hwy-45** toward **Ley Creek Dr**. Map	**0.5 Mi** *0.5 Mi Total*
2.	Merge onto **I-81 S** toward **Syracuse**. Map *If you reach Douglas Ave you've gone a little too far*	**3.2 Mi** *3.7 Mi Total*
3.	Merge onto **I-690 E** toward **E Syracuse**. Map	**1.4 Mi** *5.1 Mi Total*
4.	Take the **Teall Ave** exit, **EXIT 14**. Map	**0.2 Mi** *5.3 Mi Total*
5.	Keep **right** at the fork in the ramp. Map	**0.03 Mi** *5.3 Mi Total*
6.	Turn **right** onto **Teall Ave**. Map *Flower City Glass is on the corner*	**0.02 Mi** *5.3 Mi Total*
7.	Take the 1st **right** onto **Canal St**. Map *If you reach Lynch St you've gone about 0.1 miles too far*	**0.1 Mi** *5.4 Mi Total*
8.	**961 CANAL ST** is on the **right**. Map *If you reach N Beech St you've gone about 0.2 miles too far*	
	961 Canal St, Syracuse, NY 13210-1203	

DIRECTIONS TO
Work Care Clinic -
Non Life Threatening Injuries

Total Travel Estimate: **5.42 miles - about 7 minutes**



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Directions to

WorkCare Clinic

Non-Life Threatening Injuries

HASP FORMS

	TETRA TECH, INC. HEALTH AND SAFETY PLAN COMPLIANCE AGREEMENT	Revision Date: 10/1/2008 Document Control Number: FORM HSP-4 Page 1 of 1

Project Name: _____

Project Number: _____

I have read and understand the health and safety plan indicated above and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the safety requirements specified in the plan.

Name	Signature	Employer	Date

	TETRA TECH, INC. DAILY SAFETY MEETING FORM	Revision Date: 10/1/2008 Document Control Number: FORM HST-2 Page 1 of 2

Project: _____ Project Number: _____ PM/SSC: _____

Date/Time: _____ Project No.: _____

Client: _____ Site Location: _____

Site Activities Planned for Today: _____

_____

Safety Topics Discussed
Protective clothing and equipment:
Chemical hazards:
Physical hazards:
Environmental and biohazards:
Equipment hazards:
Decontamination procedures:
Other:
Review of emergency procedures:

Employee Questions or Comments:

Attendees	
Printed Name	Signature

Meeting Conducted by:

_____ _____

Name Title

_____

Signature

	TETRA TECH, INC. DAILY SITE LOG	Revision Date: 10/1/2008 Document Control Number: FORM SSC-1 Page 1 of 1

Site Name: _____ Date: _____

Site Safety Coordinator:_____ Project Number:_____

Name (print)	Company	I have received site-specific training	Time	
			In	Out

Comments:

_____

_____

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HASP SWPS

To prevent injuries and adverse health effects, the following general safe work practices (SWP) are to be followed when conducting work involving known and unknown site hazards on hazardous waste sites. These SWPs establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations. This list is not inclusive and may be amended as necessary.

- Do not eat, drink, chew gum or tobacco, take medication, or smoke in contaminated or potentially contaminated areas or where the possibility for contact with site contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. If a source of potable water is not available at the work site that can be used for hands-washing, the use of waterless hand cleaning products will be used, followed by actual hand-washing as soon as practicable upon exiting the site. A thorough shower and wash must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on drums, equipment, or the ground. Do not place monitoring equipment on potentially contaminated surfaces.
- Remove beards or facial hair that interferes with a satisfactory qualitative respirator fit test or routine pre-entry positive and negative pressure checks.
- Be familiar with and knowledgeable of and adhere to all instructions in the site-specific health and safety plan (HASP). At a minimum, a safety meeting will be held at the start of each project to discuss the HASP. Additional meetings will be held, as necessary, to address new or continuing safety and health concerns.
- Be aware of the location of the nearest telephone and all emergency telephone numbers.
- Attend a briefing on the anticipated hazards, equipment requirements, SWPs, emergency procedures, and communication methods before going on site.
- Plan and delineate entrance, exit, and emergency escape routes.
- Rehearse unfamiliar operations prior to implementation.

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- Use the "buddy system" whenever respiratory protection equipment is in use. Buddies should establish hand signals or other means of emergency communication in case radios break down or are unavailable.
- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.
- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). Nonessential vehicles and equipment should remain within the support zone.
- Establish appropriate support, contamination reduction, and exclusion zones.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the site safety coordinator (SSC).
- Maintain a portion of the site field logbook as a project safety log. The project safety log will be used to record the names, entry and exit dates, and times on site of all Tetra Tech personnel, subcontractor personnel, and project site visitors; air quality and personal exposure monitoring data; and other information related to safety matters. Form SSC-1, Daily Site Log, may be used to record names of on-site personnel.
- A portable eyewash station should be located in the support zone if chemical splashes to eyes are possible.
- Do not bring matches and lighters in the exclusion zone or contamination reduction zone. Flames and open fires are not permitted on site.
- Observe coworkers for signs of toxic exposure and heat or cold stress.
- Inform coworkers of nonvisual effects of illness if you experience them, such as headaches, dizziness, nausea, or blurred vision.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech). Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

Revision Date	Document Authorizer	Revision Details
10/1/2008	Chris McClain	Update from 1998 format

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This document establishes safe work practices (SWP) to follow during drilling operations. These SWPs are based on suggested safety procedures provided in the National Drilling Association's "Drilling Safety Guide." Procedures to follow before, during, and after drilling are listed below.

Before beginning any drill operation, each employee must conform to the following requirements:

- Wear a hard hat, safety glasses or goggles, steel-toed work boots, a shirt and full-length pants when working with or near the drill rig. Shirts must be tucked in at the belt.
- Do not wear loose or frayed clothing, loose long hair, or loose jewelry while working with rotating equipment.
- Do not eat, drink, or smoke near the drill rig.
- Identify all underground utility and buried structure locations before drilling.
- Ensure that drill masts or other projecting devices will be farther than 25 feet in any direction from overhead power lines.
- Ensure that the drill rig and any other machinery used is inspected daily by competent, qualified individuals. The site safety coordinator (SSC) will ensure compliance with this precaution.
- Drill rig operators will be instructed to report any abnormalities, such as equipment failure, oozing liquids, and unusual odors, to their supervisors or the SSC.
- Establish hand-signal communications for use when verbal communication is difficult. One person per work team will be designated to give hand signals to equipment operators.

While the drill rig is operating, employees must:

- Wear appropriate respiratory and personal protective equipment (PPE) when conditions warrant their use.
- Avoid direct contact with known or suspected contaminated surfaces.
- Move tools, materials, cords, hoses, and debris to prevent tripping hazards and contact with moving drill rig parts.

- Adequately secure tools, materials, and equipment subject to displacement or falling.
- Store flammable materials away from ignition sources and in approved containers.
- Maintain adequate clearance of the drill rig and mast from overhead transmission lines. The minimum clearance is 25 feet unless special permission is granted by the utility company. Call the local utility company for proper clearance.
- Only qualified and licensed personnel should operate drill rigs.
- Workers should not assume that the drill rig operator is keeping track of the rig's exact location. Workers should never walk directly behind or beside heavy equipment without the operator's knowledge.
- Workers should maintain visual contact with drill rig operators at all times.
- When an operator must maneuver equipment in tight quarters, the presence of a second person is required to ensure adequate clearance. If much backing is required, two ground guides will be used: one in the direction the equipment is moving, and the other in the operator's normal field of vision to relay signals.
- Auger sections and other equipment are extremely heavy. All lifting precautions should be taken before moving heavy equipment. Appropriate equipment, such as chains, hoists, straps, and other equipment, should be used to safely transport heavy equipment too heavy to safely lift.
- Proper personal lifting techniques will be used. Workers should lift using their legs, not their backs.
- Workers will not use equipment they are not familiar with. This precaution applies to heavy as well as light equipment.
- All personnel not essential to work activities will be kept out of the work area.
- Workers will be aware of their footing at all times.
- Workers will remain alert at all times.

After drilling operations are completed, employees should do the following:

- Shut down machinery before repairing or lubricating parts (except parts that must be in motion for lubrication).
- Shut down mechanical equipment prior to and during fueling operations. When refueling or transferring fuel, containers and equipment must be bonded to prevent the buildup of static electricity.
- Keep drill rigs in the exclusion zone until work has been completed. Such equipment should then be decontaminated within the designated decontamination area.
- Engage parking brakes when equipment is not in use.
- Implement an ongoing maintenance program for all tools and equipment. All tools and moving equipment should be inspected regularly to ensure that parts are secured, are intact, and have no cracks or areas of weakness. The equipment must turn smoothly without wobbling and must operate in accordance with manufacturer specifications. Defective items should be promptly repaired or replaced. Maintenance and repair logs will be kept.
- Store tools in clean, secure areas to prevent damage, loss, or theft.

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

Revision Date	Document Authorizer	Revision Details
10/1/2008	Chris McClain	Update from 1998 format

Truck-mounted heavy equipment and field trucks are among the types of equipment that may be used during field work. Heavy equipment can present a substantial hazard to workers. General requirements for motor vehicles and material-handling equipment are provided in the Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926, Subpart O. The following precautions will be followed when heavy equipment (such as drill rigs, front-end loaders, and backhoes) is in use:

- Heavy equipment will be inspected by the operator before each work shift. The site safety coordinator (SSC) will ensure compliance with these precautions.
- Equipment operators will be instructed to report any abnormalities, such as equipment failure, oozing liquids, and unusual odors, to their supervisors or the SSC.
- Only qualified and licensed personnel will operate heavy equipment.
- Hard hats, steel-toed boots, and safety glasses or goggles will be worn at all times around heavy equipment. Other personal protective equipment (PPE) may be required as specified in the site health and safety plan (HASP); construction site health and safety plan (C-HASP); Job Hazard Analysis (JHA), Job Safety Analysis (JSA) or other site-specific health and safety documentation.
- Workers will not assume that the equipment operator is keeping track of the exact location of operating equipment. Workers will never walk directly behind or to the side of heavy equipment without the operator's knowledge.
- Workers in close proximity to heavy equipment will maintain visual contact with equipment operators at all times.
- When an operator must maneuver equipment in tight quarters, the presence of a second person will be required to ensure adequate clearance. If backing is required, two ground guides will be used: one in the direction the equipment is moving, and the other in the operator's normal field of vision to relay signals.
- All heavy equipment used at a contaminated work site will be kept in the exclusion

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zone until the work has been completed. Such equipment will then be decontaminated within the designated decontamination area.

- Hand-signal communications will be established when verbal communication is difficult. One person per work team will be designated to give hand signals to equipment operators.
- Equipment with an obstructed rear view must have an audible alarm that sounds when the equipment is moving in reverse (unless a spotter guides the operator).
- Parking brakes will be kept engaged when equipment is not in use.
- Blades, buckets, dump bodies, and other hydraulic systems will be kept fully lowered when equipment is not in use.
- Equipment cabs will be kept free of all nonessential and loose items.
- Seat belts must be present in all vehicles having a rollover protective structure (ROPS).
- With certain exceptions, all material-handling equipment must be equipped with ROPS.
- Material-handling equipment that lacks a ROPS will not be operated on a grade unless the grade can safely accommodate the equipment involved.
- Drilling auger sections and other equipment are extremely heavy. All precautions must be taken before moving heavy equipment. Appropriate equipment must be used to transport heavy equipment.
- Only chains, hoists, straps, and other equipment that safely aids transport of heavy materials will be used.
- Proper personal lifting techniques will be used. Workers will lift using their legs, not their backs.
- A safety barrier will be used to protect workers when tires are inflated, removed, or

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installed on split rims.

- An ongoing maintenance program for all tools and equipment must be in place. All tools and moving equipment will be inspected regularly to ensure that parts are secured, are intact, and have no cracks or areas of weakness. The equipment must turn smoothly without wobbling and must operate according to manufacturer specifications. Defective items will be promptly repaired or replaced. Maintenance and repair logs will be kept.
- Tools will be stored in clean, secure areas to prevent damage, loss, or theft.
- Workers will not use equipment with which they are not familiar. This precaution applies all equipment and tolls.
- Loose-fitting clothing and loose, long hair will be prohibited around moving machinery.
- Workers will make sure that no underground or overhead power lines, sewer lines, gas lines, or telephone lines present a hazard in the work area.
- All personnel who are not essential to work activities will be kept out of the work area.
- Workers will be aware of their footing at all times.
- Workers will remain alert at all times.

Revision Date	Document Authorizer	Revision Details
10/1/2008	Chris McClain	Update from 1998 format

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This safe work practice (SWP) describes situations where heat stress is likely to occur and provides procedures for the prevention and treatment of heat-related injuries and illnesses. Wearing personal protective equipment (PPE), especially during warm weather, puts employees at considerable risk of developing heat-related illness. Health effects from heat stress may range from transient heat fatigue or rashes to serious illness or death.

Many factors contribute to heat stress, including PPE, ambient temperature and humidity, workload, and the physical condition of the employee, as well as predisposing medical conditions. However, the primary factors are elevated ambient temperatures in combination with fluid loss. Because heat stress is one of the more common health concerns that may be encountered during field activities, employees must be familiar with the signs, symptoms, and various treatment methods of each form of heat stress. Heat stroke is the most serious heat-related illness—it is a threat to life and has a 20 percent mortality rate. Direct exposure to sun, poor air circulation, poor physical condition, and advanced age directly affect the tendency to heat stroke. Table 1 lists the most serious heat conditions, their causes, signs and symptoms, and treatment.

Training is an important component of heat stress prevention. Employees are instructed to recognize and treat heat-related illnesses during 8-hour health and safety refresher and first aid training courses. When working in hot environments, specific steps should be taken to lessen the chances of heat-related illnesses. These include the following:

- Ensuring that all employees drink plenty of fluids (Gatorade® or its equivalent)
- Ensuring that frequent breaks are scheduled so overheating does not occur
- Revising work schedules, when necessary, to take advantage of the cooler parts of the day (such as working from 5:00 a.m. to 11:00 a.m. and 6:00 p.m. to nightfall).

When PPE must be worn (especially Levels A and B), suggested guidelines relating to ambient temperature and maximum wearing time per excursion are as shown in Table 2.

TABLE 1
HEAT STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Heat cramps	Fluid loss and electrolyte imbalance from dehydration	• Painful muscle cramps, especially in legs and abdomen • Faintness • Profuse perspiration	• Move affected worker to cool location • Provide sips of liquid such as Gatorade® • Stretch cramped muscles • Transport affected worker to hospital if condition worsens
Heat Exhaustion	Blood transport to skin to dissipate excessive body heat, resulting in blood pooling in the skin with inadequate return to the heart	• Weak pulse • Rapid and shallow breathing • General weakness • Pale, clammy skin • Profuse perspiration • Dizziness • Unconsciousness	• Move affected worker to cool area • Remove as much clothing as possible • Provide sips of cool liquid or Gatorade® (only if conscious) • Fan the person but do not overcool or chill • Treat for shock • Transport to hospital if condition worsens
Heat Stroke	Life threatening condition from profound disturbance of body's heat-regulating mechanism	• Dry, hot, and flushed skin • Constricted pupils • Early loss of consciousness • Rapid pulse • Deep breathing at first, and then shallow breathing • Muscle twitching leading to convulsions • Body temperature reaching 105 or 106 °F or higher	• Immediately transport victim to medical facility • Move victim to cool area • Remove as much clothing as possible • Reduce body heat promptly by dousing with water or wrapping in wet cloth • Place ice packs under arms, around neck, at ankles, and wherever blood vessels are close to skin surface • Protect patient during convulsions

TABLE 2
SUGGESTED GUIDELINES WHEN WEARING PPE

Ambient Temperature	Maximum PPE Wearing Time per Excursion
Above 90 °F	15 minutes
85 to 90 °F	30 minutes
80 to 85 °F	60 minutes
70 to 80 °F	90 minutes
60 to 70 °F	120 minutes
50 to 60 °F	180 minutes

Source: National Institute for Occupational Safety and Health (NIOSH). 1985. Memorandum Regarding Recommended Personal Protective Equipment Wearing Times at Different Temperatures. From Austin Henschel. To Sheldon Rabinovitz. June 20.

To monitor the level of an employee's heat stress, the following should be measured:

- Heart Rate: Count the radial (wrist) pulse during a 30-second period as early as possible in the rest period; if heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

  If the heart rate still exceeds 110 beats per minute at the next period, shorten the following work cycle by one-third.

- Oral Temperature: Use a clinical thermometer (3 minutes under the tongue) to measure the oral temperature at the end of the work period. If oral temperature exceeds 99.6 °F (37.6 °C), shorten the next work cycle by one-third without changing the rest period. If oral temperature still exceeds 99.6 °F at the beginning of the next rest period, shorten the following work cycle by one-third. Do not permit a worker to wear impermeable PPE when his or her oral temperature exceeds 100.6 °F (38.1 °C).

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This safe work practices (SWP) describes situations where cold stress is likely to occur and discusses procedures for the prevention and treatment of cold-related injuries and illnesses. Cold conditions may present health risks to employees during field activities. The two primary factors that influence the risk potential for cold stress are temperature and wind velocity. Wetness can also contribute to cold stress. Other factors that increase susceptibility to cold stress include age (very young or old), smoking, alcohol consumption, fatigue, and wet clothing. Hypothermia can occur at temperatures above freezing if the individual has on wet or damp clothing or is immersed in cold water. The combined effect of temperature and wind can be evaluated using a wind chill index as shown in Table 1.

Bare flesh and body extremities that have high surface area-to-volume ratios such as fingers, toes, and ears are most susceptible to wind chill or extremely low ambient temperatures. Because cold stress can create the potential for serious injury or death, employees must be familiar with the signs and symptoms and various treatments for each form of cold stress. Table 2 provides information on frostbite and hypothermia, the two most common forms of cold-related injuries.

Training is an essential component of cold stress prevention. Employees are instructed to recognize and treat cold-related injuries during 8-hour health and safety refresher and first aid training courses. When working in cold environments, specific steps should be taken to lessen the chances of cold-related injuries. These include the following:

- Protecting of exposed skin surfaces with appropriate clothing (such as face masks, handwear, and footwear) that insulates, stays dry, and blocks wind;
- Shielding the work area with windbreaks to reduce the cooling effects of wind;
- Providing equipment for keeping workers' hands warm by including warm air jets and radiant heaters in addition to insulated gloves;
- Using adequate insulating clothing to maintain a body core temperature of above 36 °C;
- Providing extra insulating clothing on site;
- Reducing the duration of exposure to cold; and
- Changing wet or damp clothing as soon as possible.

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During periods of extreme cold (10 °F or less) workers should use the buddy system to ensure constant protective observation.

Specific monitoring criteria are not established for cold stress. However, employees should be thoroughly cognizant of the signs and symptoms of frostbite and hypothermia (see Table 1) in themselves as well as in coworkers. All instances of cold stress should be reported to the site safety coordinator. Work schedules may be adjusted and warm-up regimes imposed as needed to deal with temperature and wind conditions.

TABLE 1
COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS EQUIVALENT TEMPERATURE

Estimated Wind Speed (in miles per hour - mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
CALM	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	*LITTLE DANGER* in less than 1 hour with dry skin; maximum danger from false sense of security				*INCREASING DANGER* from freezing of exposed flesh within 1 minute				*GREAT DANGER* that flesh may freeze within 30 seconds			

Trench foot and immersion foot may occur at any point on this chart.

Source: Modified from American Conference of Governmental Industrial Hygienists. 1997. "Threshold Limit Values for Chemical Substances and Physical Agents."

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TABLE 2
COLD STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Frostbite	Freezing of body tissue, usually the nose, ears, chin, cheeks, fingers, or toes	• Pain in affected area that later goes away • Area feels cold and numb • Incipient frostbite (frostnip) - skin is blanched or whitened and feels hard on the surface • Moderate frostbite - large blisters • Deep frostbite - tissues are cold, pale, and hard	• Move affected worker to a warm area • Immerse affected body part in warm (100 to 105 °F) water—not hot! • Handle affected area gently; do not rub • After warming, bandage loosely and seek immediate medical treatment
Hypothermia	Exposure to freezing or rapidly dropping temperatures	• Shivering, dizziness, numbness, weakness, impaired judgment, and impaired vision • Apathy, listlessness, or sleepiness • Loss of consciousness • Decreased pulse and breathing rates • Death	• Immediately move affected person to warm area • Remove all wet clothing and redress with loose, dry clothes • Provide warm, sweet drinks or soup (only if conscious) • Seek immediate medical treatment

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Biological hazards, or "biohazards," include plants, animals or their products, and parasitic or infectious agents that may present potential risks to worker health. This safe work practice (SWP) discusses procedures for working with biohazards, preventive guidelines, and first-aid procedures for the most common hazards field staff are likely to encounter. This SWP does not address biohazards such as those associated with medical waste. Procedures for working with this type of biohazard should be addressed in the site-specific health and safety plan (HASP), construction health and safety plan (C-HASP), job safety analyses (JSAs), activity hazard analyses (AHAs), or other health and safety project planning documents on a case-by-case basis.

During preparation for site work, the document preparer should consider which plants, animals, and other biological agents may be encountered; assess their potential risk to project personnel; and attach this SWP to the document if necessary. Office health and safety representatives should become familiar with biological hazards indigenous to the geographical area in which most of their office personnel work and assist in evaluating the risks to personnel on projects staffed from their offices. SWPs for insects, snakes, animals, plants, waterborne pathogens (giardia), and hantavirus are provided below.

1.0 INSECTS

SWPs for reducing the chance of insect bites or stings and for treating bites or stings are listed below.

- Workers should keep as much skin area covered as possible by wearing long-sleeved shirts, long pants, and a hat. Pant legs should be tucked into socks or boots and shirts into pants. In addition, workers should wear light colored clothing.
- A proven insect repellent should be used on bare skin and clothing.
- When possible, tall grasses and brush that could harbor ticks should be avoided.
- Several times during the day and at the end of the work day, each worker should perform a check for evidence of imbedded ticks or previous bites. Particular attention should be paid to the scalp, neck, ankles, back of the legs, and waist.

- When opening well covers, vaults, or other closed items, workers should watch for hornet or wasp nests and black widow or brown recluse spiders. Workers should never reach into spaces with unprotected arms.
- Workers should watch carefully for bees around open soft drinks or food.
- If a worker is stung by a bee, the stinger should be carefully removed, if present. The wound should be washed and a cold pack applied. Allergic reaction should be watched for and is evidenced by extreme swelling, redness, pain, or difficulty breathing.
- If a worker is stung or bit by a spider or scorpion, medical attention should be obtained immediately.

2.0 SNAKES

SWPs for encounters with snakes and for treating snakebites are listed below.

- Workers should avoid walking in areas known to harbor snakes. Workers should be cautious when picking up or moving items that have been on the ground.
- Workers should wear boots made of heavy material that protect the ankles and pants. Heavy work gloves should be worn for picking up items.
- If one snake is encountered, others may be present. Workers should leave the area by retracing their steps.
- If a worker is bitten, the wound should be washed and the injured area immobilized and kept lower than the heart, if possible. Ice or a tourniquet should not be applied to a snake bite. The wound should not be cut. If medical care is more than 30 minutes away from a work site, a snakebite kit should be available on site and workers should know how to use it.

3.0 ANIMALS

SWPs for encounters with animals and for treating associated wounds are listed below.

- If workers encounter a wild animal, the animal should be observed for unusual behavior such as a nocturnal animal out during the day, drooling, an appearance of partial paralysis, irritability, meanness, or a strangely quiet demeanor.

- Workers should never touch the body of a dead animal because certain diseases could be carried by fleas still on the body.

- Workers should avoid animal droppings (including bird droppings). Pathogens, some of which can become airborne, may still be present in the droppings.

- If a worker is bitten, he or she should get away from the animal to avoid further bites. Workers should not try to stop, hold, or catch the animal.

- If the wound is minor, it should be washed with soap and water. Any bleeding should then be controlled, and an antibiotic ointment and dressing should be applied. All animal bite wounds should be watched for signs of infection.

- If the wound is bleeding seriously, the bleeding should be controlled but the wound should not be cleaned. Medical assistance should be summoned immediately.

- If a rabid animal is suspected, immediate medical attention should be summoned. If possible, workers should try to remember what the rabid animal looked like and the area in which it was last seen. The animal should be reported by calling the local emergency number.

4.0 PLANTS

SWPs for plants are as follows:

- Workers should be aware of the types and appearances of poisonous plants in the work site area. Poison ivy, oak, and sumac are the most frequently encountered plants that can cause reaction from casual contact. If a worker is extremely sensitive to these plants, he or she should avoid the area entirely because airborne drift could be sufficient to cause a reaction. Other plants, such as fireweed, can cause painful, short-term irritation and should be avoided as well. Workers should avoid touching face and eye areas after contact with any suspicious plant.

- Workers should wear proper clothing if working in or near overgrown areas. Disposable outerwear should be used, if necessary, and workers should not touch the material with bare hands during removal if the outerwear may have contacted poisonous plants.

- If contact with a poisonous plant has occurred, the affected area should be immediately washed thoroughly with soap and water. If a rash or weeping sore has already begun to develop, a paste of baking soda and water should be applied to the area several times a day to reduce discomfort. Lotions such as Calamine or Caladryl should be applied to help soothe the area. If the condition gets worse and affects large areas of the body or the face, a doctor should be consulted.

- Bushy and wooded areas should be thoroughly checked for thorn-bearing trees, brush, and bramble. In some cases, impalement can cause severe pain or infection.

5.0 WATERBORNE PATHOGENS-GIARDIA

Giardia is a waterborne pathogen consisting of a protoplasmic parasite of the mammalian digestive tract. Giardia is present worldwide, with the highest occurrence in areas with poor sanitation. In the United States, most reported cases are in mountainous regions where drinking water is obtained from streams and is unfiltered or untreated.

Giardia is contracted by ingesting water contaminated with giardia cysts in the dormant state. Giardia parasites can only thrive in the digestive tracts of mammals. Dormant giardia organisms enter water through the feces of infected animals or humans. Giardia symptoms include severe diarrhea and upset stomach. Some people are asymptomatic but can transmit the disease to others. Medical treatment of giardia can be difficult and unpleasant; therefore, prevention is critical. Precautions for preventing exposure to giardia are listed below.

- Workers should assume that all fresh water streams are infected with the giardia organism and not drink any untreated water.

- Team members collecting sediment and water samples from streams should wash their hands thoroughly with soap and water after collecting the samples.

- Giardia parasites are relatively easy to destroy or filter. Water should be treated for drinking or cooking with iodine or another recommended giardia treatment before use.

6.0 HANTAVIRUS

Hantavirus pulmonary syndrome (HPS) is a potentially fatal infection caused by a rodent-borne hantavirus. HPS begins with a brief illness most commonly characterized by fever, muscle pain, headache, coughing, and nausea or vomiting. Other early symptoms include chills, diarrhea, shortness of breath, abdominal pain, and dizziness. In the first identified cases of HPS, this stage of the infection lasted 2 to 5 days before victims were hospitalized. Typically, by the time of hospitalization, victims were found to have tachycardia (a heart rate of greater than 100 beats per minute) and tachypnea (a breathing rate of greater than 20 breaths per minute). Fever was also common. In most cases, death occurred within 2 to 16 days of the onset of symptoms, and victims exhibited pulmonary edema and severe hypotension.

Currently, experts believe that HPS is spread by the deer mouse (*Peromyscus maniculatus*). Though the deer mouse has been found to be the primary host of hantavirus, several other rodent species have also tested positive for the virus. Pinon mice (*Peromyscus truei*), brush mice (*Peromyscus boylii*), and western chipmunks (*Tamia spp.*) are also likely to carry the virus. Also, cases of HPS have been reported in areas of the United States where these particular rodents are not indigenous.

Infected rodents shed the virus in their urine, feces, and saliva. Humans can be exposed to the virus through (1) inhalation of suspended rodent excreta or dust particles containing rodent excreta, (2) introduction of rodent excreta into the eyes or broken skin, and (3) ingestion of food or water contaminated by rodent excreta. HPS has a reported mortality rate of 55 percent. Transmission of hantavirus from infected individuals to healthy persons has not been documented.

Prevention of HPS infection is essential because no known antidote and no specific treatment exists for treating HPS. Therefore, employees should practice risk reduction and control measures. Guidelines for workers in locations that may have rodent infestations or habitats are listed below.

- The best approach for HPS control and prevention is through environmental hygiene practices that deter rodents from colonizing the work environment.

- Information about the symptoms of HPS and detailed guidance on preventive measures should be provided to all employees assigned to field activities.

- Medical attention should be sought immediately for workers who develop a febrile or respiratory illness within 45 days of the last potential exposure to rodents. Attending physicians should be advised of each worker's potential for occupational exposure to hantavirus. Physicians should contact local health authorities promptly if hantavirus-associated illness is suspected. A blood sample should be obtained from the affected worker and forwarded with the baseline serum sample through the state health department to the Centers for Disease Control and Prevention for hantavirus antibody testing.

- Respiratory protective equipment should be worn when handling rodents, when removing rodents from traps, and when working in areas with evidence of rodent droppings or hair. Respiratory protective equipment should include, at a minimum, a half-face air-purifying respirator (APR) or powered APR equipped with a high-efficiency particulate air (HEPA) filter (P100). Full-face regulators may be needed under some circumstances. Respiratory protective equipment should be used in accordance with Occupational Safety and Health Administration regulations.

- Dermal protection should be worn when handling rodents or traps containing rodents, or if contact with contaminated surfaces could occur. Dermal protection should include rubber or plastic gloves that should be washed and disinfected before removal.

- A trap contaminated with rodent urine or feces or in which a rodent was captured should be disinfected with a commercial disinfectant or a 0.4 percent bleach solution. A dead rodent should be disposed of by placing the carcass in a plastic bag containing enough general-purpose household disinfectant to thoroughly wet the carcass. The bag should be sealed and disposed of by burning or by burying it in a 2- to 3-foot-deep hole. Local and state health departments can also provide appropriate disposal methods.

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This safe work practice (SWP) establishes minimum procedures for protecting Tetra Tech, Inc. (Tetra Tech), personnel against the hazardous properties of oil and petroleum distillate fuel products during the performance of field work, including known and suspected releases of such materials. The SWP was developed to enable health and safety personnel and project managers (PMs) to quickly prepare and issue site-specific health and safety plans (HASPs) or other site-specific health and safety related documents for investigations of such releases. Forms HSP-3A and HSP-3B in can be used as checklists for site preparation activities and attached to the HASP with this SWP. Safety procedures for drilling, trenching, and other construction operations should be attached as necessary. Anticipated physical hazards associated with site activities should be discussed in the HASP.

This SWP must not be used for confined space entry (including trench entry) or for installing or operating full-scale fuel recovery systems. The applicability of this SWP, hazard evaluation, health and safety requirements, air monitoring, area controls, decontamination, underground storage tank (UST) preparation, emergency response, and accident reporting associated with work involving oil and petroleum distillate fuel products are discussed below.

1.0 APPLICABILITY

This SWP is applicable to field investigations involving any of the substances listed below and involving any of the activities listed below.

1.1 SUBSTANCES

- Motor oil (used and unused);
- Leaded and unleaded gasoline;
- Fuel oil No. 1 (kerosene and JP-1);
- Fuel oil No. 1-D (light diesel);
- Fuel oil No. 2 (home heating oil);
- Fuel oil No. 2-D (medium diesel);
- Fuel oil No. 4 (residual fuel oil);

- Fuel oil No. 5 (residual fuel oil);
- Fuel oil No. 6 (Bunker C fuel oil);
- JP-3, JP-4, and JP-5 (Jet fuels); and
- Gasohol.

1.2 ACTIVITIES

- Collection of subsurface soil samples using a truck-mounted drill rig, hand-held power auger, or hand auger;
- Construction, completion, and testing of groundwater monitoring wells;
- Collection of groundwater samples from new and existing wells;
- Observation of removal of underground fuel pipes and USTs; and
- Small-scale removal of contaminated soils.

2.0 HAZARD EVALUATION

Oil and petroleum distillate fuel products are mixtures of aliphatic and aromatic hydrocarbons. The predominant classes of compounds in motor oil, gasoline, kerosene, and jet fuels are paraffins (such as hexane and octane), naphthenes (such as cyclohexane), and aromatics (such as benzene and toluene). For example, gasoline contains about 80 percent paraffins, 6 percent naphthenes, and 14 percent aromatics. Kerosene and jet fuels contain 42 to 48 percent paraffins, 36 to 68 percent naphthenes, and 16 to 20 percent aromatics. Diesel fuels and heating oils contain 14 to 23 percent naphthenes, 68 to 78 percent nonvolatile aromatics, and less than 10 percent paraffins. Heavier fuels contain almost no volatile aromatic compounds. Other chemicals are often added to automotive and aviation fuels to improve their burning properties. Examples are tetraethyl-lead and ethylene dibromide. Flammability, toxicity, and exposure limits of oil and petroleum distillate fuel products are discussed below.

2.1 FLAMMABILITY

Oil and petroleum distillate fuel products possess two intrinsic hazardous properties—flammability and toxicity. The flammable property of oils and fuels presents a far greater hazard to field personnel than toxicity. Vapors of volatile components of oils and fuels can therefore also be explosive when confined.

Oil and petroleum distillate fuel products will not burn in liquid form. Only the vapors burn and then only if (1) the vapor concentration is between the compound-specific upper explosive limit (UEL) and lower explosive limit (LEL), (2) sufficient oxygen is present, and (3) an ignition source is present. The probability of fire and explosion can be minimized by eliminating any of the three factors needed to produce combustion. Two of the factors, ignition source and vapor concentration, can be controlled in many cases. Ignition can be controlled by the following:

- Open fires and smoking should be prohibited on site.
- Spark arresters should be installed on drill rig engines.
- Engines should be turned off when any compound's LEL is approached.

Vapor concentrations can be reduced by using fans and portable ventilation systems. In fuel storage tanks, vapor concentrations in head spaces can be reduced by introducing dry ice (solid carbon dioxide) into the tank because the carbon dioxide gas displaces combustible vapors and oxygen.

The LELs (in air) of the fuels discussed in this section range from 0.6 percent for JP-5 to 1.4 percent for gasoline. Flash points range from -36 °F for gasoline to greater than 150 °F for fuel oil No. 6. JP-5 has a flashpoint of 140 °F. Although it has a lower LEL than gasoline, JP-5 is usually considered less hazardous than gasoline because its vapors must be heated to a higher temperature to ignite.

2.2 TOXICITY

Oil and petroleum distillate fuel products exhibit relatively minor acute inhalation and dermal toxicity effects. Concentrations of 160 to 270 parts per million (ppm) gasoline vapor have been reported to cause eye, nose, and throat irritation after several hours of exposure. Gasoline vapor concentrations of 500 to 900 ppm can cause irritation and dizziness in 1 hour, and levels of

2,000 ppm or above have produced mild anesthesia in 30 minutes. Most fuels, particularly gasoline, kerosene, and jet fuels, are capable of causing skin irritation after prolonged contact.

Some gasoline additives, such as ethylene dichloride, ethylene dibromide, and tetraethyl and tetramethyl lead, are highly toxic; however, the additives are present in gasoline at low concentrations and their contribution to the overall toxicity of gasoline and other fuels is therefore negligible in most cases.

2.3 EXPOSURE LIMITS

In 1989, the Occupational Safety and Health Administration (OSHA) developed a permissible exposure limit (PEL) of 300 ppm for gasoline. However, this PEL was subsequently vacated. OHSA has also established PELs for individual components, such as benzene. The American Conference of Governmental Industrial Hygienists has established a threshold limit value (TLV) Time Weighted Average (TWA) of 300 ppm and Short Term Exposure Limit of 500 ppm for gasoline. These TLVs take into consideration the average concentration of benzene in gasoline (1 percent), as well as gasoline's common additives. Oil mist has a PEL of 5 milligrams per cubic meter of air. Exposure limits have been established for some of the other petroleum constituents.

3.0 HEALTH AND SAFETY REQUIREMENTS

This section discusses medical surveillance, training, and personal protective equipment (PPE) requirements for personnel working at sites where oil or petroleum distillate fuel products may be encountered.

3.1 MEDICAL SURVEILLANCE REQUIREMENTS

On-site personnel must participate in a medical surveillance program and be certified by an occupational health physician as being physically fit to wear respiratory protective devices and to perform their assigned field work. Tetra Tech's medical surveillance program is discussed in Document Control Number (DCN) 3-2.

3.2 TRAINING REQUIREMENTS

On-site personnel potentially exposed to uncontrolled releases of hazardous materials, including petroleum products must successfully complete 40 hours of initial, off-site training and receive a

certificate from a course meeting the requirements of Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.120 (e). Supervisory and refresher training must also have been completed, as necessary, for applicable site personnel. Tetra Tech's health and safety training program is discussed in DCN 3-1.

Before field work begins, the site safety coordinator (SSC) will brief all field personnel, including subcontractor employees, on their work assignments and site safety procedures. Each worker must read the site-specific HASP and sign a safety compliance agreement before commencing work. Individuals that refuse to sign the agreement will be prohibited from on-site work.

3.3 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

PPE for work at sites where oil or petroleum distillate fuel products may be encountered is summarized below.

- Chemical-resistant safety boots, such as neoprene or butyl boots with safety toe and shank, must be worn during the performance of work where surface soil is obviously contaminated with oil or fuel, when product quantities of oil or fuel are likely to be encountered, and within 10 feet of operating heavy equipment.
- National Institute for Occupational Safety and Health-approved full- or half-face respirator with organic vapor cartridges must be worn whenever total airborne hydrocarbon levels in the breathing zone of field personnel reach or exceed a 15-minute average of 11 ppm in summer and 25 ppm in winter. If total airborne hydrocarbons in the breathing zone exceed 100 ppm, work must be suspended, personnel directed to move a safe distance from the source, and the operating unit health and safety manager (HSM) or designee consulted.
- Chemical-resistant gloves, such as nitrile or neoprene gloves must be worn whenever soil or water known or suspected of containing oil or petroleum hydrocarbons is collected or otherwise handled.
- Chemical-resistant coveralls, such as Saranex or polyethylene-coated Tyvek coveralls must be worn whenever product quantities of oil or fuel are actually encountered and when oil- or fuel-saturated soil is handled.
- Splash-proof safety goggles or glasses with full side shields must be worn when working within 10 feet of any operating heavy equipment (such as a drill rig or

backhoe). Splash-proof goggles or face shields must also be worn whenever product quantities of oil or fuel are encountered.

- Hard hats must be worn when personnel work with or in the vicinity of an operating drill rig, backhoe, or other heavy equipment.

Operators of some sites such as refineries often require all personnel working within site boundaries to wear certain specified safety equipment. Such requirements shall be strictly observed by Tetra Tech personnel and subcontractors.

4.0 AIR MONITORING

Air monitoring shall be performed to protect field personnel and prevent fires or explosions. Monitoring must be performed by individuals trained in the use and care of the monitoring equipment. Instruments used on site must be maintained and calibrated in accordance with manufacturer requirements. Instrument manuals with calibration instructions shall be transported to each site along with the instrument. The following equipment is required for monitoring for oil or petroleum distillate vapors:

- Organic vapor monitor using flame ionization or photoionization technology; and
- Combustible gas indicator (CGI).

During drilling operations, vapor emissions from boreholes must be measured whenever the auger is removed from the boring and whenever flights are added or removed from hollow-stem augers. This requirement does not apply to borings less than 5 feet deep and borings of any depth drilled to install monitoring wells in soil known to be uncontaminated. Measurements should first be made with an organic vapor monitor and then with a CGI if vapor levels exceed the highest concentration measurable with the organic vapor monitor. (For example, if the organic vapor monitor goes off the scale when set on the highest range.)

Initially, measurements shall be made about 12 inches from the borehole at both upwind and downwind positions. If the total hydrocarbon concentration 12 inches from the borehole exceeds the respirator use action level (11 ppm in summer and 25 ppm in winter averaged over 15 minutes), measurements must be made in the breathing zone of the individual(s) working closest to the borehole. Decisions regarding respiratory protection should be made based on vapor concentrations in the breathing zone.

If total organic vapor concentrations within 12 inches of the borehole exceed the capacity of the organic vapor monitor, a CGI must be used to determine if explosive conditions exist. If combustible gas concentrations reach 5 to 10 percent of the LEL, continuous monitoring is required and operations may proceed with caution. If combustible gas concentrations reach 10 percent of the LEL within a 12-inch radius of the borehole or 5 percent of the LEL at a distance greater than 24 inches from the borehole, operations must be suspended, the drill rig motor shut down, and corrective action taken. If corrective action cannot be taken, field personnel and all other individuals in the vicinity of the borehole must move to a safe area and the local fire department and project manager must be alerted.

5.0 AREA CONTROLS

Access to hazardous and potentially hazardous areas must be controlled to reduce the possibility of physical injury and chemical exposure to field personnel, site visitors, and the public. A hazardous or potentially hazardous area includes any area where field personnel are required to wear respirators, borings are being drilled with powered augers, or excavation with heavy equipment is being performed.

The boundaries of hazardous and potentially hazardous areas must be identified by cordons, barricades, or emergency traffic cones, depending on conditions. If such areas are left unattended, signs warning of danger and forbidding entry must be placed around the perimeter if the areas are accessible to the public. Trenches and other large holes must be guarded with wooden or metal barricades spaced no further than 20 feet apart and connected with yellow or yellow and black nylon tape not less than 0.75 inch wide. The barricades must be placed no less than 2 feet from the edge of the excavation or hole.

Entry to hazardous areas shall be limited to individuals who must work in these areas. Unofficial visitors must not be permitted to enter hazardous areas while work is in progress. Official visitors should be discouraged from entering hazardous areas but may be allowed to enter only if they agree to abide by the provisions of this document, follow orders issued by the SSC, and are informed of the potential dangers that could be encountered in these areas.

6.0 DECONTAMINATION

A mild detergent and hot water can be used to remove oil and petroleum distillate fuel products from skin. Liquid dishwashing detergent is more effective than hand soap, and hot water is more effective than cold. Mechanic's waterless hand cleaner is recommended for initial cleaning,

followed by a detergent and water wash, for removing motor oil and heavier fuel oils (fuel oils No. 4 through 6) that are weathered to an asphaltic condition.

Detergent and hot water should also be used to clean gloves, respirators, hard hats, boots, and goggles. However, if boots do not come clean after washing with detergent and water, a strong solution of trisodium phosphate and hot water can be used. Split-spoon sampling equipment, augers, vehicle undercarriages, and tires should be steam cleaned.

7.0 UNDERGROUND STORAGE TANK PROCEDURES

Procedures used by the firm responsible for UST removal and transport must agree with procedures recommended by the American Petroleum Institute (API). If the removal and transport firm's procedures, especially firms addressing the removal or inerting of flammable vapors, disagree substantially with API procedures, the Tetra Tech project manager must be notified immediately. The project manager shall then inform the client that Tetra Tech personnel will not report to the site during UST removal or transport operations unless proper procedures are used. If the firm responsible for tank removal or transport is under subcontract to Tetra Tech, it must follow API procedures (see SWP DCN 5-18, "UST Removal Practices," for additional information).

8.0 EMERGENCY RESPONSE

Standard procedures to follow in the event of an emergency involving oil and petroleum distillate fuel products are summarized below. All responses should be coordinated through the designated SSC. First aid should be administered by trained first aid providers.

- In the event of a fire,
  - Stop work, shut off equipment, and evacuate to safe distance (a company vehicle should be kept at a reasonable distance from the work area to prevent fire hazards);
  - Contact the fire department and then the appropriate Tetra Tech office;
  - Keep a safe distance away until emergency services arrive; and
  - Do not attempt to fight fires that are not incipient fires

- In the event of an injury or illness,
  - Perform first aid, if possible, and call 911;
  - Do not move the victim if broken bones are suspected unless life is endangered; and
  - If the person is safe to move (has minor cuts or burns), transport the person to the hospital, but if injuries or illness are more serious, arrange for a rescue squad or ambulance.
- In the event of overexposure,
  - Remove the employee (only if there is no danger to rescuers) from the exposure source to a location with fresh air;
  - Contact a rescue squad or ambulance as necessary;
  - Do not continue work until the source of exposure is identified and controlled; and
  - Contact the appropriate Tetra Tech office for technical assistance.
- In the event of a hazardous materials accident,
  - Stop equipment and work;
  - Relocate to a safe distance;
  - To the extent possible, determine the source of incident (such as a utility line, gas line, pipeline, or other);
  - Contact the appropriate Tetra Tech office; and
  - Do not attempt to backout equipment from an underground utility strike without the guidance of the utility company.

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9.0 ACCIDENT REPORTING

All incidents, including near misses must be reported as required by Tetra Tech company policy. Information on accident reporting is presented in the corporate Health and Safety Manual, DCN 2-2, "Incident Investigation Program."

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The purpose of the Tetra Tech, Inc. (Tetra Tech), air monitoring program is to set forth the criteria necessary to conduct air monitoring as part of a comprehensive site evaluation that accomplishes the following:

- Identifies work areas and activities that require the use of engineering or work technique controls or require the use of personal protective equipment (PPE);
- Provides data to confirm that levels of protection afforded by the assigned PPE and engineering or work technique controls are adequate to protect workers;
- Provides data to ensure that all necessary controls and precautions are being taken to protect the public and the environment; and
- Complies with Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.120(c)(6) and (h).

1.0 SCOPE

This Program applies to hazardous waste operations and emergency response (HAZWOPER) sites as defined in OSHA 29 CFR 1910.120 and 29 CFR 1926.65. Tetra Tech subcontractors must adhere to an air monitoring program that meets or exceeds the requirements of this program.

2.0 RESPONSIBILITIES

The site safety coordinator (SSC), appointed by the project manager (PM) for each site, shall be responsible for implementation of the air monitoring program at the site. The PM is responsible for ensuring that a site-specific health and safety plan, which includes an air monitoring program for the site, is prepared and approved prior to field work beginning on a site. The air monitoring program section of the HASP shall include the identification of known or potential hazards, the implementation of sound industrial hygiene monitoring practices, equipment calibration, and analytical operations, as appropriate. The SSC will take all steps necessary to ensure that the appropriate monitoring equipment and supplies are available during hazardous materials projects. Air monitoring equipment will be used by the SSC or individuals trained in the operation, calibration, care, and limitations of the equipment under the supervision of the SSC.

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The criteria for selecting air monitoring equipment, instrumentation, calibration, monitoring implementation, and air monitoring documentation are discussed below.

3.0 CRITERIA FOR SELECTING AIR MONITORING EQUIPMENT

Priorities for monitoring should be based on information gathered during initial site characterization (see Document Control No. 3-5). This information serves as the basis for selecting the appropriate monitoring equipment and PPE to use when conducting site monitoring. Depending on site conditions, activities, the length of time spent on site, and project goals, the air monitoring program can vary from simply monitoring for immediately dangerous to life or health (IDLH) conditions and other dangerous circumstances to more extensive monitoring, such as personal exposure monitoring, perimeter monitoring, and community monitoring. Thus, not all types of monitoring described in this program will be conducted for every project.

The air monitoring requirements for a particular project must be specified in the site-specific health and safety plan (HASP). The types of field instruments to be used for a particular project shall also be discussed in the HASP. This list shall include specific equipment, models, accessories, frequency of use, procedures for calibration, and frequency of checks.

4.0 INSTRUMENTATION

Air monitoring equipment may include, but is not limited to the following:

- **Photoionization Detector (PID):** This instrument is generally used for the determination of trace concentrations of hydrocarbons (except methane gas) and other photoionizable organic and inorganic contaminants in work zones and ambient air. It is a "real-time" or direct indicating instrument nonspecific in its detection capability and has a response that varies for different chemical contaminants. A data logging feature on some PIDs can be used when a permanent record of monitoring results is desired.

- **Flame Ionization Detector (FID):** This instrument is used for surveying work zones and ambient air for the presence of organic vapors. Organic materials in the air are burned in a hydrogen fueled flame. It is also a real-time instrument nonspecific in its detection capability and has a response that varies for

different chemical contaminants. An audible alarm warns the user when a preset level is exceeded. Data logging is also available with some FIDs.

- **Personal Air Sampling Pumps:** These devices may be used in conjunction with ongoing, real-time monitoring. When an air sampling plan calls for exposure and ambient air concentration monitoring of contaminants for 8-hour (or another specified period), time-weighted averages (TWA), these pumps are used for sample collection onto specified sample media (such as filter cassettes, sorbent tubes, and grab sample bags). The pump typically provides air flow from 0.5 to 5 liters of air per minute. Samples collected on the media are analyzed in a laboratory and therefore do not provide results or readings at the time the sample was collected. Samples shall be analyzed only by laboratories successfully participating in and meeting the requirements of the American Industrial Hygiene Association's Proficiency Analytical Testing or Laboratory Accreditation programs.

- **Hand Pump and Colorimetric Indicator Tubes:** The hand pump draws a measured quantity of air through a colorimetric indicator tube. The chemical "bed" inside the tube undergoes a characteristic color change in the presence of specific contaminants. The degree or length of color change as measured and observed through the glass tube surrounding the chemical bed yields a semiquantitative measurement of the concentration of a given contaminant or class of contaminants. Colorimetric indicator tubes are available for a wide variety of chemical gases or vapors.

- **Combustible Gas Indicators (CGI):** These instruments are capable of detecting the presence of flammable gases and are used to determine the potential for explosive atmospheres. Concentrations are expressed as a percent of the lower explosive limit. Nearly all CGIs are based on the catalytic combustion of gases on a filament. Flammable gases actually burn on the filament. The resulting change in temperature produces an increase in electrical current resistance and decreases current flow. This change in current is translated by the Wheatstone bridge circuit into a meter reading.

- **Oxygen Meter:** This instrument is capable of measuring the concentration of oxygen. The sensor employs an electrolyte to detect the presence and concentration of the gas.

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- **Meteorological Instrumentation:** Meteorological instruments provide data on wind speed and direction, precipitation, humidity, and other environmental conditions and are used on site as an adjunct in determining perimeter and off-site monitoring or sampling locations and may be used for interpretation of air monitoring results.

- **Noise Monitoring Instrumentation:** Noise monitoring may consist of taking spot readings with a sound-level meter or full-shift measurements using dosimeters. All noise monitoring shall be conducted in compliance with procedures detailed in the Tetra Tech Hearing Conservation Program in Document Control No. 2-4.

- **Radiation Monitoring Instrumentation:** A radiation survey is necessary when there is reason to suspect the presence of radioactive material or contamination. All radiological survey equipment shall be used in accordance with the guidelines detailed in the Safe Work Practice Document 6-21.

5.0 CALIBRATION

The SSC or a designee under the SSC's direction will calibrate monitoring equipment in accordance with manufacturers' instructions. Frequency of calibration varies with the instrument. Some instruments require calibration before use and after each use. Other instruments are less prone to response drift and may require less frequent checks of instrument response. The user should verify the calibration frequency before use. Factory servicing of the monitoring instruments will be conducted periodically as recommended by the manufacturers. The SSC will make provisions for replacement equipment when factory service of an instrument is needed.

Documentation of instrument calibration is required. A calibration logbook is recommended. Each calibration event should be noted in the logbook. For portable monitoring instruments such as the PID or FID, the information recorded should include the following:

- Instrument type, brand, model, and serial numbers and other information such as lamp specifications;

- Date of calibration;

- Time of calibration;

- Concentration and source of calibration gas standard;
- Instrument scale range; and
- Name of person calibrating instrument.

For personal air sampling pumps, pump flow calibration results will be documented. A copy of the current calibration curve for the rotameter used for calibration will be filed with the pump calibration data. Documentation of any field servicing or repair of an instrument will be documented in the calibration logbook.

Any and all user comments regarding instrument operation, problems, questionable readings, misuse, or other issues will be fully documented in the field logbook. Certifications of analysis for calibration gas standards and span gases will be maintained on file by the SSC. Any and all factory or manufacturer communications regarding the instruments will be documented in the field logbook. Primary calibration documents for flow meters calibrated by the manufacturer or equipment technician will be maintained with the calibration documentation (especially the calibration curves).

6.0 MONITORING IMPLEMENTATION

Monitoring for airborne hazards at a work site will fall into four categories: screening and periodic monitoring, personal exposure monitoring, perimeter (work zone or work site) monitoring, and community monitoring. Before commencement of site work, background air monitoring should be conducted by the SSC at locations representative of and consistent with work zones proposed in the HASP. The prestartup or background sampling locations will be determined by the SSC, who will consider such factors as wind direction, terrain, and building locations. The four categories of monitoring are discussed below.

6.1 Screening and Periodic Monitoring

Site characterization is used to identify primary health and safety concerns associated with a work site (see Document Control Number (DCN) 3-5). Once site work has begun, screening monitoring should be conducted to evaluate the potential threats associated with air contaminant sources identified. Screening should be performed with the instrument and detector appropriate for the contaminant to evaluate the actual sources and concentrations of contaminants released in the immediate area of site personnel. Information from the

screening will help determine the need for periodic monitoring of site conditions or personal exposure monitoring.

Periodic monitoring of ambient air in the work area is necessary when screening has demonstrated an air contaminant source that may persist as a hazard to personnel. Periodic monitoring is also necessary when a new task has begun or a change in procedures has occurred. Periodic monitoring should be conducted using direct reading instrumentation to fully evaluate the work area. The HASP should provide information on which concentration, indicated as action levels, will trigger specific employee protection actions such as donning of respirators or evacuation of the work area.

6.2 Personal Exposure Monitoring

Personal exposure monitoring will be conducted whenever routine, real-time screening or periodic monitoring has determined that an action level requiring PPE upgrade has been reached. Personal worker exposure monitoring related to hazardous work activities will also be conducted whenever personnel voice concerns regarding hazardous substance exposure based on qualified symptoms confirmed by the SSC or documented by a physician.

Personal exposure monitoring may include both worker breathing zone and ambient work zone air. The monitoring should be conducted during each hazardous, task-specific activity. Samples can be collected to determine the 8-hour TWA or short-term exposures represented by the specific task at hand. Initial samples will be collected for workers with the highest likelihood of exposure. The number of initial determination samples will be determined by the SSC based on the extent and conditions of the new task-specific activity. Sampling may include survey or real-time monitoring with the PID or FID supplemented by filter cassette (for dusts and metals), sorbent tube (organics), and badge (organics) sampling media data. Colorimetric indicator tube readings can also be used.

Specific hazard exposure will be monitored on or around personnel engaged in unique work activities (such as electric arc welding, torch cutting or welding, and plastic pipe cement use) and where there exists a concern for exposure over an Occupational Safety and Health Administration (OSHA) permissible exposure limit.

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6.3 Perimeter Monitoring

Perimeter monitoring needs will be determined by the SSC based on site and contaminant characteristics. Perimeter monitoring will be conducted during all active phases of a hazardous materials operation until sufficient documentation has established either no hazard or a constant known hazard level unlikely to change. Work zone perimeter monitoring may additionally involve any of the previously discussed passive, active, or real-time, or other specialized monitoring techniques as necessary, based on the SSC's determination.

6.4 Community Monitoring

Monitoring of nuisance dust, metals, and organics at the site perimeter may be necessary when hazardous activities likely to be a source of fugitive emissions are in progress. These samples will be taken at the site perimeter or just outside the perimeter downwind of work in progress. These samples will be taken using normal occupational exposure sampling strategies as discussed in Section 4.0.

To comply with requirements of the California Air Quality Control Regions defined in the Clean Air Act or with other state and local requirements, periodic high-volume sampling for dusts may need to be conducted at the site perimeter. The SSC may also use real-time aerosol monitoring as appropriate and within the requirements of applicable regulations.

7.0 AIR MONITORING DOCUMENTATION

All air monitoring data should be logged daily by the SSC in a field logbook or on forms developed for the project. All other documents (such as strip chart records or printouts from data logging instruments) will be collected and maintained with the monitoring records. All calibration- and instrument-related documentation will be maintained with the monitoring records. Chain-of-custody forms will accompany all analytical samples to the laboratory.

When personal exposure monitoring has been conducted, results will be documented and provided to the employees monitored. A copy of this information will also be filed in the employee's medical surveillance record.

All monitoring documents will be kept secure by the SSC for inclusion in the project file.

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Decontamination is the physical process of removing or neutralizing contaminants that have accumulated on personnel and equipment. The Tetra Tech, Inc. (Tetra Tech), decontamination program establishes proper decontamination procedures for site work to protect field personnel from hazardous materials and prevent the migration of chemicals from hazardous waste sites.

The levels and types of decontamination procedures required are based on site-specific factors, including the following:

- Chemical, physical, and toxicological properties of on-site wastes;
- Pathogenicity of infectious wastes;
- Potential for contaminant contact based on assigned worker duties, activities, and functions;
- Potential for wastes to permeate, degrade, or penetrate materials used for PPE, clothing, vehicles, tools, and instruments;
- Movement of personnel and equipment between different work zones;
- Emergencies;
- Methods available for protecting workers during decontamination; and
- Impact of the decontamination process and compounds on worker health and safety.

1.0 SCOPE

This program is an integral part of health and safety plan (HASP) development and implementation. Decontamination methods must be included in the HASP for all sites covered by the Occupational Safety and Health Administration (OSHA) standard for hazardous waste operation and emergency response (HAZWOPER) in Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.120.

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2.0 RESPONSIBILITIES

The operating unit health and safety manager (HSM) shall provide technical guidance to project managers and site safety coordinators (SSC) regarding appropriate decontamination procedures for a site. The project manager (PM) is responsible for ensuring that decontamination procedures are implemented on each project. The SSC will oversee and enforce the requirements of the decontamination program on site. Field personnel and subcontractors are required to adhere to the decontamination procedures specified in the site-specific health and safety plan (HASP).

HASP components related to decontamination, decontamination facility design, decontamination by commercial laundries or cleaning establishments, decontamination waste disposal methods, and decontamination during medical emergencies are discussed below.

3.0 HASP COMPONENTS

A decontamination plan is part of a HASP and is implemented before any personnel or equipment may enter areas where the potential for contact with hazardous substances exists. The decontamination plan should contain the following information:

- Number and layout of decontamination stations;
- Decontamination equipment needed;
- Appropriate decontamination methods;
- Procedures to prevent contamination of clean areas;
- Methods and procedures to minimize worker contact with contaminants during removal of personal protective equipment (PPE) and clothing; and
- Methods for disposing of clothing and equipment that are not completely decontaminated.

The decontamination plan should be revised as necessary to reflect changes in the type of PPE, site conditions, or site hazards.

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HASPs shall also contain procedures to minimize contact with and contamination by hazardous materials. The procedures should address the following:

- Decontamination should be performed in areas that will minimize exposure of uncontaminated employees or equipment;
- The level of protection worn by the decontamination crew in the decontamination plan;
- Appropriate decontamination procedures for all personnel leaving a contaminated area;
- Proper decontamination or disposal of all contaminated clothing and equipment;
- Proper decontamination or disposal of all equipment and solvents used for decontamination;
- Decontamination, cleaning, laundering, or replacement of protective clothing and equipment to maintain effectiveness;
- Decontamination of impermeable protective clothing that has contacted or is likely to have contacted hazardous material before removal;
- Immediate removal of permeable clothing that has becomes wet with hazardous substances and, if possible, showering of personnel; and
- Work sites requiring showers and change rooms must meet the requirements of Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.141, and "Sanitation".

4.0 DECONTAMINATION FACILITY DESIGN

Decontamination facilities are typically located within a contamination reduction zone (CRZ). Specific areas within the CRZ are typically designated as decontamination areas for personnel, equipment, machinery, and vehicles. The established area must have sufficient room to provide for full decontamination. The CRZ also should have marked entry and exit points and should control access into and out of the exclusion zone.

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5.0 DECONTAMINATION BY COMMERCIAL LAUNDRIES OR CLEANING ESTABLISHMENTS

Any commercial laundries or cleaning establishments used by Tetra Tech to clean protective clothing or equipment shall be informed by the PM or SSC of the potentially harmful effects of exposure to hazardous substances.

6.0 DECONTAMINATION WASTE DISPOSAL METHODS

All decontamination equipment used must be decontaminated and disposed of properly. Buckets, brushes, clothing, tools, and other contaminated equipment should be collected, placed in containers, and labeled. Also, all spent solutions and wash water should be collected and disposed of properly. Clothing that is not completely decontaminated should be placed in plastic bags pending further decontamination and disposal. Collection and disposal methods should be specified in the HASP.

7.0 DECONTAMINATION DURING MEDICAL EMERGENCIES

In the event of an injury, the SSC must decide if decontamination of the victim is necessary or appropriate. Situations may arise when decontamination may aggravate the injury or when the injury is so serious that the victim should not be decontaminated. If the SSC decides that decontamination will not interfere with the necessary medical treatment, then protective clothing and equipment should be washed, rinsed, and removed.

In medical emergencies when decontamination cannot be performed, provisions should be made to minimize contamination of rescue personnel (for example, by wrapping the victim in blankets or plastic sheets). All rescue or emergency service personnel should be informed of the presence of contamination and the procedures required for decontamination. A designated on-site representative should accompany the victim to the emergency facility to provide information to the attending physician (such as Material Safety Data Sheets on the hazardous materials present at the site and other information as appropriate).

8.0 EVALUATING THE EFFECTIVENESS OF DECONTAMINATION

Each HASP shall include a plan for evaluating the effectiveness of decontamination. Some methods that may be used depending on site operations, site conditions, and contaminants, may include:

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- Wipe sampling of equipment or protective clothing;
- Sampling of decontamination rinseate;
- Screening with monitoring equipment; or
- Visual evaluation of decontaminated equipment.

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This Traffic Work Zone Protection Program has been developed to provide for the safety of Tetra Tech employees when engaged in activities where they are exposed to vehicular traffic. The types of operations where employees and equipment are at risk include; surveying, construction, utility work, maintenance operations, environmental sampling and incident management operations. Protective measures such as work zone protection plans, high-visibility clothing; traffic control devices, pedestrian safety; flagger control and worker training are discussed in this safe work practice.

1.0 SCOPE

This SWP applies to all employees assigned to work where the primary work activity takes place in areas of vehicular traffic. Vehicular traffic includes the movement of passenger/commercial motor vehicles as well as construction-related vehicles and mobile equipment.

2.0 RESPONSIBILITIES

2.1. Project Engineer/Project Manager

Traffic work zone hazards shall be evaluated by the Project Manager prior to performing work in any roadway, highway or other area where vehicular traffic is of concern. Upon evaluation of project requirements, the Project Manager shall identify site specific controls to ensure conformance with the safe work practices outlined in this document.

2.2. Site Safety Coordinator

The Site Safety Coordinator shall communicate and enforce the site-specific work zone protection requirements of the project.

2.3. Employees

All employees assigned to work on projects covered by this safe work practice shall follow all safety precautions established. All employees shall immediately report any unsafe condition to their supervisor.

2.4. Operating unit Health and Safety Manager

The HSM shall ensure that this SWP has been communicated to effected engineers and employees. The HSM shall periodically audit compliance with this safe work practice.

3.0 PROGRAM ELEMENTS

Work zone protective measures should be an integral part of every project from planning, through design and construction. The primary function of these protective measures is to protect workers and equipment; and to provide for the safe and efficient movement of vehicles, bicyclists and pedestrians through or around projects that require temporary traffic control planning. The various elements that may be implemented include work zone protection plans, high visibility clothing, traffic control devices, pedestrian safety, flagger control, illumination, and worker training. Program element requirements are primarily adopted from the Department of Transportation Manual of Uniform Traffic Control Devices, (2003 Edition with Revisions No. 1 and 2 Incorporated) and other standard resources.

3.1. Work Zone Protection Plan

A work zone protection plan (WZPP) shall be developed for Tetra Tech projects where project activities may impact traffic and expose employees to moving vehicles. The WZPP must address traffic hazards and traffic controls that will meet the changing conditions on the site. The plan must address items such as accountability and coordination at the work site, flow of construction vehicles, equipment and workers at the site, work zone layout (i.e. warning area, signage, transition areas, and work-zone, buffer and termination zones), use of temporary traffic control devices, contact information and emergency response services.

Form- WZPP provides the basic format for this plan. This form or its equivalent in conjunction with city, state or client traffic control requirements shall be part of the work zone protection plan for the project. The work zone protection plan shall be developed prior mobilization and shall be signed and approved by the project engineer and site safety coordinator. The details of the plan shall be communicated to all site employees during the initial health and safety meeting.

In those cases where work falls under the scope of the OSHA HAZWOPER Standard, the elements of the work zone protection plan may be included in the OSHA required site specific Health and Safety Plan (HASP).

3.2. High Visibility Clothing

Employees working in the vicinity of traffic areas shall wear high visibility clothing that conforms to the ANSI/ISEA 107-1999 Standard. This standard specifies performance for materials and clothing design. It also classifies garments according to risk. The design principles for all classifications require that clothing must have 360-degree visibility and must have either an orange, red-orange, or yellow-green fluorescent background. The higher hazard classifications require greater areas of fluorescent background and retroreflective trim. The following presents the high visibility clothing requirements according to the ANSI defined conspicuity classes:

Class 1: Low Risk

This class includes work where the employee can give full and undivided attention to approaching traffic, there is ample separation of pedestrian workers and vehicle traffic, the background in not complex and vehicle/equipment speeds do not exceed 25 miles per hour (mph). Types of activities falling under this class include: directing vehicles to parking areas, sidewalk maintenance activities, sampling activities greater than 15 feet from the roadway, and activities conducted by warehouse workers and delivery vehicle drivers.

A class 1 vest may have a mesh inset and must be striped with retroreflective bands at least 1" wide.

Class 2: Medium Risk

This class includes work where greater visibility is desired due to inclement weather, complex backgrounds are present, employees perform tasks which divert attention from approaching traffic, vehicle/equipment exceeds 25 mph but is less than 50 mph and work activities take place in or near vehicle traffic. Types of activities include roadway construction, utility workers, survey crew, and environmental sampling activities within 15 feet of the roadway, as well as emergency response and accident site investigations.

A class 2 vest is completely constructed of high visibility material (no mesh insets), must be striped with retroreflective bands at least 1 3/8" wide, and will look different from front and back (typically the bands will cross in the back).

Class 3: High Risk

This classification covers work where employees are exposed to traffic travelling greater than 50 mph, or when the pedestrian worker and vehicle operator have high task loads. Class 3 activities include roadway construction, utility work, survey crew activities and emergency response activities.
A class 3 worker must be conspicuous through the full range of body motions at a minimum of a quarter mile and must be identifiable as a person. Class 3 conspicuity requirements cannot be met with a conventional vest alone and may include a jacket, coveralls and pants. Clothing must contain bands of retroreflective material at least 2" wide

3.3. Traffic Control Devices

Traffic control devices can be utilized to provide adequate warning, delineation, and channelization to assist road users in advance of and through temporary traffic control zones.

This can be accomplished by the proper use of signage, channeling devices, barricades, barriers, crash cushions and impact attenuators.

All temporary traffic control devices should be removed as soon as practical when they are no longer needed. When work is suspended for a short period of time, temporary traffic control devices that are no longer appropriate shall be removed or covered.

Chapter 6H of the MUTCD Manual provides specific traffic control applications for a variety of work zone situations. These applications shall be referred to and implemented as appropriate for the type of work being conducted. The MUTCD protective measures and work zone layout shall be included the temporary traffic control plan developed for the site.

The most common temporary traffic control devices used by Tetra Tech are discussed below.

3.4. Signage

Signage is used to warn and direct traffic. Size, color and shape are dictated by the Department of Transportation and approved signs can be found in Part 2 of the Federal Highway Administration "Standard Highway Signs" book. Signs must be placed between five and seven feet from the ground depending on location. Typically, warning signs in a temporary traffic control zone must have a black legend on an orange background.

Where road conditions permit, appropriate warning signs should be placed in advance of the temporary traffic control zone at varying distances depending on the type of roadway, condition, activity and posted speed. Section 6F.16 through 6F.51 and Table 6C-1 of the MUTCD contains guidance regarding the use and spacing of advance warning signs. Appendix A or web link.

3.5. Channelizing Devices

The function of channelizing devices is to warn road users of conditions created by work activities in or near the roadway and to guide road users through the temporary disruption. Channelizing devices include cones, tubular markers, panels, barricades and drums. They should be placed to separate traffic from the work zone, delineate pedestrian or bicycle paths or opposing directions of motor vehicle traffic. They also provide for smooth and gradual motor vehicle traffic flow from one lane to another, onto a bypass or detour, or into a narrower lane.

Channelization devices should be constructed and ballasted in such a way that they do not pose a hazard to workers or drivers if struck by a vehicle. The placement of the various types of channelization devices is discussed in the MUTCD manual Section 6F.55 through 6F.62 .

In areas where there is frequent fog, snow or severe road curvature, warning lights may be added to these devices.

3.6. Pedestrian safety

In addition to safety measures developed for worker and vehicular traffic, safety precautions shall be implemented for pedestrians that can be expected at the work site. Pedestrians should be provided with a safe and convenient path. Members of the public shall not be permitted to pass through Tetra Tech work zones at any time unless specific safety accommodations have been made. Accommodations include but are not limited to, advanced notice of sidewalk closures (signs placed at intersections to discourage midblock crossing), installation of suitable fencing of the work area, channelization of foot traffic using traffic control devices and caution tape and construction of a covered walkway to protect from falling debris.

Movement by work vehicles and equipment across designated pedestrian paths should be kept to a minimum. When crossing pedestrian paths is necessary, flaggers should control traffic. The staging or stopping of work vehicles or equipment shall not be permitted along the side of pedestrian paths.

Provisions for persons with disabilities shall also be given consideration.

3.7. Flagger Control

Traffic shall be coordinated through the use of flaggers in situations when alternative traffic management systems are not feasible. Flaggers may be required when traffic in both directions must use a single lane; traffic must be stopped during movement of equipment to and from the work zone, or any other operation where equipment will obstruct the free flow of traffic.

Flagging operations should only be performed by employees that have had adequate training in safe traffic control practices. They shall be stationed far enough from the work zone to slow down or stop traffic before they enter the work zone. All pre-warning signs shall be placed well in advance of the flagger as possible.

All flaggers shall wear high visibility clothing appropriate for the class of work conducted. A STOP/SLOW paddle shall be used to control road users through temporary traffic control zones. When flaggers are utilized, there must be a means to communicate between the supervisor of the operation and/or additional flaggers.

3.8. Illumination

Utility, maintenance, or construction activities on or near roadways may be conducted at night when traffic volumes are lower. When nighttime work is being performed, floodlights should be

used to illuminate the work area, flagger stations, equipment crossings and other areas as necessary. When floodlights are used they should not be placed in such a manner that they produce a glare or blinding condition for passing motorists. Researchers at the University of Florida have developed illumination guidelines for nighttime work. They are as follows:

Category 1
For large-scale visual tasks with comparatively low need for accuracy the general illumination for the required work zone shall be a minimum of 5 foot-candles.

Category 2
For work conducted around machinery and requires a greater level of accuracy, a minimum of 10 foot-candles shall be provided.

Category 3
In situations that require extreme caution and attention such as flagging or signaling operations, a minimum of 20 foot-candles shall be provided.

3.9. Safety Training

Workers assigned to work in areas of vehicular traffic shall receive information and training on how to work next to motor vehicle traffic in a way that minimizes their risk. Employees with specific traffic control responsibilities should be trained in temporary traffic control techniques, device usage, and placement.

The work zone protection plan shall be reviewed with all employees prior to mobilization on site. Specific safety measures to be implemented shall be reviewed.

Revision Date	Document Authorizer	Revision Details
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Appendix A
FORM WZPP (Work Zone Protection Plan)

Tetra Tech Operating Unit	**Project Name**	
Proposed Dates and Time of Scheduled Work	**Project Number**	
Description of Project Provide a brief description of the scope of work, identifying major job/operations that will be conducted. Include the number of personnel expected on site and types of equipment that will be used.		
Describe Work Zone Provide names of effected roadways, physical characteristics, including the correct number of lanes, turn lanes, pavement markings, parking lanes, medians, traffic islands, posted speed limits as well as all intersecting streets and affected sidewalks within the proposed work zone. Attached detailed drawings.		
Work Zone Protective Measures Identify and provide for specific locations for all traffic control devices (i.e. signs, cones, tubular markers, flaggers etc.) Refer to specific MUTCD traffic control applications set forth in Part 6 of the MUTCD Manual. Attach copy of MUTCD work zone set up.		
Name and Location of Nearest Emergency Medical Facility		
Contacts		
Project Manager	Phone	
Client Representative	Phone	
Site Safety Coordinator	Phone	
Approvals		
Project Manager	Signature	Date
Site Safety Coordinator	Signature	Date

This program outlines minimum requirements to protect employees who may be exposed to hazards during trenching and excavation activities and to provide general guidance for compliance with Title 29 of the *Code of Federal Regulations* (CFR), Part 1926, Subpart P, "Excavations."

1.0 SCOPE

This program and procedures applies to all sites and activities involving excavation or trenching as defined in 29 CFR 1926 Subpart P.

2.0 RESPONSIBILITIES

Project managers (PMs) shall ensure that all excavation, shoring, and trenching activities are conducted in accordance with the requirements outlined in this document and Subpart P of 29 CFR 1926. Project managers must also ensure that projects involving trenching and excavation are staffed by an individual trained and qualified to perform "competent person" duties as described in this procedure. Operating unit health and safety managers (HSMs) will provide assistance to PMs in implementing this SWP.

The site safety coordinator (SSC) is responsible for on-site enforcement of this SWP.

3.0 DEFINITIONS

The following definitions apply to this SWP:

Benching: Forming one or a series of horizontal levels or steps in the sides of an excavation to protect employees from cave-ins.

Competent Person: One capable of identifying existing or predictable hazards in the work environment that are unsanitary or dangerous to employees and who has authorization to take prompt corrective measures to eliminate the hazards.

Excavation: Any manmade cut, cavity, trench, or depression in an earth surface formed by earth removal.

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Shoring: Metal, hydraulic, mechanical, or timber system that supports the sides of an excavation and that is designed to prevent cave-ins.

Sloping: Sloping the sides of an excavation at an incline away from the excavation to protect employees from cave-ins.

Trench: A narrow excavation (in relation to its length) that is usually deeper than it is wide but less than 15 feet wide.

4.0 PROCEDURES

Described below are the general safety requirements and protective system requirements for trenching and excavation activities.

4.1 General Safety Requirements

General safety requirements that must be in place before work begins are as follows:

- Utility companies or a utilities locating service in the area must be notified **before excavation or trenching activities begin** to arrange for locating and protecting underground utilities.
- Access to trenching areas must be controlled and limited to authorized personnel. Prior to entering a trench or excavation, workers must notify the project manager, SSC, and nearby equipment operators whose activities could affect the trench or excavation.
- No person may enter a trench or work at the foot of the face of an excavation until a qualified, competent person has inspected the excavation and determined whether sloping or shoring is required to protect against cave-in or subsidence and the appropriate protection has subsequently been installed.
- Trenches and excavations must be assessed by a qualified, competent person, even in the absence of working personnel, whenever heavy equipment will be operating nearby in order to ensure that the trench or excavation will support the weight of the equipment without subsistence or causing the accidental overturning of machinery.

- Trenches and excavations must be inspected regularly (daily at a minimum) to ensure that changes in temperature, precipitation, shallow groundwater, overburden, nearby building weight, vibration, or nearby equipment operation have not caused weakening of the sides, faces, and floors and to ensure that personnel protection is being maintained. Form TEC – Trenching and Excavation Checklist or its equivalent is to be used to document inspections.

- When subsidence or tension cracks are apparent anywhere in an excavation, all work should be stopped until the problem is corrected.

- The competent person must inspect trenches or excavations after any precipitation event to ensure integrity has been maintained.

- Sufficient ramps or ladders must be provided in excavations 4 or more feet deep to allow quick egress. Ramps or ladders may be placed no more than 25 feet apart, must be secured from shifting, and must extend at least 3 feet above the top of the trench or excavation. Structural ramps must be designed by a competent person.

- Material removed from an excavation or trench must be placed far enough from the edge (at least 2 feet) to prevent it from sliding into the excavation or trench or from stressing the trench or excavation walls. Worker protection must also be provided from loose rock or soil on the excavation faces.

- If trenches or excavations are near walkways or roadways, guards or warning barriers must be placed to alert pedestrians and drivers of the presence of the trench or excavation.

- If possible, trenches or excavations should be covered or filled in when unattended. Otherwise, strong barriers must be placed around the trench or excavation and lighting must be provided at night if the trench or excavation is near a walkway or roadway.

- When a hazardous atmosphere could exist, the excavation must be tested for appropriate hazardous substances and oxygen level before personnel entry. Excavation where hazardous atmospheres exist must be treated as a confined space. Entry must follow procedures outlined in “Confined Spaced Entry Program,” Document Control No. 2-5.

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- Entry is not allowed into excavations where water has accumulated.

4.2 Protective System Requirements

Protective systems protect employees from cave-ins, material that could fall in or roll off the face of the excavation, and collapse of adjacent structures. Protective systems include shoring, shielding, sloping and benching, and other systems. Sloping and benching and shoring system requirements are described below.

4.2.1 Sloping and Benching Requirements

Sloping and benching system construction must follow the guidelines established in Appendix B to Subpart P of 29 CFR 1926. Maximum allowable slopes for excavations are summarized below. All slopes indicated are expressed as the ratio of horizontal distance (H) to vertical rise (V).

Soil or Rock Type	Maximum Allowable Slope (H:V) for Excavations Less than 20 Feet Deep
Stable Rock	Vertical (90°)
Type A	0.75:1 (53°)
Type B	1:1 (45°)
Type C	1.5:1 (34°)

Soil types are defined in Appendix A to Subpart P of 29 CFR 1926 and are summarized below.

Type A: Cohesive soils with an unconfined compression strength of 1.5 tons per square foot (ton/ft^2) or greater (such as clay, silty clay, sandy clay, or clay loam)

Type B: Cohesive soils with unconfined compression strength of greater than 0.5 but less than 1.5 ton/ft^2 (such as angular gravel, silt, silt loam, or sandy loam)

Type C: Cohesive soils with an unconfined compression strength of less than 0.5 ton/ft^2 (such as gravel, sand, loamy sand, submerged soil, or unstable submerged rock)

Sloping and benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.

Soil types must be determined by the competent person using at least one visual and one manual test. Manual tests include plasticity, dry strength, thumb penetration, and drying tests.

4.2.2 Shoring System Requirements

Appendixes C, D, and E to Subpart P of 29 CFR 1926 outline requirements for timber shoring for trenches, aluminum hydraulic shoring for trenches, and alternatives to timber shoring, respectively. Guidelines for shoring systems are listed below.

- If it is not economically feasible or there are space restrictions to prevent cutting the trench or excavation walls back to a safe angle of repose, all trenches or excavations 5 feet deep or more must be shored.
- Shoring should be erected as trenching or excavation progresses and as closely as possible to the excavation floor.
- Shoring timber dimensions must meet the minimum timber requirements specified in Tables C1.1 through C1.3 of Appendix C to Subpart P 29 CFR 1926. Aluminum hydraulic shoring must be constructed using the guidelines and dimension requirements specified in Appendix D of the same standard.
- Trench shields may be used instead of shoring or bracing. Shields must be constructed of steel flat sides welded to a heavy framework of structural pipe. Shields should be moved along by the excavator as trenching or excavation proceeds.

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	TETRA TECH, INC. TRENCHING AND EXCAVATION CHECKLIST	Revision Date: 10/1/2008 Document Control Number: DCN 4-05 F Page 1 of 2

This document has been developed to ensure that potential hazards associated with trenching and excavation operations are identified, evaluated, and that proper hazard controls are implemented onsite. This document must be used for all trenching or excavation work lasting for more than three days in length. Regardless of project duration, a daily inspection is required of all excavations, adjacent areas and protective systems. Documentation of this inspection must be maintained in the project log. The information in this document should be reviewed with all employees prior to commencing site operations.

Date:	Project Name:
Location:	Foreman:
Competent Person:	Competent Person Signature:
Scope of Work:	

Soil and Site Condition (respond to each item listed)			
Class	❒ A	❒ B	❒ C
Determined By	❒ Visual Test	❒ Manual Test	❒ Penetrometer
Soil Layered	❒ Yes	❒ No	❒ NA
Zones of weak soils or fractured planes in material	❒ Yes	❒ No	❒ NA
Evidence of shrinkage cracks in or on trench walls	❒ Yes	❒ No	❒ NA
Evidence of possible cave in or slide	❒ Yes	❒ No	❒ NA
Vibration	❒ Yes	❒ No	❒ NA
Previously disturbed soil	❒ Yes	❒ No	❒ NA
Previous rain/snow	❒ Yes	❒ No	❒ NA

Protection Methods (indicate protection method selected)			
Slope	❒ Yes	❒ No	❒ NA
Horizontal : Vertical			
Bench system	❒ Yes	❒ No	❒ NA
Trench shoring	❒ Yes	❒ No	❒ NA
Trench box	❒ Yes	❒ No	❒ NA
Shield system	❒ Yes	❒ No	❒ NA
Other			
Describe			

Hazard Assessment	Hazard Control			
Underground Utilities				
	Underground utilities located and marked	❒ Yes	❒ No	❒ NA
	Locate tickets onsite	❒ Yes	❒ No	❒ NA
Exposure to Falling Loads, Heavy Equipment or Loose Rock				
	Restricted access while excavating or lifting material	❒ Yes	❒ No	❒ NA
	Warning system for mobile equipment near excavation edge	❒ Yes	❒ No	❒ NA
	Barricades	❒ Yes	❒ No	❒ NA
	Cones	❒ Yes	❒ No	❒ NA
	Hand signals	❒ Yes	❒ No	❒ NA
	Stop logs	❒ Yes	❒ No	❒ NA
	Excavation scaling	❒ Yes	❒ No	❒ NA
	Material and spoils storage at least 2 feet from edge	❒ Yes	❒ No	❒ NA
Exposure to Vehicular Traffic				
	Traffic Control Plan	❒ Yes	❒ No	❒ NA
	Work Zone Protection	❒ Yes	❒ No	❒ NA
	High Visibility Clothing	❒ Yes	❒ No	❒ NA
Access and Means of Egress				
	Means of egress (ladder or other means) at no more than 25 feet of travel distance	❒ Yes	❒ No	❒ NA
	Ladder extends 3 feet beyond surface of trench	❒ Yes	❒ No	❒ NA
Hazardous Atmospheres				
Oxygen Concentration < 19.5%	Confined Space Entry Procedures Required Implement Ventilation	❒ Yes	❒ No	❒ NA
Toxic Gases approaching permissible exposure limits	Confined Space Entry Procedures Required Implement Ventilation	❒ Yes	❒ No	❒ NA
Flammable Atmosphere > 20% LEL of flammable gas	Confined Space Entry Procedures Required Implement Ventilation	❒ Yes	❒ No	❒ NA
	Respiratory Protection	❒ Yes	❒ No	❒ NA
Exposure to Water Accumulation				
	Increase frequency of competent person inspections and monitoring	❒ Yes	❒ No	❒ NA
	Water removal system in place	❒ Yes	❒ No	❒ NA
Exposure to Falls > 6 feet				
	Provide walkways with guardrails	❒ Yes	❒ No	❒ NA
Undermined Adjacent Structures i.e. buildings, pavement, walls, sidewalks				
	Competent Person inspection	❒ Yes	❒ No	❒ NA
	Bracing and support provided to protect structures from undermining the undercuts	❒ Yes	❒ No	❒ NA

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This safe work practice (SWP) has been prepared to address health and safety issues associated with haulage and earth moving at construction work sites. This SWP has been prepared to supplement a construction site health and safety plan (C-HASP).

1.0 APPLICABILITY

This SWP shall apply to all projects which involve hauling and earth moving activities. The project manager (PM) shall ensure application and adherence to this SWP. This SWP may be used as an attachment to a Tetra Tech Construction Health and Safety Plan (C-HASP).

2.0 HAULAGE AND EARTH MOVING

Haulage and earth moving requirements provided in this section are based on Article 10 of the California Construction Safety Orders. General, construction and maintenance, warning methods, operation, fueling, repair, and rollover protective structure requirements are defined in the following sections.

2.1. General Requirements

The following sections describe general requirements for haulage and earth moving on private roadways and off-highway conditions, dust control, equipment control, exhaust, and heat shields in the State of California. These requirements are based on CCR Title 8 Section 1590.

2.1.1 Private Roads and Off-Highway Condition

On single-lane private roads with two-way traffic shall be provided with turnouts. Where turnouts are not practicable, a control system shall be provided to prevent vehicles from meeting on such single-lane roads.

On private roads used for two-way traffic, arrangements shall be such that vehicles travel on the right side as much as possible. Signs shall be posted to clearly indicate variations from this system. Where practicable, separate haulage roads shall be provided between loaded and empty units. Haulage roads shall be wide enough to allow for safe passage. Safe distances between moving units shall be maintained.

NOTE: Left hand traffic patterns are permitted provided that vehicle operators are advised of the pattern and job site conditions warrant that the procedure is safe.

Private roads shall be maintained free from holes and ruts that affect the safe control of the vehicle. Emergency access ramps and berms used by an employer shall be constructed to restrain and control runaway vehicles.

Where a hazard exists to employees because of traffic or haulage conditions, a system of traffic controls shall be required so as to abate the hazard.

NOTE: Nothing in this SWP shall preclude the use of additional signs that are not included in the "Manual of Traffic Controls for Construction and Maintenance Work Zones". Examples include the following: "Haul Road," "Left Hand Pattern," "Scraper Crossing," etc.

Employees, such as grade-checkers, surveyors and others exposed to vehicular traffic, shall wear flagging garments, or equivalent, as required for flaggers in Document Control Number (DCN) 4-4 "Vehicle Use, Traffic Control, and Flaggers".

2.1.2 Dust Control

Action shall be taken to prevent dust from seriously reducing visibility. In dusty operations, equipment operators shall use adequate respiratory protection in accordance with the Tetra Tech Respiratory Protection Program (DCN 2-6).

2.1.3 Equipment Control.

Equipment shall be under control at all times and shall be kept in gear when descending grades.

No vehicle shall be driven at a speed greater than is reasonable and proper. Vehicles shall be operated with due regard for weather, traffic, intersections, width and character of the roadway, type of motor vehicle, and any other existing conditions.

2.1.4 Exhaust

Arrangements shall be made to direct exhaust gases away from the operator's breathing zone.

2.1.5 Heat Shields

When push-tractors are working in tandem, heat shields, or equivalent protection, shall be provided for operators.

2.2 Construction and Maintenance Requirements

The construction and maintenance requirements for haulage vehicles and equipment are listed below:

Windshields: Windshields complying with the applicable provisions of the state vehicle code shall be provided and maintained on haulage vehicles and scrapers.

Equipment and Accessories: Equipment and accessories installed on haulage vehicles shall be arranged so as to avoid impairing the driver's operational vision to the front or sides.

Brakes: Service brake systems for self-propelled, rubber-tired, off-highway equipment manufactured before January 1, 1972 (for scrapers January 1, 1971) shall meet minimum performance criteria for service brake systems as set forth in the Society of Automotive Engineers Recommended Practices listed below. Service, emergency and parking brake systems for self-propelled, rubber-tired, off-highway equipment manufactured after January 1, 1972 (for scrapers January 1, 1971) shall meet the applicable minimum performance criteria for each system as set forth in the same Society of Automotive Engineers Recommended Practices:

Self-Propelled Graders	SAE J236-1971
Trucks and Wagons	SAE J166-1971
Front-End Loaders and Dozers	SAE J237-1971
Self-Propelled Scrapers	SAE J319b-1971

Note: Equipment that meets the performance criteria of SAE Recommended Practice J1152-APR 1980, Braking Performance—Rubber-Tired Construction

Machines, satisfies the requirements of this Section.

Air Tank Service: Liquids should be drained automatically from vehicle's compressed air tanks, but if such automatic equipment is not provided, the tanks shall be drained manually at least once each operating shift.

Cab Shield: Haulage vehicles, whose pay load is loaded by means of cranes, power shovels, loaders, or similar equipment, shall have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.

Fenders complying with the following standards from SAE Recommended Practice J321, November, 1967 or J321b April, 1978, shall be provided on new scrapers, carryalls, related power units, and trailed hauling units manufactured and placed into service after January 1, 1971.

Lights: Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two headlights and two taillights in operable condition.

Canopy: Crawler tractors, bulldozers, carryalls and similar equipment manufactured and used prior to April 1, 1971, except for scrapers, front-end loaders and new equipment covered by 1596, shall have canopy protection and seat belts for the operator when used where there is exposure to falling or rolling objects.

Operating Levers: Operating levers controlling hoisting or dumping devices on haulage bodies shall be equipped with a latch or other device which will prevent accidental starting or tripping of the mechanism.

Trip Handles: Trip handles for tailgates of dump trucks shall be so arranged that in dumping, the operator will not be exposed either to the hazard of being struck by failing material or any part of the truck.

Dump Bodies: Haulage vehicles equipped with dump bodies that tilt to release their load by gravity through an opening at the rear or side shall be provided with a device that gives the operator a clearly audible or visible warning when sufficient force is applied by the elevating

mechanism to cause or sustain dump body elevation.

Hazard Signals: Tractor-scrapers (self-propelled) pushed by other equipment during loading operations shall be provided with a clearly audible or visible warning device that can be activated by the operator of the tractor-scraper to communicate an "ALL STOP" warning to the pushing equipment in event of an emergency.

2.3 Warning Methods

Every vehicle with a haulage capacity of 2 ½ cubic yards or more used to haul dirt, rock, concrete, or other construction material shall be equipped with a warning device that operates automatically while the vehicle is backing. The warning sound shall be of such magnitude that it will normally be audible from a distance of 200 feet and will sound immediately on backing. In congested areas or areas with high ambient noise which obscures the audible alarm, a signaler, in clear view of the operator, shall direct the backing operation.

Those vehicles not subject to the above circumstances and operating in areas where their backward movement would constitute a hazard to employees working in the area on foot, and where the operator's vision is obstructed to the rear of the vehicle shall be equipped with an effective device or method to safeguard employees such as:

- An automatic back-up audible alarm which would sound immediately on backing, or
- An automatic braking device at the rear of the vehicle that will apply the service brake immediately on contact with any obstruction to the rear, or In lieu of the above, administrative controls shall be established such as:
- A spotter or flagger in clear view of the operator who shall direct the backing operation, or
- Other procedures which will require the operator to dismount and circle the vehicle immediately prior to starting a back-up operation, or
- Prohibiting all foot traffic in the work area.

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Other means shall be provided that will furnish safety equivalent to the foregoing for personnel working in the area.

All vehicles shall be equipped with a manually operated warning device which can be clearly heard from a distance of 200 feet.

The operator of all vehicles shall not leave the controls of the vehicle while it is moving under its own engine power.

Hauling or earth moving operations shall be controlled in such a manner as to ensure that equipment or vehicle operators know of the presence of rootpickers, spotters, lab technicians, surveyors, or other workers on foot in the areas of their operations.

2.4 Haulage Vehicle Operation

Vehicles shall not be operated at speeds which will endanger the driver or traffic.

Haulage vehicles shall be under positive control during all periods of operation. When descending grades, the vehicles shall be kept in gear.

When wire rope is being wound on a power-driven drum, a mechanical threading device shall be used, where practicable, to guide the cable. When this operation must be done manually, the feet shall not be used and the hands shall be kept at least 3 feet from the drum.

All vehicles in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use:

- Service brakes, including trailer brake connections;
- Parking system (hand brake);
- Emergency stopping system (brake);

- Tires;
- Horn;
- Steering mechanism;
- Coupling devices;
- Seat belts;
- Operating controls; and
- Safety devices.

All defects affecting safe operation shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, and such where such equipment is necessary.

Exhaust Gases: Vehicle engines shall not be allowed to run in closed garages or other enclosed places, unless vents are provided which effectively remove the exhaust gases from the building.

Unstable Loads: Loads on vehicles shall be secured against displacement.

Tire Repair: Except for emergency field repairs, a safety tire rack, cage, or equivalent protection shall be used when inflating truck or equipment tires after mounting on a rim, if such tires depend upon a locking ring or similar device to hold them on the rim.

Parking Brakes: Whenever the equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set or be otherwise prevented from moving by effective mechanical means.

Scissor points on all front-end loaders which constitute a hazard to the operator shall be adequately guarded.

A loader shall not travel without adequate visibility for the driver and stability of the equipment.

No loading device shall be left unattended until the load or bucket is lowered to the ground, unless proper precautions such as blocking are taken to prevent accidental lowering.

All high lift trucks (e.g., forklifts), industrial trucks, and rider trucks used on a construction site shall conform with the applicable orders in Article 25 of the General Industry Safety Orders and shall meet the following requirements:

- If a load is lifted by two or more trucks working in unison, the proportion of the total load carried by any one truck shall not exceed its capacity.

- Steering or spinner knobs shall not be attached to the steering wheel unless the steering mechanism is of a type that prevents road reactions from causing the steering hand wheel to spin. The steering knob shall be mounted within the periphery of the wheel.

- Loading buckets, scoops, blades or similar attachments on haulage vehicles shall not be used as work platforms or to elevate or transport employees.

2.5 Fueling

No internal combustion engine fuel tank shall be refilled with a flammable liquid while the engine is running. Fueling shall be done in such a manner that the likelihood of spillage is minimal. *If a spill occurs it shall be washed away completely, evaporated, or equivalent action taken to control vapors before restarting the engine.* Fuel tank caps shall be replaced before starting the engine.

A good metal-to-metal contact shall be kept between fuel supply tank or nozzle of supply hose and the fuel tank.

No open lights, welding, or sparking equipment shall be used near internal combustion equipment being fueled or near storage tanks.

No smoking shall be permitted at or near the gasoline storage area or on equipment being fueled. Post a conspicuous sign in each fuel storage and fueling area stating: "**NO SMOKING WITHIN 25 FEET**."

Class I liquids shall not be dispensed by pressure from drums, barrels, and similar containers. Approved pumps taking suction through the top of the container or approved self-closing faucets shall be used.

No repairs shall be made to equipment while it is being fueled.

Each fuel storage tank or drum shall have the word "Flammable" conspicuously marked thereon and should also have a similarly sized word indicating the contents of the container.

A dry chemical or carbon dioxide fire extinguisher rated 6:BC or larger shall be in a location accessible to the fueling area.

2.6 Repair of Haulage Vehicles, Tractors, Bulldozers and Similar Equipment

No repairs shall be attempted on power equipment until arrangements are made to eliminate possibility of injury, caused by sudden movements or operation of the equipment or its parts. When the equipment being repaired is a bulldozer, carryall, ripper, or other machine having sharp or heavy moving parts such as blades, beds, or gates, such parts shall be lowered to the ground or securely and positively blocked in an inoperative position.

All controls shall be in a neutral position, with the engine(s) stopped and brakes set, unless work being performed requires otherwise.

Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done. In all cases where the body is raised for any work, the locking device shall be used.

2.7 Roll-Over Protective Structures (ROPS)

Requirements for ROPS are based on CCR Title 8 Section 1596 and are described in the following subsections.

2.7.1 General Requirements

ROPS and seat belts shall be installed and used on all equipment listed below:

- Scrapers, tractors, front-end loaders, bulldozers, motor graders and water wagon prime movers having brake horsepower ratings above 20. The provisions of this section do not apply to non-rider equipment.

Exceptions to this section include the following:

- Side boom, pipe-laying tractors.
- An operator restraining system, acceptable to the Division, shall be permitted to be used in lieu of the required seat belts on motor graders not designed for seated operations.
- ROPS or seat belts shall not be required for the equipment identified in above when loading/unloading from transportation vehicles on relatively flat surfaces.
- Rollers and compactors having a weight greater than 5,950 pounds.
- Rollers or compactors having segmented and/or sheepsfoot-type wheels or drums.

All rollers and compactors when operating under any of the following conditions:

- Parallel to and within 3 feet of a down slope steeper than 3 feet horizontal to 1 foot vertical, or
- Within 3 feet of a vertical or nearly vertical drop-off exceeding 1 foot in height, or
- On any grade exceeding 15 percent (10 feet horizontal to 1½ feet vertical)

2.7.2 ROPS Design Criteria

ROPS shall be in compliance with or equivalent to SAE Recommended Practice J-1040-a,

February, 1975, for equipment manufactured on or after April 1, 1971, or J1040c, April, 1979.

2.7.3 Overhead Protection

ROPS shall provide operator protection against the hazard of falling objects.

2.7.4 Retrofit Design Criteria

The basic design criteria for retrofit ROPS used on scrapers, tractors, front-end loaders, bulldozers, motor graders and water wagon prime movers manufactured prior to April 1, 1971, and for rollers and compactors manufactured prior to July 1, 1977 must meet the requirements defined in Section 1596(d).

2.7.5 Seat Belts

Seat belts shall be adequate for the intended service and in good repair. Belts shall meet the following requirements, which parallel those of SAE Recommended Practice J-386-a, November, 1973, and the applicable provisions of SAE Recommended Practice, J-4-c, July, 1965. The following requirements apply:

Adjustment: The seat belts shall be capable of snug adjustment by the occupant by a means easily within his reach or shall be provided with an automatic locking or emergency locking retractor.

Marking: Each seat belt shall be permanently and legibly marked or labeled with year of manufacture, model or style number and name or trademark of manufacturer or distributor, or of the importer if manufactured outside of the United States. Marking should also include indication of compliance with SAE Recommended Practice J-386-a, November, 1973.

Stiffness: To minimize "roping," the seat belt webbing shall be woven and/or treated to produce a stiffness in the transverse direction equal to or greater than that obtained with a weave of double plain with one up, one down binder, without stuffers. This stiffness shall be effective for the usable life of the webbing. The webbing shall be flexible in the longitudinal direction to permit adjustment to -40°F.

Material: The seat belt webbing material shall have a resistance to acids, alkalis, mildew,

aging, moisture and sunlight equal to or better than that of untreated polyester fiber. The webbing shall not be less than three (3) inches in width; its ends shall be protected or treated to prevent unraveling and the breaking strength shall be at least 6,000 pounds.

Release: The seat belt buckle shall be designed so that it can be easily released with a single motion. It shall also be capable of being released with either available mittened hand.

Closure: The seat belt buckle shall be designed so that it can be easily closed with mittened hands.

Location: When a two-piece belt is used, the adjustment means shall be on each half of the belt to allow for the centering of the buckle on the operator.

Operation: Each adjustment shall be capable of being made with the use of one mittened hand.

Tests: A typical complete seat belt assembly, including webbing, straps, buckles, adjustment and attachment hardware, and retractors, shall be capable of passing the following destructive tests:

- The assembly loop shall withstand, without failure, a force of not less than 5,000 pounds and each structural component of the assembly a force of not less than 2,500 pounds.
- The length of the assembly loop between anchorages shall not increase more than 14 inches and each half of the assembly loop shall not increase more than 7 inches when subjected to a force of 5,000 pounds.
- Any webbing cut by the hardware during testing shall have a breaking strength at the cut of not less than 4,200 pounds.
-
-

Revision Date	Document Authorizer	Revision Details
10/1/2008	Chris McClain	Update from 1998 format

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HASP MSDS



Common Name: DAYTON MULTI-PURPOSE CUTTING OIL 6Z150

Manufacturer: MORAINE OIL

MSDS Revision Date: 8/1/1990

Grainger Item Number(s): 6Z149

Manufacturer Model Number(s): INACTIVE

MORAINE OIL SALES, INC., 1212 W. Second Street, Oconomowoc, Wisconsin 53066
414/5677-7523
W.W. Grainger, Inc., 333 Knightsbridge Pkwy, Lincolnshire, IL 60069
708/913-7400
6Z149

Revision date: August 1, 1990
PRODUCT TRADE NAME; Dayton Multi-Purpose Cutting CAS# 64742650
Oil #6Z150
TRANSPORTATION EMERGENCY PH NO: 414/567-7523
NFPA CODE: Health: 0 Fire: 1 Reactivity: 0
Petroleum Lubricating Mineral
Oil range % 95.00 - 99.99
Additive: Proprietary

SECTION 1 - HAZARDOUS INGREDIENTS

- This material does not contain any chemical listed as a carcinogen or potential carcinogen by OSHA, IARC Monographs or National Toxicology Program.
= 2SF34 =
- None

SECTION 2 - FIRE AND EXPLOSION HAZARDS

FLASH POINT: 390 F
UPPER FLAMMABLE LIMIT: Not Determined LOWER FLAMMABLE LIMIT: Not Determined
EXTINGUISHING MEDIA: CO2, dry chemical, foam, water spray; water fog
SPECIAL FIREFIGHTING PROCEDURES: Wear self-contained breathing apparatus with full face piece
UNUSUAL FIRE & EXPLOSION HAZARDS: None

SECTION 3 - HEALTH HAZARD DATA

ORAL TOXICITY: Greater than 5000 mg/kg in rats. Based on data from

components
EYE IRRITATION: Not expected to cause eye irritation. Based on data from components
SKIN IRRITATION: Not expected to cause skin irritation. Based on data from components
OTHER: Unknown TLV: None established. Oil mist = 5 mg/cu meter

Emergency First Aid Procedures
SKIN: Wash with soap & water EYE: Flush with water for 15 minutes
INHALATION: Remove to fresh air. See physician if irritation persists
ORAL: Call a physician. DO NOT induce vomiting. ADDITIONAL: None

SECTION 4 - SPECIAL PROTECTION INFORMATION

VENITTATION PROCEDURE: Mechanical ventilation recommended.
EYE PROTECTION: Safety Glasses
GLOVES PROTECTION: Neoprene or nitrile rubber gloves recommended
OTHER PROTECTION: None

SECTION 5 - PHYSICAL DATA

VAPOR PRESSURE: Not Determined pH; Not determined
SPECIFIC GRAVITY: 0.875 WATER SOLUBILITY: In soluble
PRECENT VOLATILE: Not Determined
VAPOR DENSITY: Not Determined EVAPORATION RATE: Not Determined
ODOR: Mild
APPEARANCE: Amber Liquid

SECTION 6 - STABILITY

STABILITY; Stable INCOMPATIBILITY: Oxidizing agents
POLYMERIZATION: Will not occur
THERMAL DECOMPOSITION: Oxides of carbon

SECTION 7 - SPILL OR LEAK PROCEDURES

SPILL PROCEDURES: Prevent entry into sewers and waterways. Pick up free liquid for recycle/disposal. Absorb small amounts on inert material for disposal.
WASTE DISPOSAL: If disposal of, this material is believed to be non-hazardous. Disposal should be in compliance with federal, state and local laws.

SECTION 8 - SPECIAL PRECAUTIONS

SPECIAL PRECAUTIONS: Remove contaminated clothing and launder before reuse.

SECTION 9 - TRANSPORTATION AND LABELING

DOT PROPER SHIPPING NAME: Not Applicable
DOT HAZARD CLASS: Not Applicable DOT ID NUMBER: None
IMO CLASS: None ICAO CLASS: None EPA HAZARDOUS SUBSTANCES: None
PRECAUTIONARY LABELS: None

The information presented herein has been compiled from sources considered to be dependable and is accurate to the best of Moraine Oil Sales' knowledge; however, Moraine makes no warranty whatsoever, expressed or implied, of MERCHANITABILITY or FITNESS FOR THE PARTICULAR PURPOSE, regarding the accuracy of such data or the results to be obtained from the use thereof. Moraine assumes to responsibility for injury to recipient or to third persons or for any damage to any property and recipient assumes all such risks.

Monsanto
Material Safety Data

POLYCHLORINATED BIPHENYLS (PCBs)

Emergency Phone No.
(Call Collect)
314-694-1000

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: POLYCHLORINATED BIPHENYLS (PCBs)
Aroclor® Series 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, 1268
Therminol® FR Series

MSDS Number: M00018515 Date: 12/95

Chemical Family: Chlorinated Hydrocarbons
Chemical Name: Polychlorinated biphenyls
Synonyms: PCBs, Chlorodiphenyls, Chlorinated biphenyls

Trade Names/Common Names:

PYRANOL® and INERTEEN® are trade names for commonly used dielectric fluids that may have contained varying amounts of PCBs as well as other components including chlorinated benzenes.

ASKAREL is the generic name for a broad class of fire resistant synthetic chlorinated hydrocarbons and mixtures used as dielectric fluids that commonly contained about 30 - 70% PCBs. Some ASKAREL fluids contained 99% or greater PCBs and some contained no PCBs.

PYDRAUL® is the trade name for hydraulic fluids that, prior to 1972, may have contained varying amounts of PCBs and other components including phosphate esters.

The product names/trade names are representative of several commonly used Monsanto products (or products formulated with Monsanto products). Other trademarked PCB products were marketed by Monsanto and other manufacturers. PCBs were also manufactured and sold by several European and Japanese companies. Contact the manufacturer of the trademarked product, if not in this listing, to determine if the formulation contained PCBs.

In 1972, Monsanto restricted sales of PCBs to applications involving only closed electrical systems, (transformers and capacitors). In 1977, all manufacturing and sales were voluntarily terminated. In 1979, EPA restricted the manufacture, processing, use, and distribution of PCBs to specifically exempted and authorized activities.

MONSANTO COMPANY, 800 N. LINDBERGH BLVD., ST. LOUIS, MO 63167

FOR CHEMICAL EMERGENCY, SPILL, LEAK, FIRE, EXPOSURE, OR ACCIDENT
Call CHEMTREC - Day or Night - 1-800-424-9300 Toll free in the continental U.S., Hawaii, Puerto Rico, Canada, Alaska, or Virgin Islands. For calls originating elsewhere: 202-483-7616 (collect calls accepted)

For additional nonemergency information, call: 314-694-3344.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemically, commercial PCBs are defined as a series of technical mixtures, consisting of many isomers and compounds that vary from mobile, oily liquids to white crystalline solids and hard noncrystalline resins. Technical products vary in composition, in the degree of chlorination, and possibly according to batch.

The mixtures generally used contain an average of 3 atoms of chlorine per molecule (42% chlorine) to 5 atoms of chlorine per module (54% chlorine). They were used as components of dielectric fluids in transformers and capacitors. Prior to 1972, PCB applications included heat transfer media, hydraulic, and other industrial fluids, plasticizers, carbonless copy paper, paints, inks, and adhesives.

Component	CAS No.
chlorinated biphenyl	1336-36-3
Aroclor 1016	12674-11-2
Aroclor 1221	11104-28-2
Aroclor 1232	11141-16-5
Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5
Aroclor 1262	37324-23-5
Aroclor 1268	11100-14-4

There are also CAS Numbers for individual PCB congeners and for mixtures of Aroclor® products.

PCBs are identified as hazardous chemicals under criteria of the OSHA Hazard Communication Standard (29 CFR Part 1910.1200). PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987)-Group 2A and in the National Toxicology Program (NTP) Annual Report on Carcinogens (Seventh).

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance and Odor: PCB mixtures range in form and color from clear to amber liquids to white crystalline solids. They have a mild, distinctive odor and are not volatile at room temperature. Refer to Section 9 for details.

WARNING!
CAUSES EYE IRRITATION
MAY CAUSE SKIN IRRITATION

PROCESSING AT ELEVATED TEMPERATURES MAY RELEASE VAPORS OR FUMES WHICH MAY CAUSE RESPIRATORY TRACT IRRITATION

POTENTIAL HEALTH EFFECTS

Likely Routes of Exposure: Skin contact and inhalation of heated vapors

Eye Contact: Causes moderate irritation based on worker experience.

Skin Contact: Prolonged or repeated contact may result in redness, dry skin and defatting based on human experience. A potential exists for developing chloracne. PCBs can be absorbed through intact skin.

Inhalation: Due to the low volatility of PCBs, exposure to this material in ambient conditions is not expected to produce adverse health effects. However, at elevated processing temperatures, PCBs may produce a vapor that may cause respiratory tract irritation if inhaled based on human experience.

Ingestion: No more than slightly toxic based on acute animal toxicity studies. Coughing, choking and shortness of breath may occur if liquid material is accidentally drawn into the lungs during swallowing or vomiting.

Other: Numerous epidemiological studies of humans, both occupationally exposed and nonworker environmentally exposed populations, have not demonstrated any causal relationship between PCB exposure and chronic human illnesses such as cancer or neurological or cardiovascular effects. PCBs at high dosage can cause skin symptoms; however, these subside upon removal of the exposure source.

Refer to Section 11 for toxicological information.

4. FIRST AID MEASURES

IF IN EYES, immediately flush with plenty of water for at least 15 minutes. If easy to do, remove any contact lenses. Get medical attention. Remove material from skin and clothing.

IF ON SKIN, immediately flush the area with plenty of water. Wash skin gently with soap as soon as it is available. Get medical attention if irritation persists.

IF INHALED, remove person to fresh air. If breathing is difficult, get medical attention.

IF SWALLOWED, do NOT induce vomiting. Rinse mouth with water. Get medical attention. Contact a Poison Control Center. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

NOTE TO PHYSICIANS: Hot PCBs may cause thermal burn. If electrical equipment arcs between conductors, PCBs or other chlorinated hydrocarbon dielectric fluids may decompose to produce hydrochloric acid (HCl), a respiratory irritant. If large amounts are swallowed, gastric lavage may be considered.

5. FIRE FIGHTING MEASURES

Flash Point: 284 degrees F (140 degrees C) or higher depending on the chlorination level of the Aroclor product

Fire Point: 349 degrees F (176 degrees C) or higher depending on the chlorination level of the Aroclor product

NOTE: Refer to Section 9 for individual flash points and fire points.

Extinguishing Media: Extinguish fire using agent suitable for surrounding fire. Use dry chemical, foam, carbon dioxide or water spray. Water may be ineffective. Use water spray to keep fire-exposed containers or transformer cool.

PCBs are fire-resistant compounds. They may decompose to form CO, CO2, HCl, phenolics, aldehydes, and other toxic combustion products under severe conditions such as exposure to flame or hot surfaces.

Dielectric fluids having PCBs and chlorinated benzenes as components have been reported to produce polychlorinated dibenzo-p-dioxins (PCDDs) and furans (PCDFs) during fire situations involving electrical equipment. At temperatures in the range of 600-650 degrees C In the presence of excess oxygen, PCBs may form polychlorinated dibenzofurans (PCDFs). Laboratory studies under similar conditions have demonstrated that PCBs do not produce polychlorinated dibenzo-p-dioxins (PCDDs).

Federal regulations require all PCB transformers to be registered with fire response personnel.

If a PCB transformer is involved in a fire-related incident, the owner of the transformer may be required to report the incident. Consult and follow appropriate federal, state and local regulations.

Fire Fighting Equipment: Fire fighters and others exposed to products of combustion should wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.

6. ACCIDENTAL RELEASE MEASURES

Cleanup and disposal of liquid PCBs and other PCB items are strictly regulated by the federal government. The regulations are found at 40 CFR Part 761. Consult these regulations as well as applicable state and local regulations prior to any cleanup or disposal of PCBs, PCB items, or PCB contaminated items.

If PCBs leak or are spilled, the following steps should be taken immediately:

All nonessential personnel should leave the leak or spill area.

The area should be adequately ventilated to prevent the accumulation of vapors.

The spill/leak should be contained. Loss to sewer systems, navigable waterways, and streams should be prevented. Spills/leaks should be removed promptly by means of absorptive material, such as sawdust, vermiculite, dry sand, clay, dirt or other similar materials, or trapped and removed by pumping or other suitable means (traps, drip-pans, trays, etc.).

Personnel entering the spill or leak area should be furnished with appropriate personal protective equipment and clothing as needed. Refer to Section 8 for personal protection equipment and clothing.

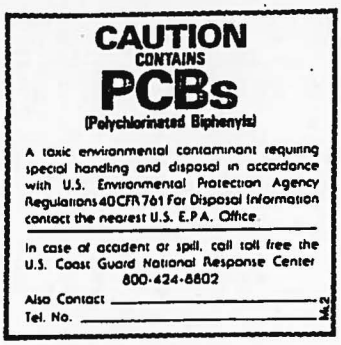
Personnel trained in emergency procedures and protected against attendant hazards should shut off sources of PCBs, clean up spills, control and repair leaks, and fight fires in PCB areas.

Refer to Section 13 for disposal information and Sections 14 and 15 for information regarding reportable quantity, and Section 7 for marking information.

7. HANDLING AND STORAGE

Care should be taken to prevent entry into the environment through spills, leakage, use vaporization, or disposal of liquid or containers. Avoid prolonged breathing of vapors or mists. Avoid contact with eyes or prolonged contact with skin. If skin contact occurs, remove by washing with soap and water. Following eye contact, flush with water. In case of spillage onto clothing, the clothing should be removed as soon as practical, skin washed, and clothing laundered. Comply with all federal, state, and local regulations.

Federal regulations under the Toxic Substances Control Act require PCBs, PCB items, storage areas, transformer vaults, and transport vehicles to be marked (check regulations, 40 CFR 761, for details).





Storage: The storage of PCB items or equipment (those containing 50 ppm or greater PCBs) and PCB waste is strictly regulated by 40 CFR Part 761. The storage time is limited, the storage area must meet physical requirements, and the area must be labeled.

Avoid contact with eyes.
Wash thoroughly after handling.
Avoid breathing processing fumes or vapors.
Process using adequate ventilation.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection: Wear chemical splash goggles and have eye baths available where there is significant potential for eye contact.

Skin Protection: Wear appropriate protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine the appropriate type glove for a given application. Wear chemical goggles, face shield, and chemical resistant clothing such as a rubber apron when splashing is likely. Wash immediately if skin is contacted. Remove contaminated clothing promptly and launder before reuse. Clean protective equipment before reuse. Provide a safety shower at any location where skin contact can occur. Wash thoroughly after handling.

ATTENTION! Repeated or prolonged skin contact may cause chloracne in some people.

Respiratory Protection: Avoid breathing vapor, mist, or dust. Use NIOSH/MSHA approved equipment when airborne exposure limits are exceeded. Full facepiece equipment is recommended when airborne exposure limits are exceeded and, if used, replaces the need for face shield and/or chemical splash goggles. Consult respirator manufacturer to determine the type of equipment for a given application. The respirator use limitations specified by NIOSH/MSHA or the manufacturer must be observed. High airborne concentrations may require use of self-contained breathing apparatus or supplied air respirator. Respiratory protection programs must be in compliance with 29 CFR Part 1910.134.

ATTENTION! Repeated or prolonged inhalation may cause chloracne in some people.

Ventilation: Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). If practical, use local mechanical exhaust ventilation at sources of vapor or mist, such as open process equipment.

Airborne Exposure Limits:

Product: Chlorodiphenyl (42% chlorine)

OSHA PEL: 1 mg/m^3 8-hour time-weighted average - Skin*
ACGIH TLV: 1 mg/m^3 8-hour time-weighted average - Skin*

Product: Chlorodiphenyl (54% chlorine)

OSHA PEL: 0.5 mg/m^3 8-hour time-weighted average - Skin*
ACGIH TLV: 0.5 mg/m^3 8-hour time-weighted average - Skin*

*For Skin notation see Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Government Industrial Hygienists, 1995-1996.

9. PHYSICAL AND CHEMICAL PROPERTIES

PROPERTIES OF SELECTED AROCLORS[1]							
PROPERTY	**1016**	**1221**	**1232**	**1242**	**1248**	**1254**	**1260**
Color (APHA)	40	100	100	100	100	100	150
Physical state	mobile oil	mobile oil	mobile oil	mobile oil	mobile oil	viscous liquid	sticky resin
Stability	inert	inert	inert	inert	inert	inert	inert
Density (lb/gal 25°C)	11.40	9.85	10.55	11.50	12.04	12.82	13.50
Specific gravity x/15.5°C	1.36-1.37 x-25°	1.18-1.19 x-25°	1.27-1.28 x-25°	1.30-1.39 x-25°	1.40-1.41 x-65°	1.49-1.50 x-65°	1.55-1.56 x-90°
Distillation range (°C)	323-356	275-320	290-325	325-366	340-375	365-390	385-420
Acidity mg KOH/g, maximum	.010	.014	.014	.015	.010	.010	.014
Fire point (°C)	none to boiling point	176	238	none to boiling point	none to boiling point	none to boiling point	none to boiling point
Flash point (°C)	170	141-150	152-154	176-180	193-196	none	none
Vapor pressure (mm Hg @ 100°F)	NA	NA	0.005	0.001	0.00037	0.00006	NA
Viscosity (Saybolt Univ. Sec. @ 100°F) (centistokes)	71-81 13-16	38-41 3.6-4.6	44-51 5.5-7.7	82-92 16-19	185-240 42-52	1800-2500 390-540	— —

[1]NA—*Not Available*

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Stability: PCBs are very stable, fire-resistant compounds.
Materials to Avoid: None
Hazardous Decomposition
Products: PCBs may decompose to form CO, CO_2, HCl, phenolics, aldehydes, and other toxic combustion products under severe conditions such as exposure to flame or hot surface.
Hazardous Polymerization: Does not occur.

11. TOXICOLOGICAL INFORMATION

Data from laboratory studies conducted by Monsanto and from the available scientific literature are summarized below.
Single exposure (acute) studies indicate:
Oral - Slightly Toxic (Rat LD50 - 8.65 g/kg for 42% chlorinated; 11.9 g/kg for 54% chlorinated)

The liquid products and their vapors are moderately irritating to eye tissues. Animal experiments of varying duration and at different air concentrations show that for similar exposure conditions, the 54% chlorinated material produces more liver injury than the 42% chlorinated material.

There are literature reports that PCBs can impair reproductive functions in monkeys. The National Cancer Institute (NCI) performed a study in 1977 using Aroclor 1254 with both sexes of rats. NCI stated that the PCB, Aroclor 1254, was not carcinogenic under the conditions of their bioassay. There is sufficient evidence in the scientific literature to conclude that Aroclor 1260 can cause liver cancer when fed to rodents at high doses. Similar experiments with less chlorinated PCB products have produced negative or equivocal results.

The consistent finding in animal studies is that PCBs produce liver injury following prolonged and repeated exposure by any route, if the exposure is of sufficient degree and duration. Liver injury is produced first, and by exposures that are less than those reported to cause cancer in rodents. Therefore, exposure by all routes should be kept sufficiently low to prevent liver injury.

Numerous epidemiological studies of humans, both occupationally exposed and nonworker environmentally exposed population, have not demonstrated any causal relationship between PCB exposure and chronic human illnesses such as cancer or neurological or cardiovascular effects. PCBs at high dosage can cause skin symptoms; however, these subside upon removal of the exposure source.

PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987)-Group 2A and in the National Toxicology Program (NTP) Seventh Annual Report on Carcinogens.

12. ECOLOGICAL INFORMATION

Care should be taken to prevent entry of PCBs into the environment through spills, leakage, use, vaporization or disposal of liquid or solids. PCBs can accumulate in the environment and can adversely affect some animals and aquatic life. In general, PCBs have low solubility in water, are strongly bound to soils and sediments, and are slowly degraded by natural processes in the environment.

13. DISPOSAL CONSIDERATIONS

The disposal of PCB items or equipment (those containing 50 ppm or greater PCBs) and PCB wastes is strictly regulated by 40 CFR Part 761. For example, all wastes and residues containing PCBs (wiping cloths, absorbent material, used disposable protective gloves and clothing, etc.) should be collected, placed in proper containers, marked and disposed of in the manner prescribed by EPA regulations (40 CFR Part 761) and applicable state and local regulations.

14. TRANSPORT INFORMATION

The data provided in this section are for information only. Please apply the appropriate regulations to properly classify a shipment for transportation.

DOT Classification:	IF WEIGHT OF PCBs TO BE SHIPPED IS OVER ONE POUND, THE FOLLOWING CLASSIFICATION AND LABEL APPLY.	
DOT Label:	LIQUID:	Environmentally Hazardous Substance, liquid, n.o.s. (Contains PCB), 9, UN 3082, III
	SOLID:	Environmentally Hazardous Substance, solid, n.o.s. (Contains PCB), 9, UN 3077, III
DOT Label:	Class: 9	
DOT Reportable Quantity:	One Pound	
IMO Classification:	Polychlorinated Biphenyls, IMO Class 9, UN 2315, II IMO Page 9034, EMS 6.1-02	
IATA/ICAO Classification:	Polychlorinated Biphenyls, 9, UN2315, II	

15. REGULATORY INFORMATION

For regulatory purposes, under the Toxic Substances Control Act, the term "PCBs" refers to a chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such a substance (40 CFR Part 761).

TSCA Inventory: not listed.

Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370): Immediate, Delayed.
SARA Section 313 Toxic Chemical(s): Listed-1993 (De Minimis concentration 0.1%.)

Reportable Quantity (RQ) under DOT (49 CFR) and CERCLA Regulations: 1 lb. (polychlorinated biphenyls) PCBs.

Release of more than 1 (one) pound of PCBs to the environment requires notification to the National Response Center (800-424-8802 or 202-426-2675).

Various state and local regulations may require immediate reporting of PCB spills and may also define spill cleanup levels. Consult your attorney or appropriate regulatory officials for information relating to spill reporting and spill cleanup.

16. OTHER INFORMATION

Reason for revision: Conversion to the 16 section format. Supersedes MSDS dated 10/88.

Therminol®, Aroclor® and Pydraul® are registered trademarks of Monsanto Company
Pyranol® is a registered trademark of General Electric Company
Inerteen® is a registered trademark of Westinghouse Electric Corporation

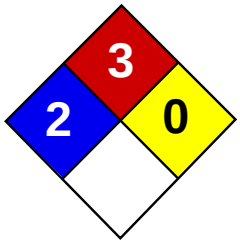
FOR ADDITIONAL NONEMERGENCY INFORMATION, CONTACT:

Gary W. Mappes
Manager, Product & Environmental Safety

Robert G. Kaley, II
Director, Environmental Affairs

Monsanto Company
800 North Lindbergh Boulevard
St. Louis, MO 63167
(314) 694-3344

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Material Safety Data Sheet
Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (irritant, sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:
CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:
Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm , it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastroinestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

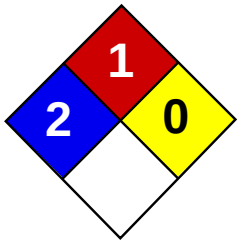
References:
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

Other Special Considerations: Not available.

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Last Updated: 11/01/2010 12:00 PM

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Material Safety Data Sheet
Methylene chloride MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methylene chloride

Catalog Codes: SLM2398, SLM3772, SLM1297, SLM2677, SLM4054

CAS#: 75-09-2

RTECS: PA8050000

TSCA: TSCA 8(b) inventory: Methylene chloride

CI#: Not available.

Synonym: Dichloromethane

Chemical Name: Methylene Chloride

Chemical Formula: C-H2-Cl2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methylene chloride	75-09-2	100

Toxicological Data on Ingredients: Methylene chloride: ORAL (LD50): Acute: 1600 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects: Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (irritant, permeator). Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Classified + (Proven.) by OSHA. Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, liver, mucous membranes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 556°C (1032.8°F)

Flash Points: Not available.

Flammable Limits: LOWER: 12% UPPER: 19%

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances: Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions: Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/ fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls: Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection: Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill: Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: TWA: 50 from ACGIH (TLV) [United States] TWA: 174 from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 84.93g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 39.75°C (103.5°F)

Melting Point: -96.7°C (-142.1°F)

Critical Temperature: Not available.

Specific Gravity: 1.3266 (Water = 1)

Vapor Pressure: 46.5 kPa (@ 20°C)

Vapor Density: 2.93 (Air = 1)

Volatility: Not available.

Odor Threshold: 214 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, n-octanol, acetone.

Solubility: Easily soluble in methanol, diethyl ether, n-octanol, acetone. Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 1600 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 52000 1 hours [Rat].

Chronic Effects on Humans: CARCINOGENIC EFFECTS: Classified + (Proven.) by OSHA. Classified 2B (Possible for human.) by IARC. Causes damage to the following organs: lungs, the nervous system, liver, mucous membranes, central nervous system (CNS).

Other Toxic Effects on Humans: Very hazardous in case of ingestion, of inhalation. Hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Dichloromethane UNNA: 1593 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations: California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Methylene chloride California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Methylene chloride Pennsylvania

RTK: Methylene chloride Massachusetts RTK: Methylene chloride TSCA 8(b) inventory: Methylene chloride SARA 313 toxic chemical notification and release reporting: Methylene chloride CERCLA: Hazardous substances.: Methylene chloride

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment: Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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COMMUNITY AIR MONITORING PLAN

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

FIELD FORMS

TETRA TECH

INSPECTION REPORT
CCH SYRACUSE LANDFILLS

Project Number: SOUTH LANDFILL Location: Syracuse, NY	Date: Weather: (8AM): (1PM): Work Period:	Report # _____ Page ____ of _____
CONTRACTOR	NUMBER OF PERSONNEL/ EQUIPMENT	TRADE OR PROFESSION
Description	Item	Comment
Photographs at GP-5, GV-2, GV-7	Photo Numbers:_____	
Photographs along wetland bushes	Photo Numbers:_____	
Photographs at SW-2 (3 minimum)	Photo Numbers:_____	
Open water – Wetland C %		
Any damaged gas vents, probes, MWs?		
OBSERVATIONS:		
Buffer zone grass health		
Landfill cap grass health and last mow date		
Wetland bush – number dead		
Observed wildlife		
Wetland C plant health and species		
Other Photo ID Numbers:		
TIME ARRIVED: TIME DEPARTED:		SIGNATURE:

INSPECTION REPORT
CCH SYRACUSE LANDFILLS

Project Number: NORTH LANDFILL Location: Syracuse, NY	Date: Weather: (8AM): (1PM): Work Period:	Report # _____ Page ____ of _____
CONTRACTOR	NUMBER OF PERSONNEL/ EQUIPMENT	TRADE OR PROFESSION
Description	Item	Comment
Photographs at GP-1 through GP-6	Photo Numbers:_____	
Photographs along Wetland A bushes	Photo Numbers:_____	
Photographs along Wetland B bushes	Photo Numbers:_____	
Open water – Wetland A % & B %		
Photos pan Wetland A & B	Photo Numbers:_____	
Any damaged gas vents, probes, MWs?		
OBSERVATIONS:		
Buffer zone grass health (NE Conservation/Wildlife Mix)		
Landfill cap grass health and last mow date		
Wetland bush – number dead		
Observed wildlife		
Wetland A plant health and species		
Wetland B plant health and species		
Other Photo ID Numbers:		
TIME ARRIVED: TIME DEPARTED:		SIGNATURE:

SITE WIDE INSPECTION REPORT
CCH SYRACUSE LANDFILLS

Project Number: SOUTH & NORTH LANDFILLS Location: Syracuse, NY	Date: Weather: (8AM): (1PM): Work Period:	Report # _____ Page ____ of _____
CONTRACTOR	NUMBER OF PERSONNEL/ EQUIPMENT	TRADE OR PROFESSION
Description	Item	Comment
Normal Annual or Severe Event? (circle 1)	Photo Numbers:_____	
Institutional Control Compliance	Photo Numbers:_____	
Engineered Control Effectiveness	Photo Numbers:_____	
Site Management Activities Conducted		
Permit and Schedule Compliance		
Site Records up to date?		
OBSERVATIONS:		
Damage due to weather event		
NYSDEC or other visitors present:		
Special observations related to annual report:		
Other activities completed this inspection:		
Other Photo ID Numbers:		
TIME ARRIVED: TIME DEPARTED:		SIGNATURE:

FIELD LOG FOR SOIL SAMPLES

Project #:	Drilled By (Company):	Drilling Method:	Borehole Number:
Project Name:	Drilled By (Crew Chief):	Sampling Method:	
Site Location:	Type of Drill Rig:		Page of
Date (start): Date (end):		Final Borehole Diameter: inches	Logged By:

Sample #	Depth Interval (ft bgs)	Blow Counts (per 6 inches)				Sample Recovery Time & Length (24 hr & ft)	Particle Size Distr. (Est. to nearest 5%)				Size			Angularity		Silt and Clay Soil Identification Criteria				Munsell Color		Odor	Moisture Content	Other Features	Qu
		1st	2nd	3rd	4th		Cbbls Bldrs	Grvl	Sand	Silt & Clay	Max (in)	Grvl	Sand	Grvl	Sand	Plas-ticity	Dry Strngth	Dila-tancy	Tough-ness	Number	Name				
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		
												F C	F M C	A SA SR R	A SA SR R	None L M H	N L M H VH	None S R	Low Med Hi				Dry Moist Wet		

End of Boring:
Start Time (Military):
Time Drilling Completed (Military):

WELL DEVELOPMENT/PURGE SUMMARY FORM

WELL ID. _____

PROJECT INFORMATION		WELL INFORMATION		INSTRUMENTS	
PROJECT		WELL COORDINATES		TEMPERATURE	
		CASING ELEVATION		CONDUCTIVITY	
PROJECT NO.		GROUND LEVEL ELEVATION		pH METER	
LOCATION		CONSTRUCTED WELL DEPTH		WATER LEVEL PROBE	
PERSONNEL		WELL CASING INSIDE DIAMETER		OTHER	

Date	Time (Military)	Purge Method	Water Level* (Feet)	Measured Well Depth* (Feet)	Total Volume Purged** (Gallons)	APPEARANCE Color / Odor / Clarity	pH (s.u.)	Temp (^{o}C)	Elec. Cond. (umhos/cm) Measured	Elec. Cond. (umhos/cm) at 25^{o}C	COMMENTS

One Well Volume = _____ **Can Well be purged dry? Yes No**

*** Depth below top of well casing. Record both initial and final measurements when using as Well Development Summary.**

**** Purge three to four well casing volumes, if possible, prior to sampling.**

TETRA TECH

EQUIPMENT CALIBRATION FORM

Equipment Make	
Equipment Model	
Instrument Identification	

DATE	TIME	CALIBRATION MEDIA	RESULTS	COMMENTS

TETRA TECH

FIELD PID DATA FORM

Project Number:	Date(s):
Project Name:	Personnel:
Site Location:	Meter Identificaiton:
	Probe eV:

Sample Number	Location	Sample Media (1)	Moisture (2)	Time Sample Collected	Time Sample Analyzed	Volatilization Period Air Temp. (^{O}C)	PID Readings (Instrument Units)			Comments
							Background	At 15 seconds	Peak Response	

(1) SO - Soil SD - Sediment GW - Ground Water SW - Surface Water WS - Waste (Solid) WL - Waste (Liquid) SG- Soil Gas Air

(2) D - Dry M - Moist W - Wet

TETRA TECH

FIELD SOIL GAS DATA FORM

Project Number:	Date(s):
Project Name:	Personnel:
Site Location:	PID Identification: / Probe eV:
	Gas Meter Identification:

Sample Number	Location	Probe Depth (inches)	Sample Media (1)	% LEL	O_2 (ppm)	CO (ppm)	H_2S (ppm)	PID Readings (Instrument Units)			Comments
								Background	Peak Response	After 15 sec.	

(1) SO - Soil SD - Sediment GW - Ground Water SW - Surface Water WS - Waste (Solid) WL - Waste (Liquid)

(2) D - Dry M - Moist W - Wet

TETRA TECH

EXPLOSIVE GAS MONITORING
FIELD DATA SHEET

Site: _____ Meteorologic Data: _____ Attach data from preceding days (Optional)

Ambient Temperature: _____ Barometric Pressure _____ (inches Hg)

Personnel: _____ Date: _____ Measurement Station: NOAA _____ On-Site _____ Other _____

MONITORING LOCATION TYPE:		FIELD INSTRUMENTATION:						
Monitoring Probe	_____	LEL Meter	Mod #	_____	S/N	_____	Calib. Date/Time	_____
Barhole Probe	_____	Pressure Gauge	Mod #	_____	S/N	_____	Calib. Date/Time	_____
Continuous Monitor	_____	Water Level Meter	Mod #	_____	S/N	_____	Calib. Date/Time	_____
Hand Held (Ambient)	_____	Other	Mod #	_____	S/N	_____	Calib. Date/Time	_____

LOCATION IDENTIFICATION							
Monitoring Probe Construction							
Total Depth (feet)							
Depth to Top of Screen (feet)							
Monitoring Probe Condition							
Clearly Labeled?	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____
Pro. Csg. In Good Condition?	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____
Concrete Pad Intact?	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____
Padlock Functional?	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____
Inner Csg. Properly Capped?	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____
Sample Ftg. Good Condition?	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____
Field Measurements							
Time of Measurement	_____ AM PM	_____ AM PM	_____ AM PM	_____ AM PM	_____ AM PM	_____ AM PM	_____ AM PM
Pressure (inches W.C.)							
% LEL							
% Carbon Monoxide							
% Oxygen							
% Hydrogen Sulfide							
Depth to Water (feet)							
Top of Screen Submerged?	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____	Yes ____ No _____
Comments							

I certify that these data were obtained in accordance with applicable regulatory and project protocols:

Signature: Date

TETRA TECH

FIELD SURFACE WATER QUALITY SAMPLING AND ANALYSIS FORM

PROJECT INFORMATION		INSTRUMENTS	
PROJECT		Temp. & pH	
PROJECT NO.		Conductivity	
LOCATION		ORP	
PERSONNEL		DO	

SAMPLE POINT ID						
WATER TYPE		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
DATE (month/day/year)						
CLOCK TIME (Military)						
WATER BODY TYPE						
SAMPLE LOCATION						
WATER DEPTH (feet)*						
SAMPLE DEPTH (feet)*						
SAMPLING DEVICE						
FIELD TEMPERATURE (^{o}C)						
pH						
ELEC. COND. (uS/cm)	Measured					
	at 25^{o} C					
ORP (mV)						
DISSOLVED OXYGEN (ppm)						
DISSOLVED OXYGEN (% Sat.)						
COLOR						
ODOR						
CLARITY						
SAMPLING PARAMETERS		# OF CONTAINERS & VOLUME; CONTAINER TYPE (A = AMBER GLASS; G = GLASS; P = PLASTIC); PRESERVATIVE TYPE (L = LAB ADDED; F = FIELD ADDED) OR NEUTRAL; FILTERED (YES or NO)				
NAME OF LABORATORY						
DATE SENT TO LAB						
SAMPLER=S NAME						

***Feet below water surface.**

FIELD WATER LEVEL DATA SHEET

Project Number:_____ Project Name:_____

Location:_____ Instrument:_____

Personnel:_____

Monitor Well/ Sample Port Identification	Date	Time	Depth to Groundwater (feet below top of casing)	Comments

TETRA TECH

FIELD WATER QUALITY SAMPLING AND ANALYSIS FORM

PROJECT INFORMATION		INSTRUMENTS	
PROJECT		Temp. & pH	Hanna
PROJECT NO.		Conductivity	Hanna
LOCATION		ORP	Not Measured
PERSONNEL		DO	Not Measured

SAMPLE POINT ID						
WATER TYPE		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
DATE (month/day/year)						
CLOCK TIME (Military)						
DEPTH TO WATER (ft)*						
MEASURED WELL DEPTH (ft)*						
CASING VOLUME (gallons)						
PURGE VOLUME (gallons)						
DEPTH SAMPLE TAKEN (ft)*						
SAMPLING DEVICE						
FIELD TEMPERATURE (^{O}C)						
pH						
ELEC. COND. (uS/cm)	Measured	NM	NM	NM	NM	
	at 25^{o} C					
ORP (mV)		NM	NM	NM	NM	
DISSOLVED OXYGEN (ppm)		NM	NM	NM	NM	
DISSOLVED OXYGEN (% Sat.)		NM	NM	NM	NM	
COLOR						
ODOR						
CLARITY						
SAMPLING PARAMETERS		# OF CONTAINERS & VOLUME; CONTAINER TYPE (A = AMBER GLASS; G = GLASS; P = PLASTIC); PRESERVATIVE TYPE (L = LAB ADDED; F = FIELD ADDED) OR NEUTRAL; FILTERED (YES or NO)				
NAME OF LABORATORY						
DATE SENT TO LAB						
SAMPLER=S NAME						

***Measured from top of well casing.**

TETRA TECH

LOW-FLOW METHOD FIELD WATER QUALITY SAMPLING AND ANALYSIS FORM FOR SAMPLEPRO AND PERISTALTIC PUMPS

PROJECT INFORMATION		INSTRUMENTS	
PROJECT		Temp., pH,	
PROJECT NO.		Conductivity	
LOCATION		ORP	
PERSONNEL		DO	

MONITOR WELL ID									
WATER TYPE		Groundwater			Groundwater			Groundwater	
DATE (month/day/year)									
STATIC WATER LEVEL (ft)*/TIME									
WELL DEPTH (feet)*									
PUMP INLET DEPTH (feet)*									
ENDING WATER LEVEL (ft)*/TIME									
START PURGE TIME (Military)									
END PURGE TIME (Military)									
PURGE VOLUME (gallons)									
SAMPLE TIME (Military)									
INDICATOR PARAMETERS		1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
TIME (minutes)										
TEMPERATURE (^{o} C)										
pH										
ELEC. COND. (uS/cm)	Measured									
	at 25^{o} C									
ORP (mV)										
DISSOLVED OXYGEN (ppm)										
DISSOLVED OXYGEN (% Sat.)										
COLOR										
ODOR										
CLARITY										
SAMPLING PARAMETERS		# OF CONTAINERS & VOLUME; CONTAINER TYPE (A=AMBER; G=GLASS; P=PLASTIC); PRESERVATIVE TYPE (L=LAB ADDED; F=FIELD ADDED) OR NEUTRAL; FILTERED (YES or NO)								
NAME OF LABORATORY										
DATE SENT TO LAB										
SAMPLER=S NAME										

***Measured from top of well casing.**

TETRA TECH

MONITOR WELL/GAS PROBE INSPECTION FORM

Project Name: _____ Location: _____

Project No: _____ Personnel: _____

Well/Probe No.: _____ Inspection Date: _____

ITEM	YES	NO	N/A	COMMENTS
Map Location Accurate?				
Adequately Visible in Hard-to-Find Area?				
Protective Posts Present? Type?				
Protective Posts Necessary?				
Is Well Painted?				
Located in a Dry Area?				
Well Labelled Inside and Outside?				
Is Well Flushmount?				
Protective Casing Diameter? Material?				
Is Well Immobile?				
Protective Casing Locked? Type of Lock?				
Protective Casing Secure in Ground?				
Rust Inside Protective Casing Cap?				
Evidence of Frost Heave?				
Weep Hole at Base of Protective Casing?				
Well Casing Free of Kinks or Bends?				
Well Cap Present, Vented?				
Well Diameter and Material				
Solvent cement present?				
Type of Surface Seal? Is Seal Cracked?				
Ground/Seal Sloped to Prevent Ponding?				
Well stickup (ft. above grade)				
Protective casing stickup (ft. above grade)				
Depth to Water Level (below PVC casing)				
Measured Well Depth (below PVC casing)				
Saturated Thickness (feet)				
Constructed Well Depth (from log):				
Thickness of Siltation: (ft.)				
Bailer easily inserted/removed?				
Proximity to drainage ditches:				

PASSIVE DIFFUSION BAG (PDB) FIELD DATA SHEET

Project Number:	Project Name:	Location:
Personnel:		

Monitor Well Identification	Date PDB Deployed	Time PDB Deployed	Depth to Groundwater (ft btoc)	PDB Depth (ft btoc)	Date PDB Retrieved & Sampled	Time PDB Retrieved & Sampled	Depth to Groundwater (ft btoc)

Note: ft btoc = feet below top of casing.

TETRA TECH

MONITOR WELL LOGS

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TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. V-1
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/06/15**
DATE COMPLETED: **10/06/15**

GROUNDWATER DEPTH
WHILE DRILLING **2.0'**

BEFORE CASING REMOVED — N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

AFTER CASING REMOVED — C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER**

SHEET 1 OF 1

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"		N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
WL ▼							**No Samples Collected**	
5.0								
							Bottom of Boring	**7.0'**
10.0							**Note: Installed 2" PVC 10-slot screen from 7.0' to 2.0'** **Installed 2" PVC riser from 2.0' to grade +2.0'** **Installed sand from 7.0' to 1.0'** **Installed bentonite seal from 1.0' to grade** **Completed installation with stickup protective cover**	

parratt wolff inc

TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. V-2
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/06/15**
DATE COMPLETED: **10/06/15**

GROUNDWATER DEPTH
WHILE DRILLING **2.0'**

BEFORE CASING REMOVED

AFTER CASING REMOVED

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER**

SHEET 1 OF 1

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"		N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
							No Samples Collected	
WL ▼								
5.0								
							Bottom of Boring	**7.0'**
10.0							**Note:** **Installed 2" PVC 10-slot screen from 7.0' to 2.0'**	
							Installed 2" PVC riser from 2.0' to grade +2.0'	
							Installed sand from 7.0' to 1.0'	
							Installed bentonite seal from 1.0' to grade	
							Completed installation with stickup protective cover	

parratt wolff inc

TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. V-3
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/07/15**
DATE COMPLETED: **10/07/15**

GROUNDWATER DEPTH
WHILE DRILLING **3.5'**

BEFORE CASING REMOVED

AFTER CASING REMOVED

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER**

SHEET 1 OF 1

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"		N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
							Brown moist to wet fine to coarse SAND, trace fine to medium gravel	
WL ▼ 5.0								
	5.0'-	**1**		**DIRECT**				
	7.0'			**PUSH**				
							Bottom of Boring	**7.0'**
10.0							**Note:** **Installed 2" PVC 10-slot screen from 7.0' to 2.0'** **Installed 2" PVC riser from 2.0' to grade +2.0'** **Installed sand from 7.0' to 1.0'** **Installed bentonite seal from 1.0' to grade** **Completed installation with stickup protective cover**	

parratt wolff inc

TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. V-4
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/07/15**
DATE COMPLETED: **10/07/15**

GROUNDWATER DEPTH
WHILE DRILLING **6.0'**

BEFORE CASING REMOVED — N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

AFTER CASING REMOVED — C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER**

SHEET 1 OF 1

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"		N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
							Brown moist to wet fine to coarse SAND, trace fine to medium gravel	
5.0								
WL ▼	**5.0'-**	**1**		**DIRECT**				
	7.0'			**PUSH**				
							Bottom of Boring	**7.0'**
10.0							**Note:** **Installed 2" PVC 10-slot screen from 7.0' to 2.0'** **Installed 2" PVC riser from 2.0' to grade +2.0'** **Installed sand from 7.0' to 1.0'** **Installed bentonite seal from 1.0' to grade** **Completed installation with stickup protective cover**	

parratt wolff inc

TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. V-5
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/07/15**
DATE COMPLETED: **10/07/15**

GROUNDWATER DEPTH
WHILE DRILLING **2.5'**

BEFORE CASING REMOVED — N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

AFTER CASING REMOVED — C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER** **SHEET 1 OF 1**

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	**1**		**DIRECT**		**Brown moist to wet fine to coarse SAND,**	
	2.0'			**PUSH**		**little fine to medium gravel**	
WL ▼							
5.0							**4.8'**
	5.0'-	**2**		**DIRECT**		**Brown-black wet PEAT**	
	7.0'			**PUSH**			
						Bottom of Boring	**7.0'**
10.0						**Note: Installed 2" PVC 10-slot screen from 7.0' to 2.0'**	
						Installed 2" PVC riser from 2.0' to grade +2.0'	
						Installed sand from 7.0' to 1.0'	
						Installed bentonite seal from 1.0' to grade	
						Completed installation with stickup protective cover	

parratt wolff inc

TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. V-6
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/07/15**
DATE COMPLETED: **10/07/15**

GROUNDWATER DEPTH
WHILE DRILLING **4.0'**

BEFORE CASING
REMOVED

AFTER CASING
REMOVED

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER
FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER
FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER**

SHEET 1 OF 1

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	**1**		**DIRECT**		**Brown moist to wet fine to coarse SAND**	
	2.0'			**PUSH**			
WL ▼							
5.0							
	5.0'-	**2**		**DIRECT**			**6.0'**
	7.0'			**PUSH**		**Brown-black wet PEAT**	
						Bottom of Boring	**7.0'**
10.0						**Note: Installed 2" PVC 10-slot screen from 7.0' to 2.0'**	
						Installed 2" PVC riser from 2.0' to grade +2.0'	
						Installed sand from 7.0' to 1.0'	
						Installed bentonite seal from 1.0' to grade	
						Completed installation with stickup protective cover	

parratt wolff inc

TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. MW-1
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/06/15**
DATE COMPLETED: **10/06/15**

GROUNDWATER DEPTH
WHILE DRILLING **2.0'**

BEFORE CASING
REMOVED

AFTER CASING
REMOVED

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER
FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER
FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER**

SHEET 1 OF 1

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	**1**		**DIRECT**		**Brown moist to wet fine to coarse SAND, trace fine to coarse gravel**	
WL ▼	**2.0'**			**PUSH**			
5.0	**4.0'-**	**2**		**DIRECT**			
	6.0'			**PUSH**			**5.5'**
						Brown-black wet PEAT	
							7.7'
						Gray wet SILT, some fine sand, trace clay	
10.0							
	10.0'-	**3**		**DIRECT**			
	12.0'			**PUSH**			
15.0	**14.0'-**	**4**		**DIRECT**			
	16.0'			**PUSH**			
						Bottom of Boring	**19.0'**
20.0							

Note: **Installed 2" PVC 10-slot screen from 19.0' to 9.0'**
Installed 2" PVC riser from 9.0' to grade +2.0'
Installed sand from 19.0' to 7.0'
Installed bentonite seal from 7.0' to 5.0'
Installed grout seal from 5.0' to grade
Completed installation with stickup protective cover

parratt wolff inc

TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. MW-2
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/06/15**
DATE COMPLETED: **10/06/15**

GROUNDWATER DEPTH
WHILE DRILLING **2.0'**

BEFORE CASING
REMOVED

AFTER CASING
REMOVED

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER
FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER
FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER**

SHEET 1 OF 1

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"		N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	**1**		**DIRECT**			**Brown moist to wet fine to coarse SAND, trace fine gravel**	
WL ▼	**2.0'**			**PUSH**				
	2.0'-	**2**		**DIRECT**				
	4.0'			**PUSH**				
5.0	**4.0'-**	**3**		**DIRECT**				**5.0'**
	6.0'			**PUSH**			**Brown-black wet PEAT**	
	6.0'-	**4**		**DIRECT**				
	8.0'			**PUSH**				**8.0'**
	8.0'-	**5**		**DIRECT**			**Gray wet SILT, some fine sand, trace clay**	
10.0	**10.0'**			**PUSH**				
	10.0'-	**6**		**DIRECT**				
	12.0'			**PUSH**				
	12.0'-	**7**		**DIRECT**				
	14.0'			**PUSH**				
15.0								
							Bottom of Boring	**15.0'**
							Note: Installed 2" PVC 10-slot screen from 15.0' to 5.0'	
							Installed 2" PVC riser from 5.0' to grade +2.0'	
20.0							**Installed sand from 15.0' to 3.0'**	
							Installed bentonite seal from 3.0' to grade	
							Completed installation with stickup protective cover	

parratt wolff inc

TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. MW-3
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/07/15**
DATE COMPLETED: **10/07/15**

GROUNDWATER DEPTH
WHILE DRILLING **3.5'**

BEFORE CASING
REMOVED

AFTER CASING
REMOVED

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER
FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER
FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER**

SHEET 1 OF 1

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Brown moist to wet fine to coarse SAND	
WL ▼ 5.0							
	5.0'-	**1**		**DIRECT**			**6.0'**
	7.0'			**PUSH**		**Brown-black wet PEAT**	
10.0							
	10.0'-	**2**		**DIRECT**			**10.5'**
	12.0'			**PUSH**		**Gray wet SILT, some fine sand, trace clay**	
						Bottom of Boring	**12.0'**
15.0							

Note: **Installed 2" PVC 10-slot screen from 12.0' to 2.0'**
Installed 2" PVC riser from 2.0' to grade +2.0'
Installed sand from 12.0' to 1.0'
Installed bentonite seal from 1.0' to grade
Completed installation with stickup protective cover

parratt wolff inc

TEST BORING LOG

5879 Fisher Road
East Syracuse, NY 13057

PROJECT **Copper Crouse-Hinds North Landfill**

LOCATION **Town of Salina, New York**

HOLE NO. MW-4
JOB NUMBER: **14041C**
SURF. EL.
DATE STARTED: **10/07/15**
DATE COMPLETED: **10/07/15**

GROUNDWATER DEPTH
WHILE DRILLING **5.5'**

BEFORE CASING REMOVED — N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" - ASTM D-1586 STANDARD PENETRATION TEST

AFTER CASING REMOVED — C - NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/ OR PERCENT CORE RECOVERY

CASING TYPE **HOLLOW STEM AUGER**

SHEET 1 OF 1

DRILLER'S FIELD LOG

DEPTH	SAMPLE DEPTH	SAMPLE NO.	Rec	SAMPLE DRIVE RECORD PER 6"		N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
							Brown moist to wet fine to coarse SAND, little fine gravel	
5.0								
WL ▼								**6.0'**
							Brown-black wet PEAT	
10.0								
	10.0'-	**1**		**DIRECT**				**11.0'**
	12.0'			**PUSH**			**Gray wet SILT, some fine sand, trace clay**	
							Bottom of Boring	**12.0'**
15.0								

Note: **Installed 2" PVC 10-slot screen from 12.0' to 2.0'**
Installed 2" PVC riser from 2.0' to grade +2.0'
Installed sand from 12.0' to 1.0'
Installed bentonite seal from 1.0' to grade
Completed installation with stickup protective cover

NEW ENGLAND CONSERVATION/WILDLIFE SEED MIX

NEW ENGLAND WETLAND PLANTS, INC

820 West Street
Amherst, MA 01002

Phone: 413.548.8000
Fax: 413.549.4000
email: info@newp.com
web address: www.newp.com

New England Conservation/Wildlife Mix

Botanical Name	Common Name	Ind.
Elymus virginicus	Virginia Wild Rye	FACW-
Schizachyrium scoparium	Little Bluestem	FACU
Festuca rubra	Creeping Red Fescue	FACU
Andropogon gerardii	Big Bluestem	FAC
Chamaecrista fasciculata	Partridge Pea	FACU
Panicum clandestinum	Deer Tongue	FAC+
Panicum virgatum	Switch Grass	FAC
Sorghastrum nutans	Indian Grass	UPL
Helenium autumnale	Common Sneezeweed	FACW+
Heliopsis helianthoides	Ox Eye Sunflower	UPL
Verbena hastata	Blue Vervain	FACW
Asclepias syriaca	Common Milkweed	FACU-
Aster umbellatus	Flat Topped/Umbrella Aster	FACW
Eupatorium purpureum	Purple Joe Pye Weed	FAC
Solidago juncea	Early Goldenrod	
Zizia aurea	Golden Alexanders	FAC

Price per lb. $36.50
Min. quantity: 2 lbs.
Total $73.00

Apply: 25 lbs/acre
1lb/1750 sq ft
Minimum quantity: 2 lbs

The New England Conservation/Wildlife Mix provides a permanent cover of grasses, wildflowers and legumes to provide both good erosion control and wildlife habitat value. This mix is designed to be a no maintenance seeding, and it is appropriate to cut and fill slopes, detention basin slopes, and disturbed areas adjacent to commercial and residential projects. Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper seed to soil contact. Best results are obtained with a Spring seeding. Late Spring through early Summer seeding will benefit with a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free soil surface is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged.

Price is $/bulk pound. FOB warehouse, plus S&H and applicable taxes.

QUALITY ASSURANCE PROJECT PLAN

CROUSE-HINDS LANDFILL
ONONDAGA COUNTY, NEW YORK
NYSDEC SITE NUMBER: 7-34-004

QUALITY ASSURANCE PROJECT PLAN

Prepared for:

Cooper Industries, LLC
600 Travis, Suite 5800
Houston, Texas 77002

Prepared by:

Tetra Tech, Inc.
175 N. Corporate Drive, Suite 100
Brookfield, WI 53045

September 2013

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QAO – Tetra Tech	**1**
Program Manager – Cooper Industries, LLC	**1**
Project Manager – TestAmerica	**1**
Remedial Project Manager – NYSDEC	**1**

LIST OF ACRONYMS AND SHORT FORMS

CC-H	**Cooper Crouse-Hinds**
COC	**Constituents of Concern**
Cooper	**Cooper Industries, LLC**
COC	**Contaminant of Concern**
DQO	**Data Quality Objectives**
EDD	**Electronic Data Deliverable**
e:DAT	**Electronic Database Access Tool**
ESD	**Explanation of Significant Difference**
GIS	**Geographical Information Systems**
LCS	**Laboratory Control Sample**
LIMS	**Laboratory Information Management System**
MS/MSD	**Matrix Spike/Matrix Spike Duplicate**
NELAP	**National Environmental Laboratory Accreditation Program**
NYSDEC	**New York State Department of Environmental Conservation**
PARCCS	**Precision, Accuracy, Representativeness, Comparability, Completeness, Sensitivity**
PCB	**Polychlorinated Biphenyl**
QA	**Quality Assurance**
QA/QC	**Quality Assurance/Quality Control**
QAPP	**Quality Assurance Project Plan**
QC	**Quality Control**
ROD	**Record of Decision**
RPD	**Relative Percent Difference**
RSD	**Relative Standard Deviation**
SMP	**Site Management Plan**
SDG	**Sample Delivery Group**
Site	**Cooper Crouse-Hinds Landfill**
SOP	**Standard Operating Procedure**
USEPA	**United States Environmental Protection Agency**
VOC	**Volatile Organic Compound**

1. INTRODUCTION

The Cooper Crouse-Hinds (CC-H) Landfills Site consists of two inactive landfills, referred to as the North and South Landfills. The Site is a Class 2 inactive hazardous waste disposal site located in the Town of Salina (North Landfill) and City of Syracuse (South Landfill), Onondaga County, New York. The North Landfill is 21.5 acres in size, and the South Landfill is 19.4 acres in size. Seventh North Street is oriented southeast-northwest and separates the two landfills that comprise the site. Adjacent to the North Landfill are on-site wetlands to the east and west, along with an on-site drainage channel to the east. Adjacent to the South Landfill are on-site wetlands to the south and an on-site drainage channel to the east.

This Quality Assurance Project Plan (QAPP) details the protocols and procedures that will be followed during post-construction monitoring that will occur at the CC-H Landfill Site. The purpose of these protocols and procedures is to ensure that all project activities will be performed in a manner consistent with the data quality objectives (DQOs) established for the project and all data collected are precise, accurate, representative, comparable, and complete.

All QA/QC procedures will be in accordance' with applicable professional technical standards, NYSDEC requirements, government regulations and guidelines, and specific project goals and requirements. There are four basic groups of elements that must be included in a QAPP. These four groups and associated elements are:

- Group A - Project Management. The elements in this group include all aspects of project management, project objectives, and project history.
- Group B - Data Generation and Acquisition. The elements in this group include descriptions of the design and implementation of all measurement systems that will be used during the project.
- Group C - Assessment/Oversight. The elements in this group encompass the procedures used to ensure proper implementation of the QAPP.
- Group D - Data Validation and Usability. The elements in this group cover the QA activities that occur after the data collection phase of the project is completed.

The elements that comprise project management, data generation and acquisition, assessment/ oversight, and data validation and usability for the additional investigation activities at the Site are documented in this QAPP.

2. PROJECT MANAGEMENT

2.1. Project Organization and Responsibilities

The responsibilities of the project personnel are described below.

- *Cooper Project Manager – (Nelson Olavarria)* Provides oversight of the contract, and all program activities. Reviews final project QA objectives, needs, problems, and requests. Approves appropriate QA corrective actions as needed. Ensures compliance with NYSDEC QA/QC policies.

- *Project Manager – (Michael Noel)* Directs project and provides technical expertise to accomplish program objectives. Ensures that project tasks are successfully completed within the projected time periods and projected budget. Oversees all remedial construction and post-construction activities, subcontractor management, technical support, and supervises and schedules field activities.

- *Quality Assurance Officer – (Daniel Morgan)* Responsible for preparation and approval of QAPP. Responsible for performing quality assurance audits and ensuring that any necessary corrective actions are implemented.

- *Field Engineers/Scientists* - Perform tasks identified in work plan in accordance with designated procedures. Adhere to procedures within health and safety plan. Provide technical QA assistance on site to accomplish project objectives including making suggestions for corrective actions.

2.2. Problem Definition

Post-construction monitoring and inspections will be conducted to evaluate performance of the implemented remedy at the CC-H Landfill Site. Constituents of concern (COCs) reported at the Site in previous reports include VOCs, PCBs and metals in Site soil, surface water and groundwater and methane gas from the landfill. This QAPP addresses sampling and analysis conducted or required to monitor the performance of the implemented remedies.

2.3. Site Background

Information on the Site background, implemented remedial actions and residual contamination are presented in Section 1.0 of the Site Management Plan (SMP).

2.4. Project Task Description and Schedule

A description of the project tasks and schedule are provided in Section 3.0 of the SMP and include the following:

Program	Frequency*	Matrix	Analysis
Landfill Cover	Semiannual	cover	visual
Landfill Gas	Quarterly	gas	% LEL
Groundwater	Quarterly	water	VOCs
Surface Water	Quarterly	water	PCBs, metals
Wetlands	Quarterly	vegetation	visual

2.5. Quality Objectives and Criteria for Measurement Data

The data quality objectives and measurement performance criteria for the project are presented in the following subsections.

2.5.1. Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements derived from the outputs of each step of the DQO process. The DQO process is a series of planning steps based on the scientific method that is designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended application.

There are seven steps in the DQO process that include:

1. stating the problem;
2. identifying the decision;
3. identifying inputs to the decision;
4. defining the boundaries of the study;
5. developing a decision rule;
6. specifying limits on decision errors; and
7. optimizing the design for obtaining data.

The details of DQO process for the project are provided below.

- The problem is identified COC impacts in the soil, surface water and groundwater and landfill gas at the Site.

- The decision is to verify the performance of the implemented remedial activities to decrease COC concentrations and/or limit exposure to COCs at the Site.

- The inputs to the decision are the data from previous investigations, implementation of remedial activities and post-construction monitoring of the implemented remedies.

- The spatial boundaries are the sampling locations presented in the SMP. The only practical constraints for the Site activities are inclement weather conditions.

- The decision rule is whether or not the implemented remedies meet Site clean-up objectives.

- The limits on decision errors include the time and resource constraints for post-construction monitoring.

- The sampling and analysis program has been designed to ensure that the problem identified above can be solved in a resource-efficient and timely manner. The scope of work for the post-construction monitoring is presented in the SMP.

2.5.2. Measurement Performance Criteria

The measurement performance criteria for· precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) are provided in the following subsections.

2.5.2.1.Field Precision Criteria

Precision of the field sample collection procedures will be assessed by the data from analysis of field duplicate samples. Relative percent differences (RPDs) will be calculated for detected analytes from surface water and groundwater and their respective field duplicate samples. Field duplicate samples will be collected at a minimum frequency of 5 percent of investigative samples. An RPD of 20 percent for water samples will be used as an advisory limit for analytes detected in both the investigative samples and field duplicate samples at concentrations greater than or equal to their quantitation limits. RPD calculations will not be performed when either one or both of the sample results for the field replicate sample pairs are reported as less than the quantitation limit. Although the RPD will be calculated between an investigative sample and its field duplicate sample, the results will not be used as a basis for qualifying data or accepting or rejecting data. The RPD and actual results will be evaluated qualitatively to assess precision of field sample collection procedures. Professional judgment will be used to qualify associated investigative sample data.

2.5.2.2. Laboratory Precision Criteria

Laboratory precision will be assessed through the calculation of RPDs for replicate/duplicate sample analyses. These will be matrix spike/matrix spike duplicate (MS/MSD) samples, which will be collected/designated at a frequency of 1 per 20 or fewer samples of the same matrix. The equation to be used to determine precision is presented in Section 4.3.1 of this QAPP. Precision control limits for the analysis are presented in Table 2.1.

2.5.2.3. Field Accuracy Criteria

The criteria for accuracy of the field sample collection procedures will be to ensure that samples are not affected by sources external to the sample, such as sample contamination by ambient conditions or inadequate equipment decontamination procedures. Field sampling accuracy will be assessed by the data from field blank samples.

Trip blanks will be included within each sample shipment container. Trip blanks containing deionized water will be routed from the lab to the field and back to the lab. Field blank samples will be collected at a frequency of 1 per 20 or fewer sampling equipment decontamination procedures or a least once per day of sampling equipment cleanings, whichever is more frequent. Field blank samples will be collected by routing laboratory-provided deionized water through decontaminated sampling equipment. Field blank samples will be analyzed to check procedural contamination and/or ambient conditions and/or sample container contamination that may cause sample contamination. Field blank samples will not be collected when precleaned, disposable sampling equipment is used.

Trip and field blank samples should not contain target analytes above the quantitation limits. Trip and field blank sample data will be evaluated using the procedures specified in Section 4.3.2 of this QAPP. Accuracy will be ensured by adhering to all sample handling procedures, sample preservation requirements, and holding time periods.

Accuracy of field PID and landfill gas detector measurements will be assessed by analyzing calibration gas.

2.5.2.4. Laboratory Accuracy Criteria

Laboratory accuracy will be assessed by determining percent recoveries from laboratory control sample (LCS) analyses. An LCS will be analyzed at a frequency of 1 per batch of 20 or fewer samples of the same matrix. Accuracy relative to the sample matrix will be assessed by determining percent recoveries from the analysis of matrix spike samples. MS/MSD samples will be collected/designated for chemical analyses at a frequency of 1 per 20 or fewer samples of the same matrix. The equation to be used to determine accuracy for this project is presented in Section 4.3.2 of this QAPP. Accuracy control limits are presented in Table 2.1.

The accuracy of the organic analyses will also be monitored through the analysis of surrogate compounds. Surrogate compounds are added to each sample, standard, blank, and QC sample prior to sample preparation and analysis. Surrogate compounds are not expected to be found occurring naturally in the samples, but behave analytically similar to the compounds of interest. Consequently, surrogate compound percent recoveries will provide information on the effect that the sample matrix exhibits on the accuracy of the analyses. Table 2.1 provides surrogate compound percent recovery control limits for the organic analyses.

2.5.2.5. Field Representativeness Criteria

Representativeness is dependent upon the proper design of the sampling program. The representativeness criteria for field sampling will be to ensure that the sampling locations are properly established, that the correct locations are sampled, and that the sampling procedures in the SMP are followed. The sampling program was designed to provide data representative of Site conditions. During development of this program, consideration was given to past data collection activities, existing analytical data, and the physical setting. The rationale for the sampling program is provided in the SMP.

2.5.2.6. Laboratory Representativeness Criteria

The representativeness criteria for laboratory data will be to ensure that the proper analytical procedures are used for sample preparation (e.g., homogenizing the sample prior to subsampling), sample analysis, and that sample holding times are met. Additionally, the accuracy and precision of the laboratory data affect representativeness. The laboratory representativeness criteria will include achieving the accuracy and precision criteria for the sample analyses.

2.5.2.7. Field Comparability Criteria

The criteria for field comparability will be to ensure and document that the sampling locations are properly established, and the sampling procedures in the SMP are followed.

2.5.2.8. Laboratory Comparability Criteria

The criteria for laboratory data comparability will be to ensure that the analytical methods used for the investigation are comparable to the methods used for previous sampling events, as applicable. The analytical methods identified in the SMP are comparable to the methods used to generate data for previous investigations.

2.5.2.9. Field Completeness Criteria

The criteria for field completeness will be that a minimum of 90 percent of the field-measured data is valid. The procedure for determining field data validity is provided in Section 3.9.2 of this QAPP. The equation for calculating completeness is presented in Section 4.3.4 of this QAPP.

2.5.2.10. Laboratory Completeness Criteria

The criteria for laboratory completeness will be that a minimum of 90 percent of the laboratory data is determined to be valid (usable) for the intended purpose. The procedure for determining laboratory data validity is provided in Section 3.9.2 of this QAPP. The equation for calculating completeness is presented in Section 4.3.4 of this QAPP.

2.5.2.11. Field Sensitivity Criteria

The criterion for field measurement sensitivity is 0.1 ppm organic vapors and 1.0 percent methane or background whichever is higher. The sensitivity of the field instruments will be measured by analyzing calibration gas and ambient air.

2.5.2.12. Laboratory Sensitivity Criteria

The sensitivity requirements for the laboratory analyses are provided in Table 2.1. The analytical methods selected for this project are U.S. EPA methods routinely used to prepare and analyze samples for these analytes. The analysis methods are sufficiently sensitive to detect the analytes of interest at or below the required cleanup goals.

2.6. Special Training/Certification Requirements

Tetra Tech's field sampling team members are required to have received the 40-hour Hazardous Waste Operations and Emergency Response safety training and annual 8-hour refresher courses required by 29 CFR Parts 1910 and 1926. On-Site subcontractor

personnel performing intrusive activities are required to have received the same training. Each subcontractor is responsible for compliance of its personnel with the applicable health and safety regulations.

The laboratory used for this project is required to be accredited by the National Environmental Laboratory Accreditation Program (NELAP) to demonstrate compliance with U.S. EPA's requirement that the laboratory have a documented quality system that complies with ANSI/ ASQC E4-94 ("Specifications and Guidelines for Quality System for Environmental Data Collection and Environmental Technology Programs", January 1995), and EPA QA/R-2 ("EPA Requirements for Quality Management Plans", March 2001). TestAmerica is accredited by NELAP for the methods of analysis and the TestAmerica QA Manual is included in Appendix A.

The surveyor used for the project will be registered in and licensed by the State of New York, as necessary.

2.7. Documentation and Records

The documents, records, and reports generated during the project are identified in the following subsections.

2.7.1. Field and Laboratory Records

Documents and records generated during the project include sample collection records, QC sample records, field measurement records, laboratory records, and data handling records. A brief description of these documents and records are provided below. Detailed information regarding these records is provided in subsequent sections of this QAPP.

Sample collection records that will be generated during the sampling activities include field logbooks, chain-of-custody records, and shipping papers. QC sample records that will be generated during the project to document QC sample collection include field logbooks for recording field' blank samples, field duplicate samples, and MS/MSD samples. TestAmerica will maintain quality records for sample integrity information. Records of sample preservation will be maintained by the project laboratory.

Field measurements will be recorded in bound logbooks or, on standard field forms. Calibration data, where applicable, will also be recorded in these logbooks or on these forms.

Laboratory records that will be maintained for the project include sample receipt documentation, field and laboratory chain-of-custody documentation, sample container cleanliness certifications, reagent and standard reference material certifications, sample preparation records, sample analysis records (e.g., run logs), instrument/raw data, QC data, calibration data, corrective action reports, and final reports. Data handling records that will be maintained include verification of computer programs used to manipulate or reduce raw data into final results and data validation reports. PASI will maintain documentation of data verification and reduction procedures as necessary for the analyses

conducted during the project. Tetra Tech will maintain checklists, notes, and reports generated during the external data validation process.

2.7.2. Data Reporting Format

Field data will be recorded in bound logbooks or on standard forms. The details for recording field data are provided in Section 3.2.2.1 of this QAPP. Field data will be generated primarily from direct reading meters or consist of field readings or observations. These data will be tabulated and included in project reports or submittals.

Laboratory reports for the analyses will include data deliverables consistent with Level II standard reporting requirements. Method detection limit studies, instrument detection limit studies, and method performance and validation studies will be maintained by TestAmerica.

2.7.3. Data Archiving and Retrieval

All records, including field and laboratory data, generated during the project will be maintained by TestAmerica and Tetra Tech consistent with the US EPA record retention requirements.

3. DATA GENERATION AND ACQUISITION

The design and implementation of the measurement systems that will be used during the project, including sampling procedures, analytical procedures and data handling and documentation are detailed in the following subsections.

3.1. Sampling Process Design

The rationale for the sampling program is provided in the SMP.

3.1.1. Sampling Methods

Sampling methods are provided in the SMP.

3.1.2. Field Equipment and Sample Container Cleaning Procedures

Equipment cleaning/decontamination procedures will be provided in the SMP. All sample containers will be provided by TestAmerica. The containers will be precleaned in accordance with the U.S. EPA guidance document entitled "Specifications and Guidance for Contaminant-Free Sample Containers II (EPA 540/R-93/051). Certificates of analysis for each lot of containers will be maintained by TestAmerica.

3.1.3. Field Equipment Maintenance, Testing, and Inspection Requirements

Field equipment will be inspected and tested prior to being shipped to the field. Maintenance logs for all field equipment are kept in Tetra Tech's field equipment files at the Tetra Tech office from which the equipment was shipped. Prior to use in the field, the equipment is checked again, generally during field calibration, and the performance information is recorded in the field logbook. All equipment shipped back from the field is inspected and tested upon return. Any required maintenance is performed and documented prior to the equipment being returned to service.

Critical spare parts for field equipment and replacement field equipment are available at each Tetra Tech office and can be shipped for overnight delivery, picked up at the Tetra Tech office, or delivered to the field when the need is identified. Alternately, field equipment vendors (e.g., Total Safety or Pine Environmental) can provide replacement equipment if needed. The replacement equipment can be shipped for overnight delivery as necessary.

3.1.4. Inspection and Acceptance Requirements for Supplies and Sample Containers

Supplies and consumables for field measurements and sampling will be obtained from various vendors and include PID calibration gas, sample containers, detergent and water for equipment decontamination, and equipment blank water. Additional field supplies and consumables include disposable sampling tools and personnel protective equipment. All field supplies will be consumed or replaced with sufficient frequency to prevent deterioration or degradation that may interfere with the analyses.

Sample containers will be provided by TestAmerica. The lab will maintain documentation of the purity/cleanliness for these materials. TestAmerica’s QA Officer is

ultimately responsible for ensuring that these materials are acceptable for the project. The acceptability of these materials for use will be evaluated by reviewing lot analysis certificates, as applicable. Water and containers that do not meet PASI's acceptability requirements will not be shipped to the field.

3.2. Sample Handling and Custody Requirements

The procedures for sample handling, labeling, shipping, and chain-of-custody documentation are provided in the subsections that follow.

3.2.1. Sample Handling

The procedures used to collect samples are provided in the SMP. The container volume, container type (material of construction), sample preservation, holding time periods, packaging, and shipping requirements for the analyses are identified in Table 3.1.

The sample- numbering system for the project has been designed to uniquely identify each sample from each sampling program and event. This numbering system consists of the sample matrix code, sample collection date, sampler's initials, and sequential number beginning with 01 for each sampling program and event.

An example of the sample numbering system follows:

MC-mmddyy-XX-0l

Where:	MC (Matrix Code)	= S – soil, GW – groundwater, IA – indoor air
	mmddyy	= Date in month-day-year
	XX	= Sampler's first and last initials
	01	= Sequential number for sampling event

Field duplicate samples will be numbered using this system to prevent laboratory bias of field QC samples. Samples designated for MS/MSD analysis will be identified as such in the remarks column of the chain-of-custody document.

Samples will be placed in shipping coolers containing bagged, cubed ice immediately following collection. The samples will be grouped in the shipping cooler by the order in which the samples were collected. Samples will be shipped to the laboratory via an express courier service generally on the day they are collected. However, samples that are collected after the courier service has picked up the shipment for the day (generally only at remote sites) and samples collected on a Sunday or holiday will be shipped on the next business day.

3.2.2. Sample Custody

Chain of custody is the sequence of possession of an item. An item (such as a sample or final evidence file) is considered to be in a person's custody if the item is in actual possession of a person, the item is in the view of the person after being in his/her actual possession, or the item was in a person's physical possession but was placed in a secure

area by that person. Field, laboratory, and final evidence file custody procedures are described in the subsections that follow.

3.2.2.1. Field Custody Procedures

Logbooks will used to record field data collection activities. Entries into field logbooks will be described in as much detail as possible to ensure that a particular situation could be reconstructed solely from logbook entries. Field logbooks will be bound field survey books or notebooks with consecutively numbered pages. Logbooks will be assigned to field personnel and will be stored at Tetra Tech's Brookfield, Wisconsin office when not in use. Each logbook will be identified by the project-specific document number (117-2202046).

The title page of each logbook will contain the following information:

- person to whom the logbook is assigned;
- logbook number;
- project name;
- project start date; and
- end date.

Entries into the logbook will contain a variety of information. At the beginning of each day's logbook entry, the date, start time, weather conditions, and the names of all sampling team members present will be entered. The names of individuals visiting the Site or field sampling team and the purpose of their visit will also be recorded in the field logbook.

All field measurements obtained and samples collected will be recorded. All logbook entries will be made in ink, signed and dated with no erasures. If an incorrect logbook entry is made, the incorrect information will be crossed out with a single strike mark that is initialed and dated by the person making the erroneous entry. The correct information will be entered into the logbook adjacent to the original entry.

Whenever a sample is collected or a measurement is made, a detailed description of the location will be recorded in the logbook. Photographs taken at a location, if any, will also be noted in the logbook. All equipment used to obtain field measurements will be recorded in the field logbook. In addition, the calibration data for all field measurement equipment will be recorded in the field logbook or on standard field forms.

Samples will be collected following the sampling procedures documented in the SAP. The equipment used to collect samples, time of sample collection, sample description, volume and number of containers, preservatives added (if applicable) will be recorded in the field logbook. Each sample will be uniquely identified using the sample numbering system provided in Section 3.2.1 of this QAPP.

The packaging and shipping procedures summarized below will ensure that the chain-of-custody of samples collected for chemical analysis remains intact:

1. The field sampler is personally responsible for the care and custody of the samples until they are transferred to another person or the laboratory. As few people as possible will handle the samples.
2. All sample containers will be identified by using sample labels that include the unique sample identification number and the date and time of collection. Sample labels will be completed for each sample using waterproof ink.
3. Samples will be accompanied by a properly completed chain-of-custody form. The sample identification numbers and required analyses will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving the samples will sign and record the date and time on the form. The chain-of-custody form documents sample custody transfers from the sampler to another person, to the laboratory, or to/from a secure storage area. An example chain-of-custody record form is provided as Figure 3.1.
4. Samples will be properly packaged for shipment (see Table 3.1) and dispatched to the laboratory for analysis with a separate signed chain-of-custody form enclosed in and secured to the inside top of each shipping cooler. Shipping coolers will be secured with custody tape for shipment to the laboratory. The custody tape is covered with clear plastic tape to prevent accidental damage to the custody tape.
5. If samples are collocated (split) with a government agency or other entity, it is the responsibility of that entity to prepare its own chain-of-custody form for the samples. Information regarding the identity of the entity and the samples that are being collocated will be recorded in the field logbook.
6. All sample shipments will be accompanied by the chain-of-custody form identifying its contents. The chain-of-custody form is a four-part carbonless-copy form. The form is completed by the sampling team, which, after signing and relinquishing custody to the shipper, retains the bottom (goldenrod) copy. The shipper, if different than the sampling team members, retains the pink copy after relinquishing custody to the laboratory. The laboratory retains the yellow copy and the fully executed white copy is returned as part of the data deliverables package.
7. If the samples are sent by common carrier, a bill of lading (e.g., FedEx air bill) will be used and copies will be retained as permanent documentation. Commercial carriers are not required to sign the chain-of-custody form as long as the form is sealed inside the sample cooler and the custody tape remains intact.

3.2.2.2. Laboratory Custody Procedures

Laboratory sample custody begins when the samples are received at the laboratory. The field sample identification numbers, laboratory sample identification numbers, date and time of sample collection, date and time of sample receipt, and requested analyses will be entered into the sample receiving log.

Following log-in, all samples will be stored within an access-controlled location and will be maintained properly preserved (as defined in Table 3.1) until completion of all laboratory analyses. Unused sample aliquots and sample extracts will be maintained properly preserved for a minimum of 30 days following receipt of the final report by Tetra Tech. TestAmerica will be responsible for the disposal of unused sample aliquots,

sample containers, and sample extracts in accordance with all applicable local, state, and federal regulations.

TestAmerica will be responsible for maintaining analytical logbooks and laboratory data. All laboratory records will be maintained consistent with US EPA record retention requirements.

3.2.2.3. Final Evidence Files Custody Procedures

The final evidence file for the project will be maintained by Tetra Tech and will consist of the following:

1. project plan;
2. project log books;
3. field data records;
4. sample identification documents;
5. chain-of-custody records;
6. correspondence;
7. references, literature;
8. final data packages;
9. miscellaneous - photos, maps, drawings, etc.; and
10. final report.

The final evidence file materials will be the responsibility of the evidentiary file custodian (Tetra Tech's Project Manager) with respect to maintenance and document removal.

3.3. Analytical Method Requirements

The field and laboratory analytical methods that will be used during the investigation are detailed in the following subsections.

3.3.1. Field Analytical Methods

If called for in the sampling and analysis plan, the head space above containerized soil samples will be screened for organic vapors using a field-portable PID. The PID readings will be used to select the appropriate location from which a soil sample will be collected and submitted for analysis. The soil sample interval from each borehole with the highest PID reading will be selected for laboratory analysis of VOCs. The field measurements will be obtained consistent with the operating manual for the equipment.

3.3.2. Laboratory Analytical Methods

The methods that will be used to analyze samples collected during the project are presented in the Table 2.1.

3.4. Quality Control Requirements

The field and laboratory QC requirements for the investigation are discussed in the following subsections.

3.4.1. Field Sampling Quality Control

Field QC requirements include analyzing reference standards for instrument calibration and for routine calibration checks. Field QC samples for this project include field blank samples to determine the existence and magnitude of sample contamination resulting from ambient conditions or sampling procedures and field duplicate samples to assess the overall precision of the sampling and analysis event. The frequency of collection for these field QC samples was provided in Section 2.5 of this QAPP. The evaluation of field QC data is provided in Section 3.9.2 of this QAPP.

3.4.2. Analytical Quality Control

The laboratory QC requirements for the organic analyses include analyzing method blanks, initial calibration standards, calibration verification standards, internal standards, surrogate compound spikes, MS/MSD samples, and LCSs. The analysis frequency and acceptance criteria for method blank samples, initial calibration, calibration verification, and internal standards will be consistent with the analytical methods in the SMP. The analysis frequency and acceptance criteria for surrogate compound spikes are discussed in Section 2.5.2 and summarized in Table 2.1. The analysis frequency and acceptance criteria for MS/MSD and LCS samples are discussed in Section 2.5.2 and summarized in Table 2.1.

The laboratory QC requirements for metals analyses include analyzing preparation blanks, initial calibration blanks, continuing calibration blanks, initial calibration verification standards, continuing calibration verification standards, interference check standards, serial dilution samples, MS/MSD samples, and LCSs. The analysis frequency for preparation blanks, initial calibration blanks, continuing calibration blanks, initial calibration verification standards, continuing calibration verification standards, interference check standards, and serial dilution samples will be consistent with the analytical methods in Table 2.1. The analysis frequency and acceptance criteria for MS/MSD and LCS samples are discussed in Section 2.5.2 and summarized in Table 2.1.

3.5. Instrument/Equipment Testing, Inspection, and Maintenance Requirements

The procedures used, to verify that instruments and equipment are functional and properly maintained are described in the following subsections.

3.5.1. Field Instrument Maintenance

Specific preventive maintenance procedures to be followed for field equipment are those recommended by the manufacturer. Field instruments will be checked and calibrated daily before use.

3.5.2. Laboratory Instrument Maintenance

As part of its QA/QC program, TestAmerica conducts routine preventive maintenance to minimize the occurrence of instrument failure and other system malfunctions. Designated laboratory employees will regularly perform routine scheduled maintenance and repair of (or coordinate the repair of) all instruments. All maintenance that is performed is documented in the laboratory’s maintenance logbooks. All laboratory instruments are maintained in accordance with manufacturer's specifications.

3.6. Calibration Procedures and Frequency

The procedures for maintaining the accuracy for all the instruments and measuring equipment that are used for conducting field tests and laboratory analyses are described in the following subsections. These instruments and equipment will be calibrated prior to each use or according to a periodic schedule.

3.6.1. Field Instruments/Equipment

Equipment to be used during field sampling will be examined to confirm that it is in operating condition. This includes checking the manufacturer's operating manual to ensure that all maintenance requirements are being observed. Individual calibration records will be reviewed to ensure that any prior equipment problems have not been overlooked and all necessary repairs to equipment have been completed.

3.6.2. Laboratory Instruments

Calibration of laboratory equipment will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing these quality control activities. These records generally will be filed at the location where the work is performed and will be subject to QA audit. For all instruments, the laboratory will maintain a properly trained repair staff with in-house spare parts or will maintain service contracts with vendors.

The records of calibration typically are maintained as follows:

1. If possible, each instrument will have record of calibration permanently affixed with an assigned record number.
2. A logbook will be assigned to each instrument showing description, manufacturer, model numbers, date of last calibration and the signature of the person who calibrated the instrument, due date of next calibration and compensation or correction figures, as appropriate.
3. A written stepwise calibration procedure will be available for each piece of test and measurement equipment.
4. Any instrument that is not calibrated to the manufacturer's original specification will display a warning tag or will otherwise be removed from service, as appropriate. Specific calibration procedures and frequencies are detailed in the laboratory's SOPs.

3.7. Inspection/Acceptance Criteria for Supplies and Consumables

The procedures that will be used to ensure that supplies and consumables used in the field and laboratory will be available as needed and free of contaminants are detailed in the following subsections.

3.7.1. Field Supplies and Consumables

Supplies and consumables for field measurements and sampling will be obtained from various vendors and include PID calibration gas, sample containers, detergent and water for equipment decontamination, and field blank water. Additional field supplies and consumables include disposable sampling tools and personnel protective equipment. All

field supplies will be consumed or replaced with sufficient frequency to prevent deterioration or degradation that may interfere with the analyses.

3.7.2. Laboratory Supplies and Consumables

Vendors may include general labware, reagents, chromatography supplies and organic and metals standards. The lot numbers of reagents and standards are recorded and dates of receipt, first use, and expiration are documented by the laboratory. Certificates of analysis are maintained on file to document reagent standard purity.

TestAmerica SOPs provide details on identifying contaminants in reagents and standards, determining deterioration of reagents and standards, and the corrective actions required if contaminants or deterioration are identified. The TestAmerica QA Officer is ultimately responsible for the ensuring the acceptability of supplies and consumables.

3.8. Data Acquisition Requirements (Non-Direct Measurements)

Historical data were generated during the studies and monitoring events identified in Section 1.0 of the SMP. Data generated during these events were validated and are usable for this phase of the project.

3.9. Data Management

The procedures for managing data from generation to final use and storage are detailed in subsections that follow.

3.9.1. Data Recording

Field data will be recorded in field logbooks and consist of measurements from direct-reading instruments or direct measurements. Field staff are responsible for recording field data and identifying and correcting any recording errors.

Laboratory data are recorded in a variety of formats. Data from instruments are recorded on magnetic media, strip charts, or bench sheets. The laboratory SOPs provide the data recording requirement for each preparation and analysis method.

3.9.2. Data Validation

Validation of field data for this project will primarily consist of checking for transcription errors and review of data recorded in field logbooks. Data transcribed from the field logbook into summary tables for reporting purposes will be verified for correctness by the QA Officer or her designee. Any limitations on the use of field data will be included in the reports.

Validation of the analytical data will be performed by Tetra Tech's QA Officer or designee based on the evaluation criteria outlined in "USEPA Contract Laboratory Program. National Functional Guidelines for Organic Data Review", EPA 540/R-99/008, October 1999 and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA 540/R-94-013, February 1994. The evaluation and action criteria specified in these documents (referred to hereafter as the National Functional Guidelines) will be used for validating the data. However, the acceptance

limits for QC data will be the control limits determined statistically by the laboratory, not the control limits specified in the National Functional Guidelines. Calibration data will be validated using the acceptance criteria specified in the analytical methods, not the National Functional Guidelines. Qualifiers assigned to the data will be consistent with the data qualifiers specified in the National Functional Guidelines. All data used to verify cleanup will be fully validated (i.e., including the review of all raw data).

3.9.3. Data Transformation/Data Reduction

Field data reduction procedures will be minimal in scope compared to those implemented for laboratory data. Only direct reading instrumentation will be employed in the field. These data will be recorded in field logbooks immediately after the measurements are obtained.

Laboratory data reduction procedures typically will be conducted according to the following protocol:

1. Raw data produced and checked by the responsible analyst is turned over for independent review by another analyst.
2. The area supervisor or senior chemist reviews the data for attainment of QC acceptance criteria.
3. The area supervisor will decide whether any sample re-analysis is required.
4. Upon completion of all reviews and acceptance of the raw data by the area supervisor, a report will be generated and sent to the laboratory Project Manager.
5. The laboratory Project Manager will complete a thorough inspection of all reports.
6. Following review and approval of the preliminary report by the laboratory Project Manager, final reports will be generated and signed.

Specific equations used for data reduction by the laboratory are provided in the laboratory SOPs.

3.9.4. Data Transmittal/Transfer

Survey data will be provided in an electronic format that is compatible with geographic information systems (GIS) software, and field measurements will be entered into a standard Microsoft Excel spreadsheet format, as necessary. Tetra Tech's Field QA Officer is responsible for verifying the correctness of the field data after the data are transferred to a spreadsheet format. Geographical and field data are maintained in a database that is described below.

Electronic data deliverables (EDDs) will be provided by the TestAmerica. The laboratory's data are downloaded into EDDs directly from the laboratory information management system (LIMS), thus eliminating the possibility of manual transcription errors. EDDs are imported and maintained in the Site database for manipulation and presentation.

Tetra Tech's QA Officer is responsible for verifying the correctness of the analytical database after the laboratory data have been imported. This is accomplished by

comparing the data from the database to the hardcopy analytical reports for a minimum of 10 percent of the sample results. If discrepancies between the database and hardcopy analytical reports are identified, a complete verification of the database will be performed or a new EDD will be submitted, imported, and verified as described previously.

3.9.5. Data Analysis

Laboratory data will be evaluated as described in Section 2.5.1 of this QAPP. It is anticipated that commercially-available GIS software, such as ArcView, or Tetra Tech' Electronic Database Access Tool (e:DAT) may be used to facilitate the evaluation/ visualization of the data. The actual software used and input parameters/ assumptions will be identified in project reports, as necessary. There is no extreme or unique computer hardware required to use these software.

3.9.6. Data Assessment

Assessment of laboratory data by TestAmerica will be performed using the procedures detailed in its SOPs. These assessments include determining the mean, standard deviation, percent relative standard deviation (RSD), percent difference, RPD, and percent recovery for certain QC elements.

Assessment of QC data for data validation purposes will include determining the mean, standard deviation, percent RSD, correlation coefficient, percent difference, percent recovery, RPD, and percent completeness. The statistical equations to determine percent recovery, RPD, and percent completeness are provided in Section 4.3 of this QAPP.

3.9.7. Data Tracking

Data generated in the field will be recorded in field logbooks or on standard field forms. Survey data will be generated *by* the surveyor and provided to Tetra Tech. There are no unique or special tracking requirements for these data. The data will be transcribed for analysis and reporting as discussed in Section 3.9.3 and the original survey data and field logbooks will be maintained in the final evidence file.

Laboratory data tracking procedures will be consistent with TestAmerica's standard procedures for tracking data from generation to reporting. TestAmerica's LIMS also provides a means for tracking data in the laboratory. TestAmerica's Operations Manager is ultimately responsible for data tracking in the laboratory.

Tracking analytical data in the database includes recording the laboratory generating the data, the date when the EDD was received and imported, the date when qualifiers were applied to the results, and the level of data validation performed. Tetra Tech's Project Manager is ultimately responsible for tracking data from entry into the database to reporting.

3.9.8. Data Storage and Retrieval

Laboratory data will be stored in hardcopy format for a minimum period of 5 years. Electronic instrument data are maintained on magnetic media (i.e., magnetic tape) for this same time period.

Tetra Tech's Project Manager is responsible for project data storage and retrieval. Final evidence files will be maintained by Tetra Tech.

3.9.9. Data Security

Laboratory data security is the responsibility of TestAmerica's Operations Manager. Archived data cannot be accessed without authorization, and the name and purpose of personnel accessing archived data are recorded. TestAmerica's LIMS is password protected and access rights are restricted by job function. Tetra Tech data security procedures include limiting project database access to database managers and analysts and general building security procedures.

4. DATA VERIFICATION, VALIDATION AND USEABILITY

The QA activities that will be performed to ensure that the project data are scientifically defensible, properly documented, of known quality, and meet the project objectives are described in the following sections.

4.1. Data Review, Verification, and Validation Requirements

All field and laboratory data will be reviewed and verified/validated. The procedures and criteria used to verify and validate field and laboratory data will consist of evaluating the· data to the measurement performance criteria in Section 2.5.2 of this QAPP. Field data and logbooks will be reviewed to ensure that the requirements of the sampling program, including the number of samples and locations, sampling, and sample handling procedures, were fulfilled. Acceptable departures from the planned sampling program, such as collecting a sample from an adjacent location because of an obstruction, will not impact data usability.

Sample collection procedures will be reviewed for compliance with the requirements of the SMP and QAPP. If alternate sampling procedures were used, the acceptability of the procedure will be evaluated to determine the affect on the usability of the data. Data usability will not be affected if the procedure used is determined to be an acceptable alternative that fulfills the measurement performance criteria in Section 2.5.2 of this QAPP. However, data generated from sampling procedures that do not provide representative samples will be rejected.

Sample handling records will be reviewed to ensure that sample integrity remained intact from collection to laboratory receipt and that samples were properly preserved. Chain-of-custody documentation and sample condition upon laboratory receipt will be reviewed. The data from samples for which the chain-of-custody or sample identification cannot be verified will be rejected. The data for samples that were not properly preserved will be qualified or rejected depending on the severity of the deviation from the requirements of the SMP and QAPP. The criteria for rejecting improperly preserved samples will be that the sample has been rendered unsuitable for analysis. The criteria for qualifying or rejecting data for samples that are received at the laboratory without being properly preserved, but not rendered unsuitable for analysis, will be based on the sample holding time period evaluation criteria for unpreserved samples specified in the National Functional Guidelines. Data qualification will be consistent with the action specified in the National Functional Guidelines.

Field and laboratory data will be verified to ensure that the methods used to analyze the samples were consistent with the requirements of this QAPP. Data generated from the use of unapproved methods will be rejected. Acceptable departures from the methods specified in this QAPP include using an alternate field meter of comparable capability if the specified meter becomes inoperable.

QC data will be reviewed to determine compliance with the acceptance criteria in Section 2.5 of this QAPP. QC data that do not meet the acceptance criteria will result in sample

data qualification. Significant departures from the QC acceptance criteria may result in rejected data. Situations that result in data rejection include samples analyzed beyond twice the technical holding time period, organic LCS analyte recoveries less than 10 percent if the analyte is not detected in the associated samples, inorganic LCS analyte recoveries less than 30 percent if the analyte is not detected in the associated samples, and surrogate compound spike recoveries less than 10 percent if the analytes associated with the surrogate compound are not detected in the associated samples and the samples were not diluted or determined to exhibit matrix interferences.

4.2. Verification and Validation Methods

Field data will be verified by reviewing field documentation and chain-of-custody records. Data from direct-reading field instruments will be internally verified by reviewing calibration and operating records. TestAmerica will internally verify its data by reviewing and documenting sample receipt, sample preparation, sample analysis (including internal QC checks), and data reduction and reporting. Any deviations from the acceptance criteria, corrective actions taken, and data determined to be of limited usability (i.e., laboratory-qualified data) will be noted in the laboratory reports.

Data validation will be conducted by Tetra Tech consistent with the procedure identified in Section 3.9.2 of this QAPP. The data verification/validation procedure will identify data as being acceptable, of limited usability (qualified as estimated), or rejected. The conditions that result in data being qualified as estimated or rejected were identified in Section 4.1 of this QAPP. The results of the data verification/validation will be provided in data validation memoranda that are provided to Tetra Tech's Project Manager;

Data determined to be unusable may require corrective action to be taken. Potential types of corrective action may include resampling by the field team or reanalysis of samples by the laboratory. The corrective actions taken are dependent upon the ability to mobilize the field team and whether or not the data are critical for project DQOs to be achieved. Should Tetra Tech's QA Officer identify a situation requiring corrective action during data verification/validation, Tetra Tech's Project Manager will be responsible for approving the implementation of the corrective action.

4.3. Usability/Reconciliation with Data Quality Objectives

The overall usability of the data for the investigation will be assessed by evaluating the PARCCS of the data set to the measurement performance criteria in Section 2.5.2 of this QAPP using basic statistical quantities, as applicable. The procedures and statistical formulas to be used for these evaluations are presented in the following subsections.

4.3.1. Precision

Project precision will be evaluated by assessing the RPD data from field duplicate samples. Analytical precision will be evaluated by assessing the RPD data from either duplicate spiked sample analyses or duplicate sample analyses. The RPD between two measurements is calculated using the following simplified formula:

$$RPD = ((R_1-R_2)/(R_1+R_2))*200$$

where:

R 1 = value of first result
R2 = value of second result

Overall precision for the sampling program will be determined by calculating the mean RPD for all field duplicates. This will provide an evaluation of the overall variability attributable to the sampling procedure, sample matrix, and laboratory procedures in each sampling program.

The overall precision requirement will be the same as the project precision. It should be noted that the RPD of two measurements could be very high when the data approach the quantitation limit of an analysis. The calculation of the mean RPD will only include the RPD values for field duplicate sample analyte data that are greater than or equal to 5 times the quantitation limit for an analysis.

4.3.2. Accuracy/Bias

The data from method blank samples, field blank samples, MS/MSD samples, surrogate compound spikes, and LCSs will be used to determine accuracy and potential bias of the sample data.

The data from method blank samples provide an indication of laboratory contamination that may result in bias of sample data. Sample data associated with method blank contamination will have been identified during the data verification/validation process. Sample data associated with method blank contamination are evaluated during data validation procedure to determine if analytes detected in samples associated with contaminated method blanks are “real” or are the result of laboratory contamination. The procedure for this evaluation involves comparing the concentration of the analyte in the sample to the concentration in the method blank sample taking into account adjustments for sample dilutions and dry-weight reporting. In general, the sample data are qualified as not detected if the sample concentration is less than 5 times (10 times for common laboratory contaminants) the method blank concentration. Typically, the quantitation limit for the affected analyte is elevated to the concentration detected in the sample.

The data from field blanks provide an indication of field conditions that may result in bias of sample data. Sample data associated with contaminated field blank samples will have been identified during the data verification/validation process. The evaluation procedure and qualification of sample data associated with field blank contamination is performed in the same manner as the evaluation procedure for method blank sample contamination.

Matrix spike sample data provide information regarding the accuracy/bias of the analytical methods relative to the sample matrix. Matrix spike samples are field samples that have been fortified with target analytes prior to sample preparation and analysis. The percent recovery data provide an indication of the effect that the sample matrix may have

on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during the data verification/validation process.

Surrogate spike recoveries provide information regarding the accuracy/bias of organic analyses on an individual sample basis. Surrogate compounds are not expected to be found in the samples and are added to every sample prior to sample preparation. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during the data verification/validation process.

Analytical accuracy/bias will be determined by evaluating the percent recovery data of LCSs. LCSs are artificial samples prepared in the laboratory using a blank matrix fortified with analytes from a standard reference material that is independent of the calibration standards. LCSs are prepared and analyzed in the same manner as the field samples. The percent recovery data from LCS analyses will provide an indication of the accuracy and bias of the analytical method for each target analyte.

Percent recovery is calculated using the following formula:

$$\%R = (SSR-SR)/SA*100$$

where:

SSR	=	Spiked Sample Result
SR	=	Sample Result or Background
SA	=	Spike Added

The percent recovery for surrogate compounds and LCSs are determined by dividing the measured value by the true value and multiplying by 100.

Overall accuracy/bias for the sampling events will be determined by calculating the percent of accuracy measurements that meet the measurement performance criteria specified in Section 2.5.2 of this QAPP. Overall accuracy will be considered acceptable if the surrogate percent recoveries are met for at least 75 percent of the· samples and the LCS percent recoveries are met for all the samples and the MS/MSD percent recoveries are met for at least 75 percent of the samples.

4.3.3. Sample Representativeness

Representativeness of the samples will be assessed by reviewing the results of field audits and the data from field duplicate samples. Overall sample representativeness will be determined by calculating the percentage of field duplicate sample data that achieved the RPD criteria specified in Section 2.5.2 of this QAPP. Overall sample representativeness will be considered acceptable if the results of field audits indicate that the approved sampling methods or alternate acceptable sampling methods were used to collect the samples and the field duplicate RPD data are acceptable for at least 75 percent of the samples.

4.3.4. Completeness

Completeness will be assessed by comparing the number of valid (usable) sample results to the total possible number of results within a specific sample matrix and/ or analysis. Percent completeness will be calculated using the following formula:

% Completeness = (# of Valid (usable) Measurements/ # of Measurements Planned)*100

Overall completeness will be assessed by calculating the mean percent completeness for the entire set of data obtained for each sampling program. The overall completeness will be calculated when all sampling and analysis is concluded. Overall completeness will be considered acceptable if at least 90 percent of the data are determined to be valid.

4.3.5. Comparability

The comparability of data sets will be evaluated by reviewing the sampling and analysis methods used to generate the data for each data set. Project comparability will be determined to be acceptable if the sampling and analysis methods specified in this QAPP and any approved QAPP revisions or amendments are used for generating the data.

Overall comparability of data from split samples (samples that are collected at the same time from the same location and split equally between two parties using sample containers from the same source or vendor) will be evaluated by determining the RPD of detected analytes in both samples following data verification/validation. Analytes that are detected in only one of the two samples will be assessed by reviewing the data verification/ validation reports for both data sets and determining the cause of the discrepancy, if possible. Overall comparability of split sample data will be considered acceptable if the RPD for detected analytes with concentrations greater than or equal to 5 times their respective quantitation limits does not exceed RPD acceptance criteria for field duplicate samples.

4.3.6. Sensitivity and Quantitation Limits

The quantitation limits for the sample data will be reviewed to ensure that the sensitivity of the analyses was sufficient to achieve the detectability requirements specified in Table 2.1 of this QAPP. The method blank sample data and LCS percent recovery data will be reviewed to assess compliance with the measurement performance criteria specified in Section 2.5.2 of this QAPP.

Overall sensitivity will be assessed by comparing the sensitivity achieved for the samples to the detectability requirements for the analyses. Overall sensitivity will be considered acceptable if quantitation/detection limits for the samples are sufficient to achieve the detectability requirements for the project.

It should be noted that quantitation limits might be elevated as a result of high concentrations of target compounds, non-target compounds, and matrix interferences (collectively known as sample matrix effects). In these cases, the sensitivity of the analyses will be evaluated on an individual sample basis relative to the applicable evaluation criteria. The need to investigate the use of alternate analytical methods may be

required if the sensitivity of the analytical methods identified in this QAPP cannot achieve the evaluation criteria as a result of sample matrix effects.

4.3.7. Data Limitations and Actions

Data use limitations will be identified in data validation reports. Data that do not meet the measurement performance criteria specified in this QAPP will be identified and the impact on the project quality objectives will be assessed and discussed in these reports and project reports. Field information will be reviewed to ensure that all sampling procedures and field measurements were conducted in accordance with the requirements of this QAPP. Field measurements obtained or data from samples collected using procedures inconsistent with the requirements of this QAPP will be evaluated using the procedures in Section 4.1. Specific actions for field or laboratory data that do not meet the measurement performance criteria depends on the use of the data, and may require that additional samples be collected or the use of the data be restricted.

Table 2.1 Quality Control Limits

Media	Method Description	Method Code
Soil	Volatile Organic Compounds by GC/MS	8260C
	Closed System Purge and Trap	5035LP_Calc

		Reporting Limit		Method Detection Limit		LCSREC Recovery			LCSRPD		MSREC Recovery			MSRPD		SUREC Recovery		
Analyte Description	CAS #	Limit	Units	Limit	Units	Low	High	Units	Precision	Units	Low	High	Units	Precision	Units	Low	High	Units
1,1,1-Trichloroethane	71-55-6	5	ug/Kg	0.363	ug/Kg	77	121	%	20	%	77	121	%	30	%			%
1,1,2,2-Tetrachloroethane	79-34-5	5	ug/Kg	0.811	ug/Kg	80	120	%	20	%	80	120	%	30	%			%
1,1,2-Trichloroethane	79-00-5	5	ug/Kg	0.65	ug/Kg	78	122	%	20	%	78	122	%	30	%			%
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5	ug/Kg	1.14	ug/Kg	60	140	%	20	%	60	140	%	30	%			%
1,1-Dichloroethane	75-34-3	5	ug/Kg	0.61	ug/Kg	73	126	%	20	%	73	126	%	30	%			%
1,1-Dichloroethene	75-35-4	5	ug/Kg	0.612	ug/Kg	59	125	%	20	%	59	125	%	30	%			%
1,2,4-Trichlorobenzene	120-82-1	5	ug/Kg	0.304	ug/Kg	64	120	%	20	%	64	120	%	30	%			%
1,2-Dibromo-3-Chloropropane	96-12-8	5	ug/Kg	2.5	ug/Kg	63	124	%	20	%	63	124	%	30	%			%
1,2-Dichlorobenzene	95-50-1	5	ug/Kg	0.391	ug/Kg	75	120	%	20	%	75	120	%	30	%			%
1,2-Dichloroethane	107-06-2	5	ug/Kg	0.251	ug/Kg	77	122	%	20	%	77	122	%	30	%			%
1,2-Dichloropropane	78-87-5	5	ug/Kg	2.5	ug/Kg	75	124	%	20	%	75	124	%	30	%			%
1,3-Dichlorobenzene	541-73-1	5	ug/Kg	0.257	ug/Kg	74	120	%	20	%	74	120	%	30	%			%
1,4-Dichlorobenzene	106-46-7	5	ug/Kg	0.7	ug/Kg	73	120	%	20	%	73	120	%	30	%			%
2-Butanone (MEK)	78-93-3	25	ug/Kg	1.83	ug/Kg	70	134	%	20	%	70	134	%	30	%			%
2-Hexanone	591-78-6	25	ug/Kg	2.5	ug/Kg	59	130	%	20	%	59	130	%	30	%			%
4-Methyl-2-pentanone (MIBK)	108-10-1	25	ug/Kg	1.64	ug/Kg	65	133	%	20	%	65	133	%	30	%			%
Acetone	67-64-1	25	ug/Kg	4.21	ug/Kg	61	137	%	20	%	61	137	%	30	%			%
Benzene	71-43-2	5	ug/Kg	0.245	ug/Kg	79	127	%	20	%	79	127	%	30	%			%
Bromodichloromethane	75-27-4	5	ug/Kg	0.67	ug/Kg	80	122	%	20	%	80	122	%	30	%			%
Bromoform	75-25-2	5	ug/Kg	2.5	ug/Kg	68	126	%	20	%	68	126	%	30	%			%
Bromomethane	74-83-9	5	ug/Kg	0.45	ug/Kg	37	149	%	20	%	37	149	%	30	%			%
Carbon disulfide	75-15-0	5	ug/Kg	2.5	ug/Kg	64	131	%	20	%	64	131	%	30	%			%
Carbon tetrachloride	56-23-5	5	ug/Kg	0.484	ug/Kg	75	135	%	20	%	75	135	%	30	%			%
Chlorobenzene	108-90-7	5	ug/Kg	0.66	ug/Kg	76	124	%	20	%	76	124	%	30	%			%
Dibromochloromethane	124-48-1	5	ug/Kg	0.64	ug/Kg	76	125	%	20	%	76	125	%	30	%			%
Chloroethane	75-00-3	5	ug/Kg	1.13	ug/Kg	69	135	%	20	%	69	135	%	30	%			%
Chloroform	67-66-3	5	ug/Kg	0.309	ug/Kg	80	118	%	20	%	80	118	%	30	%			%
Chloromethane	74-87-3	5	ug/Kg	0.302	ug/Kg	63	127	%	20	%	63	127	%	30	%			%
cis-1,2-Dichloroethene	156-59-2	5	ug/Kg	0.64	ug/Kg	81	117	%	20	%	81	117	%	30	%			%
cis-1,3-Dichloropropene	10061-01-5	5	ug/Kg	0.72	ug/Kg	82	120	%	20	%	82	120	%	30	%			%
Cyclohexane	110-82-7	5	ug/Kg	0.7	ug/Kg	70	130	%	20	%	70	130	%	30	%			%
Dichlorodifluoromethane	75-71-8	5	ug/Kg	0.413	ug/Kg	57	142	%	20	%	57	142	%	30	%			%
Ethylbenzene	100-41-4	5	ug/Kg	0.345	ug/Kg	80	120	%	20	%	80	120	%	30	%			%
1,2-Dibromoethane	106-93-4	5	ug/Kg	0.642	ug/Kg	78	120	%	20	%	78	120	%	30	%			%
Isopropylbenzene	98-82-8	5	ug/Kg	0.754	ug/Kg	72	120	%	20	%	72	120	%	30	%			%
Methyl acetate	79-20-9	5	ug/Kg	0.93	ug/Kg	60	140	%	20	%	60	140	%	30	%			%
Methyl tert-butyl ether	1634-04-4	5	ug/Kg	0.491	ug/Kg	63	125	%	20	%	63	125	%	30	%			%
Methylcyclohexane	108-87-2	5	ug/Kg	0.76	ug/Kg	60	140	%	20	%	60	140	%	30	%			%
Methylene Chloride	75-09-2	5	ug/Kg	2.3	ug/Kg	61	127	%	20	%	61	127	%	30	%			%
Styrene	100-42-5	5	ug/Kg	0.25	ug/Kg	80	120	%	20	%	80	120	%	30	%			%
Tetrachloroethene	127-18-4	5	ug/Kg	0.671	ug/Kg	74	122	%	20	%	74	122	%	30	%			%
Toluene	108-88-3	5	ug/Kg	0.378	ug/Kg	74	128	%	20	%	74	128	%	30	%			%
Toluene-d8 (Surr)	2037-26-5		ug/Kg		ug/Kg			%		%			%		%	71	125	%
trans-1,2-Dichloroethene	156-60-5	5	ug/Kg	0.516	ug/Kg	78	126	%	20	%	78	126	%	30	%			%
trans-1,3-Dichloropropene	10061-02-6	5	ug/Kg	2.2	ug/Kg	73	123	%	20	%	73	123	%	30	%			%
Trichloroethene	79-01-6	5	ug/Kg	1.1	ug/Kg	77	129	%	20	%	77	129	%	30	%			%
Trichlorofluoromethane	75-69-4	5	ug/Kg	0.473	ug/Kg	65	146	%	20	%	65	146	%	30	%			%
Vinyl chloride	75-01-4	5	ug/Kg	0.61	ug/Kg	61	133	%	20	%	61	133	%	30	%			%
Xylenes, Total	1330-20-7	10	ug/Kg	0.84	ug/Kg	70	130	%	20	%	80	120	%	30	%			%
1,2-Dichloroethane-d4 (Surr)	17060-07-0		ug/Kg		ug/Kg			%		%			%		%	64	126	%
4-Bromofluorobenzene (Surr)	460-00-4		ug/Kg		ug/Kg			%		%			%		%	72	126	%

Table 2.1 Quality Control Limits

Media	Method Description	Method Code
Soil	Volatile Organic Compounds by GC/MS	8260C
	Closed System Purge and Trap	5035A_M_Calc

		Reporting Limit		Method Detection Limit		LCSREC Recovery			LCSRPD		MSREC Recovery			MSRPD		SUREC Recovery		
Analyte Description	CAS #	Limit	Units	Limit	Units	Low	High	Units	Precision	Units	Low	High	Units	Precision	Units	Low	High	Units
1,1,1-Trichloroethane	71-55-6	100	ug/Kg	27.7	ug/Kg			%		%			%		%			%
1,1,2,2-Tetrachloroethane	79-34-5	100	ug/Kg	16.24	ug/Kg			%		%			%		%			%
1,1,2-Trichloroethane	79-00-5	100	ug/Kg	21	ug/Kg			%		%			%		%			%
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	100	ug/Kg	50	ug/Kg			%		%			%		%			%
1,1-Dichloroethane	75-34-3	100	ug/Kg	30.9	ug/Kg	82	138	%	20	%	82	138	%	20	%			%
1,1-Dichloroethene	75-35-4	100	ug/Kg	34.6	ug/Kg	54	144	%	20	%	50	147	%	20	%			%
1,2,4-Trichlorobenzene	120-82-1	100	ug/Kg	37.9	ug/Kg			%		%			%		%			%
1,2-Dibromo-3-Chloropropane	96-12-8	100	ug/Kg	50	ug/Kg			%		%			%		%			%
1,2-Dichlorobenzene	95-50-1	100	ug/Kg	25.5	ug/Kg	80	132	%	20	%	80	132	%	20	%			%
1,2-Dichloroethane	107-06-2	100	ug/Kg	40.9	ug/Kg	78	129	%	20	%	78	129	%	20	%			%
1,2-Dichloropropane	78-87-5	100	ug/Kg	16.2	ug/Kg			%		%			%		%			%
1,3-Dichlorobenzene	541-73-1	100	ug/Kg	26.7	ug/Kg			%		%			%		%			%
1,4-Dichlorobenzene	106-46-7	100	ug/Kg	14	ug/Kg			%		%			%		%			%
2-Butanone (MEK)	78-93-3	500	ug/Kg	297	ug/Kg			%		%			%		%			%
2-Hexanone	591-78-6	500	ug/Kg	205	ug/Kg			%		%			%		%			%
4-Methyl-2-pentanone (MIBK)	108-10-1	500	ug/Kg	32	ug/Kg			%		%			%		%			%
Acetone	67-64-1	500	ug/Kg	411	ug/Kg			%		%			%		%			%
Benzene	71-43-2	100	ug/Kg	4.8	ug/Kg	75	131	%	20	%	52	132	%	20	%			%
Bromodichloromethane	75-27-4	100	ug/Kg	20	ug/Kg			%		%			%		%			%
Bromoform	75-25-2	100	ug/Kg	50	ug/Kg			%		%			%		%			%
Bromomethane	74-83-9	100	ug/Kg	22	ug/Kg			%		%			%		%			%
Carbon disulfide	75-15-0	100	ug/Kg	45.5	ug/Kg			%		%			%		%			%
Carbon tetrachloride	56-23-5	100	ug/Kg	25.5	ug/Kg			%		%			%		%			%
Chlorobenzene	108-90-7	100	ug/Kg	13.2	ug/Kg	80	127	%	20	%	65	129	%	20	%			%
Dibromochloromethane	124-48-1	100	ug/Kg	48.4	ug/Kg			%		%			%		%			%
Chloroethane	75-00-3	100	ug/Kg	20.8	ug/Kg			%		%			%		%			%
Chloroform	67-66-3	100	ug/Kg	68.6	ug/Kg			%		%			%		%			%
Chloromethane	74-87-3	100	ug/Kg	23.8	ug/Kg			%		%			%		%			%
cis-1,2-Dichloroethene	156-59-2	100	ug/Kg	27.6	ug/Kg	79	128	%	20	%	79	128	%	20	%			%
cis-1,3-Dichloropropene	10061-01-5	100	ug/Kg	23.9	ug/Kg			%		%			%		%			%
Cyclohexane	110-82-7	100	ug/Kg	22.2	ug/Kg			%		%			%		%			%
Dichlorodifluoromethane	75-71-8	100	ug/Kg	43.6	ug/Kg			%		%			%		%			%
Ethylbenzene	100-41-4	100	ug/Kg	29.1	ug/Kg	78	136	%	20	%	78	136	%	20	%			%
1,2-Dibromoethane	106-93-4	100	ug/Kg	3.8	ug/Kg			%		%			%		%			%
Isopropylbenzene	98-82-8	100	ug/Kg	15	ug/Kg			%		%			%		%			%
Methyl acetate	79-20-9	100	ug/Kg	47.6	ug/Kg			%		%			%		%			%
Methyl tert-butyl ether	1634-04-4	100	ug/Kg	37.8	ug/Kg	67	137	%	20	%	67	137	%	20	%			%
Methylcyclohexane	108-87-2	100	ug/Kg	46.8	ug/Kg			%		%			%		%			%
Methylene Chloride	75-09-2	100	ug/Kg	19.8	ug/Kg			%		%			%		%			%
Styrene	100-42-5	100	ug/Kg	24.1	ug/Kg			%		%			%		%			%
Tetrachloroethene	127-18-4	100	ug/Kg	13.44	ug/Kg	72	141	%	20	%	72	141	%	20	%			%
Toluene	108-88-3	100	ug/Kg	26.8	ug/Kg	76	133	%	20	%	43	133	%	20	%			%
Toluene-d8 (Surr)	2037-26-5		ug/Kg		ug/Kg			%		%			%		%	50	149	%
trans-1,2-Dichloroethene	156-60-5	100	ug/Kg	23.6	ug/Kg	81	147	%	20	%	81	147	%	20	%			%
trans-1,3-Dichloropropene	10061-02-6	100	ug/Kg	4.8	ug/Kg			%		%			%		%			%
Trichloroethene	79-01-6	100	ug/Kg	27.8	ug/Kg	77	130	%	20	%	77	130	%	20	%			%
Trichlorofluoromethane	75-69-4	100	ug/Kg	46.9	ug/Kg			%		%			%		%			%
Vinyl chloride	75-01-4	100	ug/Kg	33.5	ug/Kg			%		%			%		%			%
Xylenes, Total	1330-20-7	200	ug/Kg	16.8	ug/Kg			%		%			%		%			%
1,2-Dichloroethane-d4 (Surr)	17060-07-0		ug/Kg		ug/Kg			%		%			%		%	53	146	%
4-Bromofluorobenzene (Surr)	460-00-4		ug/Kg		ug/Kg			%		%			%		%	49	148	%

Table 2.1 Quality Control Limits

Media	Method Description	Method Code
Soil	Semivolatile Organic Compounds by GC/MS	8270D
	Ultrasonic Extraction	3550C

		Reporting Limit		Method Detection Limit		LCSREC Recovery			LCSRPD		MSREC Recovery			MSRPD		SUREC Recovery		
Analyte Description	CAS #	Limit	Units	Limit	Units	Low	High	Units	Precision	Units	Low	High	Units	Precision	Units	Low	High	Units
Biphenyl	92-52-4	170	ug/Kg	10.51428	ug/Kg	71	120	%	20	%	71	120	%	20	%			%
bis (2-chloroisopropyl) ether	108-60-1	170	ug/Kg	17.64	ug/Kg	44	120	%	24	%	44	120	%	24	%			%
2,4,5-Trichlorophenol	95-95-4	170	ug/Kg	36.8149	ug/Kg	59	126	%	18	%	59	126	%	18	%			%
2,4,6-Trichlorophenol	88-06-2	170	ug/Kg	11.13659	ug/Kg	59	123	%	19	%	59	123	%	19	%			%
2,4-Dichlorophenol	120-83-2	170	ug/Kg	8.84975	ug/Kg	52	120	%	19	%	52	120	%	19	%			%
2,4-Dimethylphenol	105-67-9	170	ug/Kg	45.59644	ug/Kg	36	120	%	42	%	36	120	%	42	%			%
2,4-Dinitrophenol	51-28-5	330	ug/Kg	59.06137	ug/Kg	35	146	%	22	%	35	146	%	22	%			%
2,4-Dinitrotoluene	121-14-2	170	ug/Kg	26.13436	ug/Kg	55	125	%	20	%	55	125	%	20	%			%
2,6-Dinitrotoluene	606-20-2	170	ug/Kg	41.30373	ug/Kg	66	128	%	15	%	66	128	%	15	%			%
2-Chloronaphthalene	91-58-7	170	ug/Kg	11.32611	ug/Kg	57	120	%	21	%	57	120	%	21	%			%
2-Chlorophenol	95-57-8	170	ug/Kg	8.59328	ug/Kg	38	120	%	25	%	38	120	%	25	%			%
2-Methylphenol	95-48-7	170	ug/Kg	5.19098	ug/Kg	48	120	%	27	%	48	120	%	27	%			%
2-Methylnaphthalene	91-57-6	170	ug/Kg	2.04484	ug/Kg	47	120	%	21	%	47	120	%	21	%			%
2-Nitroaniline	88-74-4	330	ug/Kg	54.14509	ug/Kg	61	130	%	15	%	61	130	%	15	%			%
2-Nitrophenol	88-75-5	170	ug/Kg	7.71638	ug/Kg	50	120	%	18	%	50	120	%	18	%			%
3,3'-Dichlorobenzidine	91-94-1	170	ug/Kg	148	ug/Kg	48	126	%	25	%	48	126	%	25	%			%
3-Nitroaniline	99-09-2	330	ug/Kg	38.81322	ug/Kg	61	127	%	19	%	61	127	%	19	%			%
4,6-Dinitro-2-methylphenol	534-52-1	330	ug/Kg	58.29008	ug/Kg	49	155	%	15	%	49	155	%	15	%			%
4-Bromophenyl phenyl ether	101-55-3	170	ug/Kg	53.70538	ug/Kg	58	131	%	15	%	58	131	%	15	%			%
4-Chloro-3-methylphenol	59-50-7	170	ug/Kg	6.94446	ug/Kg	49	125	%	27	%	49	125	%	27	%			%
4-Chloroaniline	106-47-8	170	ug/Kg	49.54531	ug/Kg	49	120	%	22	%	49	120	%	22	%			%
4-Chlorophenyl phenyl ether	7005-72-3	170	ug/Kg	3.59842	ug/Kg	63	124	%	16	%	63	124	%	16	%			%
4-Methylphenol	106-44-5	330	ug/Kg	9.4	ug/Kg	50	119	%	24	%	50	119	%	24	%			%
4-Nitroaniline	100-01-6	330	ug/Kg	18.8558	ug/Kg	63	128	%	24	%	63	128	%	24	%			%
4-Nitrophenol	100-02-7	330	ug/Kg	40.91715	ug/Kg	43	137	%	25	%	43	137	%	25	%			%
Acenaphthene	83-32-9	170	ug/Kg	1.98418	ug/Kg	53	120	%	35	%	53	120	%	35	%			%
Acenaphthylene	208-96-8	170	ug/Kg	1.38072	ug/Kg	58	121	%	18	%	58	121	%	18	%			%
Acetophenone	98-86-2	170	ug/Kg	8.66305	ug/Kg	66	120	%	20	%	66	120	%	20	%			%
Anthracene	120-12-7	170	ug/Kg	4.32194	ug/Kg	62	129	%	15	%	62	129	%	15	%			%
Atrazine	1912-24-9	170	ug/Kg	7.51146	ug/Kg	60	164	%	20	%	60	164	%	20	%			%
Benzaldehyde	100-52-7	170	ug/Kg	18.51196	ug/Kg	21	120	%	20	%	21	120	%	20	%			%
Benzo[a]anthracene	56-55-3	170	ug/Kg	2.91388	ug/Kg	65	133	%	15	%	65	133	%	15	%			%
Benzo[a]pyrene	50-32-8	170	ug/Kg	4.06861	ug/Kg	64	127	%	15	%	64	127	%	15	%			%
Benzo[b]fluoranthene	205-99-2	170	ug/Kg	3.27501	ug/Kg	64	135	%	15	%	64	135	%	15	%			%
Benzo[g,h,i]perylene	191-24-2	170	ug/Kg	2.02566	ug/Kg	50	152	%	15	%	50	152	%	15	%			%
Benzo[k]fluoranthene	207-08-9	170	ug/Kg	1.85814	ug/Kg	58	138	%	22	%	58	138	%	22	%			%
Bis(2-chloroethoxy)methane	111-91-1	170	ug/Kg	9.18259	ug/Kg	61	133	%	17	%	61	133	%	17	%			%
Bis(2-chloroethyl)ether	111-44-4	170	ug/Kg	14.57441	ug/Kg	45	120	%	21	%	45	120	%	21	%			%
Bis(2-ethylhexyl) phthalate	117-81-7	170	ug/Kg	54.38616	ug/Kg	61	133	%	15	%	61	133	%	15	%			%
Butyl benzyl phthalate	85-68-7	170	ug/Kg	45.32835	ug/Kg	61	129	%	16	%	61	129	%	16	%			%
Caprolactam	105-60-2	170	ug/Kg	73.02415	ug/Kg	54	133	%	20	%	54	133	%	20	%			%
Carbazole	86-74-8	170	ug/Kg	1.95306	ug/Kg	59	129	%	20	%	59	129	%	20	%			%
Chrysene	218-01-9	170	ug/Kg	1.68779	ug/Kg	64	131	%	15	%	64	131	%	15	%			%
Dibenz(a,h)anthracene	53-70-3	170	ug/Kg	1.98543	ug/Kg	54	148	%	15	%	54	148	%	15	%			%
Di-n-butyl phthalate	84-74-2	170	ug/Kg	58.34917	ug/Kg	58	130	%	15	%	58	130	%	15	%			%
Di-n-octyl phthalate	117-84-0	170	ug/Kg	3.94792	ug/Kg	62	133	%	16	%	62	133	%	16	%			%
Dibenzofuran	132-64-9	170	ug/Kg	1.75662	ug/Kg	56	120	%	15	%	56	120	%	15	%			%
Diethyl phthalate	84-66-2	170	ug/Kg	5.09952	ug/Kg	66	126	%	15	%	66	126	%	15	%			%
Dimethyl phthalate	131-11-3	170	ug/Kg	4.40366	ug/Kg	65	124	%	15	%	65	124	%	15	%			%
Fluoranthene	206-44-0	170	ug/Kg	2.44588	ug/Kg	62	131	%	15	%	62	131	%	15	%			%
Fluorene	86-73-7	170	ug/Kg	3.88915	ug/Kg	63	126	%	15	%	63	126	%	15	%			%
Hexachlorobenzene	118-74-1	170	ug/Kg	8.38584	ug/Kg	60	132	%	15	%	60	132	%	15	%			%
Hexachlorobutadiene	87-68-3	170	ug/Kg	8.63759	ug/Kg	45	120	%	44	%	45	120	%	44	%			%
Hexachlorocyclopentadiene	77-47-4	170	ug/Kg	51.03698	ug/Kg	31	120	%	49	%	31	120	%	49	%			%
Hexachloroethane	67-72-1	170	ug/Kg	13.06357	ug/Kg	41	120	%	46	%	41	120	%	46	%			%
Indeno[1,2,3-cd]pyrene	193-39-5	170	ug/Kg	4.66924	ug/Kg	56	149	%	15	%	56	149	%	15	%			%
Isophorone	78-59-1	170	ug/Kg	8.43613	ug/Kg	56	120	%	17	%	56	120	%	17	%			%
N-Nitrosodi-n-propylamine	621-64-7	170	ug/Kg	13.36969	ug/Kg	46	120	%	31	%	46	120	%	31	%			%
N-Nitrosodiphenylamine	86-30-6	170	ug/Kg	9.22816	ug/Kg	20	119	%	15	%	20	119	%	15	%			%
Naphthalene	91-20-3	170	ug/Kg	2.80953	ug/Kg	46	120	%	29	%	46	120	%	29	%			%
Nitrobenzene	98-95-3	170	ug/Kg	7.48254	ug/Kg	49	120	%	24	%	49	120	%	24	%			%
Nitrobenzene-d5 (Surr)	4165-60-0		ug/Kg		ug/Kg			%		%			%		%	34	132	%
Pentachlorophenol	87-86-5	330	ug/Kg	57.89626	ug/Kg	33	136	%	35	%	33	136	%	35	%			%
Phenanthrene	85-01-8	170	ug/Kg	3.54216	ug/Kg	60	130	%	15	%	60	130	%	15	%			%
Phenol	108-95-2	170	ug/Kg	17.76801	ug/Kg	36	120	%	35	%	36	120	%	35	%			%
Phenol-d5 (Surr)	4165-62-2		ug/Kg		ug/Kg			%		%			%		%	11	120	%
Pyrene	129-00-0	170	ug/Kg	1.09282	ug/Kg	51	133	%	35	%	51	133	%	35	%			%
p-Terphenyl-d14 (Surr)	1718-51-0		ug/Kg		ug/Kg			%		%			%		%	65	153	%
2,4,6-Tribromophenol (Surr)	118-79-6	0	ug/Kg	0	ug/Kg			%		%			%		%	39	146	%
2-Fluorobiphenyl	321-60-8		ug/Kg		ug/Kg			%		%			%		%	37	120	%
2-Fluorophenol (Surr)	367-12-4		ug/Kg		ug/Kg			%		%			%		%	18	120	%

Table 2.1 Quality Control Limits

Media	Method Description	Method Code
Soil	Metals (ICP)	6010C
	Preparation, Metals	3050B

		Reporting Limit		Method Detection Limit		LCSREC Recovery			LCSRPD		MSREC Recovery			MSRPD		SUREC Recovery		
Analyte Description	CAS #	Limit	Units	Limit	Units	Low	High	Units	Precision	Units	Low	High	Units	Precision	Units	Low	High	Units
Aluminum	7429-90-5	10	mg/Kg	4.4	mg/Kg	41	160	%	20	%	75	125	%	20	%			
Antimony	7440-36-0	15	mg/Kg	0.4	mg/Kg	25	272	%	20	%	75	125	%	20	%			
Arsenic	7440-38-2	2	mg/Kg	0.4	mg/Kg	69	131	%	20	%	75	125	%	20	%			
Barium	7440-39-3	0.5	mg/Kg	0.11	mg/Kg	72	127	%	20	%	75	125	%	20	%			
Beryllium	7440-41-7	0.2	mg/Kg	0.028	mg/Kg	73	127	%	20	%	75	125	%	20	%			
Cadmium	7440-43-9	0.2	mg/Kg	0.03	mg/Kg	73	127	%	20	%	75	125	%	20	%			
Calcium	7440-70-2	50	mg/Kg	3.3	mg/Kg	74	126	%	20	%	75	125	%	20	%			
Chromium	7440-47-3	0.5	mg/Kg	0.2	mg/Kg	68	132	%	20	%	75	125	%	20	%			
Cobalt	7440-48-4	0.5	mg/Kg	0.05	mg/Kg	75	125	%	20	%	75	125	%	20	%			
Copper	7440-50-8	1	mg/Kg	0.21	mg/Kg	74	126	%	20	%	75	125	%	20	%			
Iron	7439-89-6	10	mg/Kg	1.1	mg/Kg	31	169	%	20	%	75	125	%	20	%			
Lead	7439-92-1	1	mg/Kg	0.24	mg/Kg	70	130	%	20	%	75	125	%	20	%			
Magnesium	7439-95-4	20	mg/Kg	0.927	mg/Kg	64	136	%	20	%	75	125	%	20	%			
Manganese	7439-96-5	0.2	mg/Kg	0.032	mg/Kg	74	125	%	20	%	75	125	%	20	%			
Nickel	7440-02-0	5	mg/Kg	0.23	mg/Kg	70	130	%	20	%	75	125	%	20	%			
Potassium	7440-09-7	30	mg/Kg	20	mg/Kg	61	139	%	20	%	75	125	%	20	%			
Selenium	7782-49-2	4	mg/Kg	0.4	mg/Kg	64	137	%	20	%	75	125	%	20	%			
Silver	7440-22-4	0.5	mg/Kg	0.2	mg/Kg	66	135	%	20	%	75	125	%	20	%			
Sodium	7440-23-5	140	mg/Kg	13	mg/Kg	27	174	%	20	%	75	125	%	20	%			
Thallium	7440-28-0	6	mg/Kg	0.3	mg/Kg	67	132	%	20	%	75	125	%	20	%			
Vanadium	7440-62-2	0.5	mg/Kg	0.11	mg/Kg	54	146	%	20	%	75	125	%	20	%			
Zinc	7440-66-6	2	mg/Kg	0.153	mg/Kg	67	133	%	20	%	75	125	%	20	%			

Media	Method Description	Method Code
Soil	PCBs by Gas Chromatography	8082A
	Ultrasonic Extraction	3550C_Med

		Reporting Limit		Method Detection Limit		LCSREC Recovery			LCSRPD		MSREC Recovery			MSRPD		SUREC Recovery		
Analyte Description	CAS #	Limit	Units	Limit	Units	Low	High	Units	Precision	Units	Low	High	Units	Precision	Units	Low	High	Units
PCB-1016	12674-11-2	0.0167	mg/Kg	0.00326	mg/Kg	51	185	%	50	%	42	159	%	50	%			%
PCB-1221	11104-28-2	0.0167	mg/Kg	0.00326	mg/Kg			%		%			%		%			%
PCB-1232	11141-16-5	0.0167	mg/Kg	0.00326	mg/Kg			%		%			%		%			%
PCB-1242	53469-21-9	0.0167	mg/Kg	0.00326	mg/Kg			%		%			%		%			%
PCB-1248	12672-29-6	0.0167	mg/Kg	0.00326	mg/Kg			%		%			%		%			%
PCB-1254	11097-69-1	0.0167	mg/Kg	0.00782	mg/Kg	20	200	%		%			%		%			%
PCB-1260	11096-82-5	0.0167	mg/Kg	0.00782	mg/Kg	61	184	%	50	%	47	153	%	50	%			%
Tetrachloro-m-xylene	877-09-8		mg/Kg		mg/Kg			%		%			%		%	46	175	%
DCB Decachlorobiphenyl	2051-24-3		mg/Kg		mg/Kg			%		%			%		%	47	176	%

Table 2.1 Quality Control Limits

Media	Method Description	Method Code
Water	Volatile Organic Compounds by GC/MS	8260C
	Purge and Trap	5030C

		Reporting Limit		Method Detection Limit		LCSREC Recovery			LCSRPD		MSREC Recovery			MSRPD		SUREC Recovery		
Analyte Description	CAS #	Limit	Units	Limit	Units	Low	High	Units	Precision	Units	Low	High	Units	Precision	Units	Low	High	Units
1,1,1-Trichloroethane	71-55-6	1	ug/L	0.82	ug/L	73	126	%	15	%	73	126	%	15	%			%
1,1,2,2-Tetrachloroethane	79-34-5	1	ug/L	0.21	ug/L	70	126	%	15	%	70	126	%	15	%			%
1,1,2-Trichloroethane	79-00-5	1	ug/L	0.23	ug/L	76	122	%	15	%	76	122	%	15	%			%
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1	ug/L	0.31	ug/L	52	148	%	20	%	52	148	%	20	%			%
1,1-Dichloroethane	75-34-3	1	ug/L	0.38	ug/L	71	129	%	20	%	71	129	%	20	%			%
1,1-Dichloroethene	75-35-4	1	ug/L	0.29	ug/L	58	121	%	16	%	58	121	%	16	%			%
1,2,4-Trichlorobenzene	120-82-1	1	ug/L	0.41	ug/L	70	122	%	20	%	70	122	%	20	%			%
1,2-Dibromo-3-Chloropropane	96-12-8	1	ug/L	0.39	ug/L	56	134	%	15	%	56	134	%	15	%			%
1,2-Dichlorobenzene	95-50-1	1	ug/L	0.79	ug/L	80	124	%	20	%	80	124	%	20	%			%
1,2-Dichloroethane	107-06-2	1	ug/L	0.21	ug/L	75	127	%	20	%	75	127	%	20	%			%
1,2-Dichloropropane	78-87-5	1	ug/L	0.72	ug/L	76	120	%	20	%	76	120	%	20	%			%
1,3-Dichlorobenzene	541-73-1	1	ug/L	0.78	ug/L	77	120	%	20	%	77	120	%	20	%			%
1,4-Dichlorobenzene	106-46-7	1	ug/L	0.84	ug/L	75	120	%	20	%	75	120	%	20	%			%
2-Butanone (MEK)	78-93-3	10	ug/L	1.32	ug/L	57	140	%	20	%	57	140	%	20	%			%
2-Hexanone	591-78-6	5	ug/L	1.24	ug/L	65	127	%	15	%	65	127	%	15	%			%
4-Methyl-2-pentanone (MIBK)	108-10-1	5	ug/L	2.1	ug/L	71	125	%	35	%	71	125	%	35	%			%
Acetone	67-64-1	10	ug/L	3	ug/L	56	142	%	15	%	56	142	%	15	%			%
Benzene	71-43-2	1	ug/L	0.41	ug/L	71	124	%	13	%	71	124	%	13	%			%
Bromodichloromethane	75-27-4	1	ug/L	0.39	ug/L	80	122	%	15	%	80	122	%	15	%			%
Bromoform	75-25-2	1	ug/L	0.26	ug/L	66	128	%	15	%	66	128	%	15	%			%
Bromomethane	74-83-9	1	ug/L	0.69	ug/L	55	144	%	15	%	55	144	%	15	%			%
Carbon disulfide	75-15-0	1	ug/L	0.19	ug/L	59	134	%	15	%	59	134	%	15	%			%
Carbon tetrachloride	56-23-5	1	ug/L	0.27	ug/L	72	134	%	15	%	72	134	%	15	%			%
Chlorobenzene	108-90-7	1	ug/L	0.75	ug/L	72	120	%	25	%	72	120	%	25	%			%
Dibromochloromethane	124-48-1	1	ug/L	0.32	ug/L	75	125	%	15	%	75	125	%	15	%			%
Chloroethane	75-00-3	1	ug/L	0.32	ug/L	69	136	%	15	%	69	136	%	15	%			%
Chloroform	67-66-3	1	ug/L	0.34	ug/L	73	127	%	20	%	73	127	%	20	%			%
Chloromethane	74-87-3	1	ug/L	0.35	ug/L	68	124	%	15	%	68	124	%	15	%			%
cis-1,2-Dichloroethene	156-59-2	1	ug/L	0.81	ug/L	74	124	%	15	%	74	124	%	15	%			%
cis-1,3-Dichloropropene	10061-01-5	1	ug/L	0.36	ug/L	74	124	%	15	%	74	124	%	15	%			%
Cyclohexane	110-82-7	1	ug/L	0.18	ug/L	65	126	%	20	%	65	126	%	20	%			%
Dichlorodifluoromethane	75-71-8	1	ug/L	0.68	ug/L	59	135	%	20	%	59	135	%	20	%			%
Ethylbenzene	100-41-4	1	ug/L	0.74	ug/L	77	123	%	15	%	77	123	%	15	%			%
1,2-Dibromoethane	106-93-4	1	ug/L	0.73	ug/L	77	120	%	15	%	77	120	%	15	%			%
Isopropylbenzene	98-82-8	1	ug/L	0.79	ug/L	77	122	%	20	%	77	122	%	20	%			%
Methyl acetate	79-20-9	1	ug/L	0.5	ug/L	60	140	%	20	%	60	140	%	20	%			%
Methyl tert-butyl ether	1634-04-4	1	ug/L	0.16	ug/L	64	127	%	37	%	64	127	%	37	%			%
Methylcyclohexane	108-87-2	1	ug/L	0.16	ug/L	60	140	%	20	%	60	140	%	20	%			%
Methylene Chloride	75-09-2	1	ug/L	0.44	ug/L	57	132	%	15	%	57	132	%	15	%			%
Styrene	100-42-5	1	ug/L	0.73	ug/L	70	130	%	20	%	70	130	%	20	%			%
Tetrachloroethene	127-18-4	1	ug/L	0.36	ug/L	74	122	%	20	%	74	122	%	20	%			%
Toluene	108-88-3	1	ug/L	0.51	ug/L	80	122	%	15	%	80	122	%	15	%			%
Toluene-d8 (Surr)	2037-26-5		ug/L		ug/L			%		%			%		%	71	126	%
trans-1,2-Dichloroethene	156-60-5	1	ug/L	0.9	ug/L	73	127	%	20	%	73	127	%	20	%			%
trans-1,3-Dichloropropene	10061-02-6	1	ug/L	0.37	ug/L	72	123	%	15	%	72	123	%	15	%			%
Trichloroethene	79-01-6	1	ug/L	0.46	ug/L	74	123	%	16	%	74	123	%	16	%			%
Trichlorofluoromethane	75-69-4	1	ug/L	0.88	ug/L	62	152	%	20	%	62	152	%	20	%			%
Vinyl chloride	75-01-4	1	ug/L	0.9	ug/L	65	133	%	15	%	65	133	%	15	%			%
Xylenes, Total	1330-20-7	2	ug/L	0.66	ug/L	76	122	%	16	%	76	122	%	16	%			%
1,2-Dichloroethane-d4 (Surr)	17060-07-0		ug/L		ug/L			%		%			%		%	66	137	%
4-Bromofluorobenzene (Surr)	460-00-4		ug/L		ug/L			%		%			%		%	73	120	%

Table 2.1 Quality Control Limits

Media	Method Description	Method Code
Water	Semivolatile Organic Compounds (GC/MS)	8270D
	Liquid-Liquid Extraction (Separatory Funnel)	3510C_LVI

		Reporting Limit		Method Detection Limit		LCSREC Recovery			LCSRPD		MSREC Recovery			MSRPD		SUREC Recovery		
Analyte Description	CAS #	Limit	Units	Limit	Units	Low	High	Units	Precision	Units	Low	High	Units	Precision	Units	Low	High	Units
Biphenyl	92-52-4	5	ug/L	0.653	ug/L	30	140	%	20	%	30	140	%	20	%			%
bis (2-chloroisopropyl) ether	108-60-1	5	ug/L	0.52	ug/L	28	136	%	24	%	28	136	%	24	%			%
2,4,5-Trichlorophenol	95-95-4	5	ug/L	0.48	ug/L	65	126	%	18	%	65	126	%	18	%			%
2,4,6-Trichlorophenol	88-06-2	5	ug/L	0.61	ug/L	64	120	%	19	%	64	120	%	19	%			%
2,4-Dichlorophenol	120-83-2	5	ug/L	0.51	ug/L	64	120	%	19	%	64	120	%	19	%			%
2,4-Dimethylphenol	105-67-9	5	ug/L	0.5	ug/L	57	120	%	42	%	57	120	%	42	%			%
2,4-Dinitrophenol	51-28-5	10	ug/L	2.22	ug/L	42	153	%	22	%	42	153	%	22	%			%
2,4-Dinitrotoluene	121-14-2	5	ug/L	0.447	ug/L	65	154	%	20	%	62	148	%	20	%			%
2,6-Dinitrotoluene	606-20-2	5	ug/L	0.4	ug/L	74	134	%	15	%	65	154	%	15	%			%
2-Chloronaphthalene	91-58-7	5	ug/L	0.46	ug/L	41	124	%	21	%	41	124	%	21	%			%
2-Chlorophenol	95-57-8	5	ug/L	0.53	ug/L	48	120	%	25	%	48	120	%	25	%			%
2-Methylphenol	95-48-7	5	ug/L	0.4	ug/L	39	120	%	27	%	39	120	%	27	%			%
2-Methylnaphthalene	91-57-6	5	ug/L	0.6	ug/L	34	122	%	21	%	34	122	%	21	%			%
2-Nitroaniline	88-74-4	10	ug/L	0.42	ug/L	67	136	%	15	%	67	136	%	15	%			%
2-Nitrophenol	88-75-5	5	ug/L	0.48	ug/L	59	120	%	18	%	59	120	%	18	%			%
3,3'-Dichlorobenzidine	91-94-1	5	ug/L	0.4	ug/L	33	140	%	25	%	33	140	%	25	%			%
3-Nitroaniline	99-09-2	10	ug/L	0.48	ug/L	69	129	%	19	%	69	129	%	19	%			%
4,6-Dinitro-2-methylphenol	534-52-1	10	ug/L	2.2	ug/L	64	159	%	15	%	64	159	%	15	%			%
4-Bromophenyl phenyl ether	101-55-3	5	ug/L	0.45	ug/L	71	126	%	15	%	71	126	%	15	%			%
4-Chloro-3-methylphenol	59-50-7	5	ug/L	0.45	ug/L	64	120	%	27	%	64	120	%	27	%			%
4-Chloroaniline	106-47-8	5	ug/L	0.59	ug/L	60	124	%	22	%	60	124	%	22	%			%
4-Chlorophenyl phenyl ether	7005-72-3	5	ug/L	0.35	ug/L	71	122	%	16	%	48	145	%	16	%			%
4-Methylphenol	106-44-5	10	ug/L	0.36	ug/L	39	120	%	24	%	36	120	%	24	%			%
4-Nitroaniline	100-01-6	10	ug/L	0.25	ug/L	64	135	%	24	%	64	135	%	24	%			%
4-Nitrophenol	100-02-7	10	ug/L	1.52	ug/L	16	120	%	48	%	16	120	%	48	%			%
Acenaphthene	83-32-9	5	ug/L	0.41	ug/L	60	120	%	24	%	60	120	%	24	%			%
Acenaphthylene	208-96-8	5	ug/L	0.38	ug/L	63	120	%	18	%	63	120	%	18	%			%
Acetophenone	98-86-2	5	ug/L	0.54	ug/L	45	120	%	20	%	45	120	%	20	%			%
Anthracene	120-12-7	5	ug/L	0.28	ug/L	58	148	%	15	%	58	148	%	15	%			%
Atrazine	1912-24-9	5	ug/L	0.46	ug/L	56	179	%	20	%	56	179	%	20	%			%
Benzaldehyde	100-52-7	5	ug/L	0.267	ug/L	30	140	%	20	%	30	140	%	20	%			%
Benzo[a]anthracene	56-55-3	5	ug/L	0.36	ug/L	55	151	%	15	%	55	151	%	15	%			%
Benzo[a]pyrene	50-32-8	5	ug/L	0.47	ug/L	60	145	%	15	%	60	145	%	15	%			%
Benzo[b]fluoranthene	205-99-2	5	ug/L	0.34	ug/L	54	140	%	15	%	54	140	%	15	%			%
Benzo[g,h,i]perylene	191-24-2	5	ug/L	0.35	ug/L	66	152	%	15	%	66	152	%	15	%			%
Benzo[k]fluoranthene	207-08-9	5	ug/L	0.73	ug/L	51	153	%	22	%	51	153	%	22	%			%
Bis(2-chloroethoxy)methane	111-91-1	5	ug/L	0.35	ug/L	50	128	%	17	%	50	128	%	17	%			%
Bis(2-chloroethyl)ether	111-44-4	5	ug/L	0.4	ug/L	51	120	%	21	%	51	120	%	21	%			%
Bis(2-ethylhexyl) phthalate	117-81-7	5	ug/L	1.8	ug/L	53	158	%	15	%	53	158	%	15	%			%
Butyl benzyl phthalate	85-68-7	5	ug/L	0.42	ug/L	58	163	%	16	%	58	163	%	16	%			%
Caprolactam	105-60-2	5	ug/L	2.2	ug/L	30	140	%	20	%	30	140	%	20	%			%
Carbazole	86-74-8	5	ug/L	0.3	ug/L	59	148	%	20	%	59	148	%	20	%			%
Chrysene	218-01-9	5	ug/L	0.33	ug/L	69	140	%	15	%	69	140	%	15	%			%
Dibenz(a,h)anthracene	53-70-3	5	ug/L	0.42	ug/L	57	148	%	15	%	57	158	%	15	%			%
Di-n-butyl phthalate	84-74-2	5	ug/L	0.31	ug/L	58	149	%	15	%	58	149	%	15	%			%
Di-n-octyl phthalate	117-84-0	5	ug/L	0.47	ug/L	55	167	%	16	%	55	167	%	16	%			%
Dibenzofuran	132-64-9	10	ug/L	0.51	ug/L	49	137	%	15	%	49	137	%	15	%			%
Diethyl phthalate	84-66-2	5	ug/L	0.22	ug/L	59	146	%	15	%	59	146	%	15	%			%
Dimethyl phthalate	131-11-3	5	ug/L	0.36	ug/L	59	141	%	15	%	59	141	%	15	%			%
Fluoranthene	206-44-0	5	ug/L	0.4	ug/L	55	147	%	15	%	55	147	%	15	%			%
Fluorene	86-73-7	5	ug/L	0.36	ug/L	55	143	%	15	%	55	143	%	15	%			%
Hexachlorobenzene	118-74-1	5	ug/L	0.51	ug/L	14	108	%	15	%	38	131	%	15	%			%
Hexachlorobutadiene	87-68-3	5	ug/L	0.68	ug/L	14	108	%	44	%	14	108	%	44	%			%
Hexachlorocyclopentadiene	77-47-4	5	ug/L	0.59	ug/L	13	119	%	49	%	13	119	%	49	%			%
Hexachloroethane	67-72-1	5	ug/L	0.59	ug/L	14	101	%	46	%	14	101	%	46	%			%
Indeno[1,2,3-cd]pyrene	193-39-5	5	ug/L	0.47	ug/L	69	146	%	15	%	69	146	%	15	%			%
Isophorone	78-59-1	5	ug/L	0.43	ug/L	48	133	%	17	%	48	133	%	17	%			%
N-Nitrosodi-n-propylamine	621-64-7	5	ug/L	0.54	ug/L	56	120	%	31	%	56	120	%	31	%			%
N-Nitrosodiphenylamine	86-30-6	5	ug/L	0.51	ug/L	25	125	%	15	%	25	125	%	15	%			%
Naphthalene	91-20-3	5	ug/L	0.76	ug/L	35	117	%	29	%	35	117	%	29	%			%
Nitrobenzene	98-95-3	5	ug/L	0.29	ug/L	45	123	%	24	%	45	123	%	24	%			%
Nitrobenzene-d5 (Surr)	4165-60-0		ug/L		ug/L			%		%			%		%	46	120	%
Pentachlorophenol	87-86-5	10	ug/L	2.2	ug/L	39	136	%	37	%	39	136	%	37	%			%
Phenanthrene	85-01-8	5	ug/L	0.44	ug/L	57	147	%	15	%	57	147	%	15	%			%
Phenol	108-95-2	5	ug/L	0.39	ug/L	17	120	%	34	%	17	120	%	34	%			%
Phenol-d5 (Surr)	4165-62-2		ug/L		ug/L			%		%			%		%	16	120	%
Pyrene	129-00-0	5	ug/L	0.34	ug/L	58	136	%	19	%	58	136	%	19	%			%
p-Terphenyl-d14 (Surr)	1718-51-0		ug/L		ug/L			%		%			%		%	67	150	%
2,4,6-Tribromophenol (Surr)	118-79-6		ug/L		ug/L			%		%			%		%	52	132	%
2-Fluorobiphenyl	321-60-8		ug/L		ug/L			%		%			%		%	48	120	%
2-Fluorophenol (Surr)	367-12-4		ug/L		ug/L			%		%			%		%	20	120	%

Table 2.1 Quality Control Limits

Media	Method Description	Method Code
Water	Metals (ICP)	6010C
	Preparation, Total Metals	3005A_TOT

		Reporting Limit		Method Detection Limit		LCSREC Recovery			LCSRPD		MSREC Recovery			MSRPD		SUREC Recovery		
Analyte Description	CAS #	Limit	Units	Limit	Units	Low	High	Units	Precision	Units	Low	High	Units	Precision	Units	Low	High	Units
Aluminum	7429-90-5	0.2	mg/L	0.06	mg/L	80	120	%	20	%	75	125	%	20	%			
Antimony	7440-36-0	0.02	mg/L	0.00679	mg/L	80	120	%	20	%	75	125	%	20	%			
Arsenic	7440-38-2	0.01	mg/L	0.00555	mg/L	80	120	%	20	%	75	125	%	20	%			
Barium	7440-39-3	0.002	mg/L	0.0007	mg/L	80	120	%	20	%	75	125	%	20	%			
Beryllium	7440-41-7	0.002	mg/L	0.0003	mg/L	80	120	%	20	%	75	125	%	20	%			
Cadmium	7440-43-9	0.001	mg/L	0.0005	mg/L	80	120	%	20	%	75	125	%	20	%			
Calcium	7440-70-2	0.5	mg/L	0.1	mg/L	80	120	%	20	%	75	125	%	20	%			
Chromium	7440-47-3	0.004	mg/L	0.001	mg/L	80	120	%	20	%	75	125	%	20	%			
Cobalt	7440-48-4	0.004	mg/L	0.00063	mg/L	80	120	%	20	%	75	125	%	20	%			
Copper	7440-50-8	0.01	mg/L	0.0016	mg/L	80	120	%	20	%	75	125	%	20	%			
Iron	7439-89-6	0.05	mg/L	0.0193	mg/L	80	120	%	20	%	75	125	%	20	%			
Lead	7439-92-1	0.005	mg/L	0.003	mg/L	80	120	%	20	%	75	125	%	20	%			
Magnesium	7439-95-4	0.2	mg/L	0.0434	mg/L	80	120	%	20	%	75	125	%	20	%			
Manganese	7439-96-5	0.003	mg/L	0.0004	mg/L	80	120	%	20	%	75	125	%	20	%			
Nickel	7440-02-0	0.01	mg/L	0.00126	mg/L	80	120	%	20	%	75	125	%	20	%			
Potassium	7440-09-7	0.5	mg/L	0.1	mg/L	80	120	%	20	%	75	125	%	20	%			
Selenium	7782-49-2	0.015	mg/L	0.0087	mg/L	80	120	%	20	%	75	125	%	20	%			
Silver	7440-22-4	0.003	mg/L	0.0017	mg/L	80	120	%	20	%	75	125	%	20	%			
Sodium	7440-23-5	1	mg/L	0.324	mg/L	80	120	%	20	%	75	125	%	20	%			
Thallium	7440-28-0	0.02	mg/L	0.01024	mg/L	80	120	%	20	%	75	125	%	20	%			
Vanadium	7440-62-2	0.005	mg/L	0.0015	mg/L	80	120	%	20	%	75	125	%	20	%			
Zinc	7440-66-6	0.01	mg/L	0.0015	mg/L	80	120	%	20	%	75	125	%	20	%			

Media	Method Description	Method Code
Water	PCBs by Gas Chromatography	8082A
	Liquid-Liquid Extraction (Separatory Funnel)	3510C_LVI_1YR

		Reporting Limit		Method Detection Limit		LCSREC Recovery			LCSRPD		MSREC Recovery			MSRPD		SUREC Recovery		
Analyte Description	CAS #	Limit	Units	Limit	Units	Low	High	Units	Precision	Units	Low	High	Units	Precision	Units	Low	High	Units
PCB-1016	12674-11-2	0.5	ug/L	0.176	ug/L	51	137	%	50	%	52	134	%	50	%			%
PCB-1221	11104-28-2	0.5	ug/L	0.176	ug/L			%		%			%		%			%
PCB-1232	11141-16-5	0.5	ug/L	0.176	ug/L			%		%			%		%			%
PCB-1242	53469-21-9	0.5	ug/L	0.176	ug/L			%		%			%		%			%
PCB-1248	12672-29-6	0.5	ug/L	0.176	ug/L			%		%			%		%			%
PCB-1254	11097-69-1	0.5	ug/L	0.25	ug/L			%		%			%		%			%
PCB-1260	11096-82-5	0.5	ug/L	0.25	ug/L	45	139	%	50	%	19	136	%	50	%			%
Tetrachloro-m-xylene	877-09-8		ug/L		ug/L			%		%			%		%	23	127	%
DCB Decachlorobiphenyl	2051-24-3		ug/L		ug/L			%		%			%		%	19	126	%

Table 2.2 Project Target Analytes and Remediation Goals

SOIL	Contaminants of Concern	SCG (mg/kg)
VOCs	Acetone	0.05
	1,1,1-Trichloroethane	0.68
	1,1-Dichloroethane	0.27
	Acetone	0.05
	Benzene	0.06
	Chlorobenzene	1.1
	Chloroethane	1.9
	Ethylbenzene	1
	Methylene Chloride	0.05
	Tetrachloroethene	1.3
	Toluene	0.7
	Trichloroethene	0.47
	Xylenes, Total	0.26
SVOCs	1,2,4-Trichlorobenzene	3.4
	2,4,5-Trichlorophenol	0.1
	2-Methylphenol	0.1 or MDL
	4-Methylphenol	0.9
	Benzo(a)anthracene	1
	Benzo(a)pyrene	1
	Benzo(b)fluoranthene	1
	Benzo(k)fluoranthene	0.8
	Chrysene	1
	Dibenz(a,h)anthracene	0.33
	Dibenzofuran	6.2
	Indeno(1,2,3-cd)pyrene	0.5
	Phenol	0.3
PCBs	Total PCBs	1
Metals	Arsenic	13
	Barium	350
	Beryllium	7.2
	Cadmium	2.5
	Chromium	10 or SB
	Copper	50
	Iron	2000 or SB
	Lead	63
	Mercury	0.18
	Nickel	30
	Silver	2
	Zinc	109
	Total Cyanide	27

Table 2.2 Project Target Analytes and Remediation Goals

GROUNDWATER	Contaminants of Concern	SCG (mg/L)
VOCs	1,4-Dichlorobenzene	0.003
	Benzene	0.001
	Chlorobezene	0.005
	Chloroethane	0.005
	Chloroform	0.007
	Ethylbenzene	0.005
	Methylene Chloride	0.005
	Toluene	0.005
SVOCs	Benzo(a)anthracene	0.000002
	Benzo(a)pyrene	0.000002
	Benzo(b)fluoranthene	0.000002
	Benzo(k)fluoranthene	0.000002
	Bis(2-Ethylhexyl)phthalate	0.005
	Chrysene	0.000002
	Fluoranthene	0.05
	Indeno(1,2,3-cd)pyrene	0.000002
	Naphthalene	0.01
	Phenanthrene	0.05
	Pyrene	0.05
	Total Phenols	0.001
Metals	Arsenic	0.025
	Barium	1
	Beryllium	0.003
	Cadmium	0.005
	Chromium	0.05
	Iron	0.3 *
	Lead	0.025
	Magnesium	35
	Manganese	0.3 *
	Selenium	0.01
	Sodium	20
	Zinc	2

SURFACE WATER	Contaminants of Concern	SCG (mg/L)
VOCs	Methylene Chloride	0.2
SVOCs	Benzo(a)athracene	0.00003 GV
	Benzo(a)pyrene	0.0000012 GV
PCBs	Aroclor 1242	0.000000001
	Total PCBs	0.000000001
Metals	Aluminum	0.1
	Cadmium	0.0066[a]
	Chromium	0.250[a]
	Copper	0.0314[a]
	Iron	0.3
	Lead	0.0179[a]
	Zinc	0.290[a]

Table 2.2 Project Target Analytes and Remediation Goals

SEDIMENTS	Contaminants of Concern	SCG (mg/kg)
SVOCs	Benzo(a)anthracene	0.079
	Benzo(a)pyrene	0.079
	Benzo(b)fluoranthene	0.079
	Benzo(k)fluoranthene	0.079
	Chrysene	0.079
	Fluorene	0.483
	Indeno(1,2,3-cd)pyrene	0.079
PCBs	Total PCBs	1
Metals	Arsenic	LEL- 6
		SEL- 33
	Cadmium	LEL- 0.6
		SEL- 9
	Chromium	LEL- 26
		SEL- 110
	Iron	LEL- 20,000
		SEL-40,000
	Lead	LEL- 31
		SEL- 110
	Manganese	LEL- 460
		SEL- 1,000
	Mercury	LEL- 0.15
		SEL- 1.3
	Nickel	LEL- 16
		SEL- 50
	Silver	LEL- 1
		SEL- 2
	Zinc	LEL- 120
		SEL- 270

Notes:
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
SCG = standards, criteria, and guidance values
VOCs = Volatile Organic Compounds
SVOCs = Semivolatile Organic Compounds
PCBs = Polychlorinated Biphenyls
LEL = Lowest Effects Level
SEL = Severe Effects Level
SB = Site Background
MDL = Method Detection Limit
[a] The Standard was calculated based on total hardness, which was derived from calcium and magnesium concentrations. The mean total hardness of 434 ppm was used to calculate the Standard.

Table 3.1 Sample Containerization and Holding Times

Soil/Sediment Analysis	Bottle Type	Preservation (a)	Holding Time (b)
Volatile Organic Compounds (VOCs)	Wide-mouth glass w/ Teflon lined cap	Cool to 4ºC	10 days
Semivolatile Organic Compounds (SVOCs)	Wide-mouth glass w/ Teflon lined cap	Cool to 4ºC	10 days (c)
PCBs	Wide-mouth glass w/ Teflon lined cap	Cool to 4ºC	10 days (c)
Metals	Wide-mouth plastic or glass	Cool to 4ºC	6 months, except mercury (26 days)

Water Analysis	Bottle Type	Preservation (a)	Holding Time (b)
Volatile Organic Compounds (VOCs)	(2) 40 mL glass vial with Teflon septum	Cool to 4ºC	10 days
Semivolatile Organic Compounds (SVOCs)	1000 mL glass w/ Teflon-lined cap	Cool to 4ºC	5 days (d)
PCBs	1000 mL glass w/ Teflon-lined cap	Cool to 4ºC	5 days (d)
Metals	1000 mL plastic bottle	Nitric Acid to pH < 2; Cool to 4ºC	6 months, except mercury (26 days)

Notes
(a) All samples to be preserved in ice during collection and transport.
(b) Days from validated time of sample receipt (VTSR)
(c) Sohxlet or sonication procedures for extraction and concentration of soil samples for SVOCs must be completed within 5 days of VTSR. Sohxlet or sonication procedures for extraction and concentration of soil/sediment samples for PCBs must be completed within 5 days of VTSR. Extracts of soil samples must be analyzed within 40 days of extraction.

(d) Continuous liquid-liquid extraction is the required extraction for water samples for SVOCs. Continuous liquid-liquid extraction and concentration of water samples for SVOC analysis must begin within 5 days and be completed within 7 days of VTSR. Extracts of water samples must be analyzed within 40 days of extraction.

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Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	**Project Manager:**	**Site Contact:**	**Date:**	COC No:
Your Company Name here	**Tel/Fax:**	**Lab Contact:**	**Carrier:**	_____ of _____ COCs
Address	**Analysis Turnaround Time**			Sampler:
City/State/Zip	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx Phone	TAT if different from Below _____			Walk-in Client:
(xxx) xxx-xxxx FAX	☐ 2 weeks			Lab Sampling:
Project Name:	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)															Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

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Quality Assurance Manual

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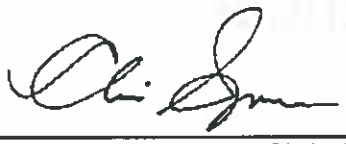
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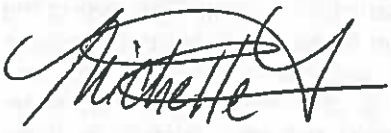
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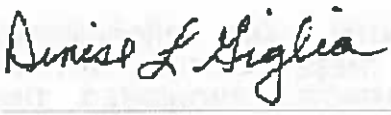
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Operations Manager – Jennifer Pierce — 02/13/2013 Date



Organic Preparation Manager – Michelle Freeman — 02/13/2013 Date



GC/MS Volatiles Manager – Denise Giglia — 02/13/2013 Date



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CA-Q-S-002	Acceptable Manual Integration Practices
CA-Q-S-004	Method Compliance & Data Authenticity Audits
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CA-Q-S-008	Management Systems Review
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CA-L-S-002	Internal Investigation of Potential Data Discrepancies and Determination for Data Recall
CA-L-S-002	Subcontracting Procedures
CA-L-P-004	Ethics Policy

CA-L-P-002	Contract Compliance Policy
CW-F-P-002	Authorization Matrix
CW-F-P-004	Procurement and Contracts Policy
CA-C-S-001	Work Sharing Process
CA-T-P-001	Qualified Products List
CW-F-S-007	Controlled Purchases Policy
CW-F-S-018	Vendor Selection
CA-Q-M-002	Corporate Quality Management Plan
CW-E-M-001	Corporate Environmental Health & Safety Manual

REFERENCED LABORATORY SOPs

SOP Reference	Title
BF-GP-001	Calibration of Autopipettes and Repipetters
BF-GP-002	Support Equipment: Maintenance, Record Keeping and Corrective Actions
BF-GP-005	Sample Homogenization and Subsampling
BF-GP-012	Technical Data Review
BF-GP-013	Manual Integration
BF-GP-015	Record Storage and Retention
BF-GP-018	Strict Internal Chain or Custody
BF-GP-019	Standard Traceability and Preparation
BF-GP-020	Thermometer Calibration
BF-PM-001	Project Information Requirements
BF-PM-003	Bottle Order Set-up
BF-PM-005	Correctness of Analysis
BF-QA-001	Determination of Method Detection Limits
BF-QA-002	Quality Control Limits
BF-QA-003	Procedure for Writing, Reviewing and Revising Controlled Documents

BF-QA-004	Laboratory Personnel Training
BF-QA-005	Preventative and Corrective Action
BF-QA-006	Data Quality Review
BF-SR-001	Cooler Shipping - Bottle Kits and Samples
BF-SR-002	Receipt of Analytical Samples

SECTION 3

INTRODUCTION, SCOPE AND APPLICABILITY

3.1 INTRODUCTION AND COMPLIANCE REFERENCES

TestAmerica Buffalo's Quality Assurance Manual (QAM) is a document prepared to define the overall policies, organization objectives and functional responsibilities for achieving TestAmerica's data quality goals. The laboratory maintains a local perspective in its scope of services and client relations and maintains a national perspective in terms of quality.

The QAM has been prepared to assure compliance with 2003 National Environmental Laboratory Accreditation Conference (NELAC) standards, The NELAC Institute (TNI) Standard, dated 2009, Volume 1 Modules 2 and 4, and ISO/IEC Guide 17025(E) In addition, the policies and procedures outlined in this manual are compliant with TestAmerica's Corporate Management Plan (CQMP) and the various accreditation and certification programs listed in Appendix 3. The CQMP provides a summary of TestAmerica's quality and data integrity system. It contains requirements and general guidelines under which all TestAmerica facilities shall conduct their operations.

The QAM has been prepared to be consistent with the requirements of the following documents:

- EPA 600/4-88/039, *Methods for the Determination of Organic Compounds in Drinking Water,* EPA, Revised July 1991.
- EPA 600/R-95/131, *Methods for the Determination of Organic Compounds in Drinking Water,* Supplement III, EPA, August 1995.
- EPA 600/4-79-019, *Handbook for Analytical Quality Control in Water and Wastewater Laboratories,* EPA, March 1979.
- Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846), Third Edition September 1986, Final Update I, July 1992, Final Update II A, August 1993, Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996; Final Update IV, January 2008.
- Federal Register, 40 CFR Parts 136, 141, 172, 173, 178, 179 and 261. New York State Analytical Services Protocol, July 2005
- Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-R-05-004, January 2005).
- Statement of Work for Inorganics & Organics Analysis, SOM and ISM, current versions, USEPA Contract Laboratory Program Multi-media, Multi-concentration.
- APHA, *Standard Methods for the Examination of Water and Wastewater,* 18th Edition, 19th, 20th, and on-line Editions. 21st.
- *U.S. Department of Energy* Order 414.1B, *Quality Assurance*, Approved April 29, 2004.
- *U.S. Department of Energy* Order 414.1C, *Quality Assurance*, June 17, 2005.
- *U.S. Department of Energy, Quality Systems for Analytical Services*, Revision 3.6, November 2010.

- Toxic Substances Control Act (TSCA).

3.2 TERMS AND DEFINITIONS

A Quality Assurance Program is a company-wide system designed to ensure that data produced by the laboratory conforms to the standards set by state and/or federal regulations. The program functions at the management level through company goals and management policies, and at the analytical level through Standard Operating Procedures (SOPs) and quality control. The TestAmerica program is designed to minimize systematic error, encourage constructive, documented problem solving, and provide a framework for continuous improvement within the organization.

Refer to Appendix 2 for the Glossary/Acronyms.

3.3 SCOPE / FIELDS OF TESTING

The laboratory analyzes a broad range of environmental and industrial samples every month. Sample matrices vary among air, drinking water, effluent water, groundwater, hazardous waste, sludge and soils. The Quality Assurance Program contains specific procedures and methods to test samples of differing matrices for chemical, physical and biological parameters. The Program also contains guidelines on maintaining documentation of analytical processes, reviewing results, servicing clients and tracking samples through the laboratory. The technical and service requirements of all analytical requests are thoroughly evaluated before commitments are made to accept the work. Measurements are made using published reference methods or methods developed and validated by the laboratory.

The methods covered by this manual include the most frequently requested methodologies needed to provide analytical services in the United States and its territories. The specific list of test methods used by the laboratory can be found in Section 19.0. The approach of this manual is to define the minimum level of quality assurance and quality control necessary to meet these requirements. All methods performed by the laboratory shall meet these criteria as appropriate. In some instances, quality assurance project plans (QAPPs), project specific data quality objectives (DQOs) or local regulations may require criteria other than those contained in this manual. In these cases, the laboratory will abide by the requested criteria following review and acceptance of the requirements by the Laboratory Director/Manager and the Quality Assurance (QA) Manager. In some cases, QAPPs and DQOs may specify less stringent requirements. The Laboratory Director/Manager and the QA Manager must determine if it is in the lab's best interest to follow the less stringent requirements.

3.4 MANAGEMENT OF THE MANUAL

3.4.1 Review Process

The template on which this manual is based is reviewed annually by Corporate Quality Management Personnel to assure that it remains in compliance with Section 3.1. The manual itself is reviewed every two years by senior laboratory management to assure that it reflects current practices and meets the requirements of the laboratory's clients and regulators as well as the CQMP. Occasionally, the manual may need changes in order to meet new or changing

regulations and operations. The QA Manager will review the changes in the normal course of business and incorporate changes into revised sections of the document. All updates will be reviewed by the senior laboratory management staff. The laboratory updates and approves such changes according to our Document Control & updating procedures (refer to BF-QA-003)

SECTION 4

MANAGEMENT REQUIREMENTS

4.1 OVERVIEW

TestAmerica Buffalo is a local operating unit of TestAmerica Laboratories, Inc. The organizational structure, responsibilities and authorities of the corporate staff of TestAmerica Laboratories, Inc. are presented in the CQMP. The laboratory has day-to-day independent operational authority overseen by corporate officers (e.g., President, Chief Executive Officer, Corporate Quality, etc.). The laboratory operational and support staff work under the direction of the Laboratory Director. The organizational structure for both Corporate & TestAmerica Buffalo is presented in Figure 4-1.

4.2 ROLES AND RESPONSIBILITIES

In order for the Quality Assurance Program to function properly, all members of the staff must clearly understand and meet their individual responsibilities as they relate to the quality program. The following descriptions briefly define each role in its relationship to the Quality Assurance Program.

4.2.1 Additional Requirements for Laboratories

The responsibility for quality resides with every employee of the laboratory. All employees have access to the QAM, are trained to this manual and are responsible for upholding the standards therein. Each person carries out his/her daily tasks in a manner consistent with the goals and in accordance with the procedures in this manual and the laboratory's SOPs. Role descriptions for corporate personnel are defined in the CQMP. This manual is specific to the operations of TestAmerica's Buffalo laboratory.

4.2.2 Laboratory Director

TestAmerica Buffalo's Laboratory Director is responsible for the overall quality, safety, financial, technical, human resource and service performance of the whole laboratory and reports to their respective GM. The Laboratory Director provides the resources necessary to implement and maintain an effective and comprehensive Quality Assurance and Data Integrity Program.

The Laboratory Director has the authority to affect those policies and procedures to ensure that only data of the highest level of excellence are produced. As such, the Laboratory Director is responsible for maintaining a working environment which encourages open, constructive problem solving and continuous improvement.

Specific responsibilities include, but are not limited to:

- Provides one or more department managers for the appropriate fields of testing. If the Department Manager is absent for a period of time exceeding 15 consecutive calendar

days, the Laboratory Director must designate another full time staff member meeting the qualifications of the Department Manager to temporarily perform this function. If the absence exceeds 65 consecutive calendar days, the primary NELAC accrediting authority must be notified in writing.

- Ensures that all analysts and supervisors have the appropriate education and training to properly carry out the duties assigned to them and ensures that this training has been documented.
- Ensures that personnel are free from any commercial, financial and other undue pressures which might adversely affect the quality of their work.
- Ensures TestAmerica's human resource policies are adhered to and maintained.
- Ensures that sufficient numbers of qualified personnel are employed to supervise and perform the work of the laboratory.
- Ensures that appropriate corrective actions are taken to address analyses identified as requiring such actions by internal and external performance or procedural audits. Procedures that do not meet the standards set forth in the QAM or laboratory SOPs may be temporarily suspended by the Laboratory Director.
- Reviews and approves all SOPs prior to their implementation and ensures all approved SOPs are implemented and adhered to.
- Pursues and maintains appropriate laboratory certification and contract approvals. Supports ISO 17025 requirements.
- Ensures client specific reporting and quality control requirements are met.

Leads the management team, consisting of the QA Manager, the Technical Director, Customer Service Manager, and the Operations Manager as direct reports.

4.2.2 Quality Assurance (QA) Manager or Designee

The QA manager has responsibility and authority to ensure the continuous implementation of the quality system based on ISO 17025.

The QA Manager reports directly to the Laboratory Director and has access to Corporate QA for advice and resources. This position is able to evaluate data objectively and perform assessments without outside (i.e., managerial) influence. Corporate QA may be used as a resource in dealing with regulatory requirements, certifications and other quality assurance related items. The QA Manager directs the activities of the QA department to accomplish specific responsibilities, which include, but are not limited to:

- Serves as the focal point for QA/QC in the laboratory.
- Having functions independent from laboratory operations for which he/she has quality assurance oversight.
- Maintaining and updating the QAM.
- Monitoring and evaluating laboratory certifications; scheduling proficiency testing samples.

- Monitoring and communicating regulatory changes that may affect the laboratory to management.
- Training and advising the laboratory staff on quality assurance/quality control procedures that are pertinent to their daily activities.
- Have documented training and/or experience in QA/QC procedures and the laboratory's Quality System.
- Having a general knowledge of the analytical test methods for which data audit/review is performed (and/or having the means of getting this information when needed).
- Arranging for or conducting internal audits on quality systems, data authenticity and the technical operation.
- The laboratory QA Manager will maintain records of all ethics-related training, including the type and proof of attendance.
- Maintain, improve, and evaluate the corrective action and preventive action systems.
- Notifying laboratory management of deficiencies in the quality system and ensuring corrective action is taken. Procedures that do not meet the standards set forth in the QAM or laboratory SOPs shall be investigated following procedures outlined in Section 12 and if deemed necessary may be temporarily suspended during the investigation.
- Objectively monitor standards of performance in quality control and quality assurance without outside (e.g., managerial) influence.
- Coordinating of document control of SOPs, MDLs, control limits, and miscellaneous forms and information.
- Review a subset of all final data reports for internal consistency.
- Review of external audit reports and data validation requests.
- Follow-up with audits to ensure client QAPP requirements are met.
- Establishment of reporting schedule and preparation of various quality reports for the Laboratory Director, clients and/or Corporate QA.
- Development of suggestions and recommendations to improve quality systems.
- Research of current state and federal requirements and guidelines.
- Leads the QA team to enable communication and to distribute duties and responsibilities.
- Ensuring Communication & monitoring standards of performance to ensure that systems are in place to produce the level of quality as defined in this document.
- Notifying laboratory management of deficiencies in the quality system and ensuring corrective action is taken. Procedures that do not meet the standards set forth in the QAM or laboratory SOPs are temporarily suspended following the procedures outlined in Section 12.

- Evaluation of the thoroughness and effectiveness of training.
- Compliance with ISO 17025.

4.2.3 Technical Director or Designee

The Technical Director reports directly to the Laboratory Director and is responsible for assessing the construction and management of the facility design, maintaining environmental conditions, technical and financial evaluation of capital equipment and capital budgeting and asset valuation.

In addition, the Technical Director solves day to day technical issues, provides technical training and guidance to staff, project managers and clients, investigates technical issues identified by operations personnel or QA, and directs evaluation of new methods. Specific responsibilities include but are not limited to:

- Reviewing and approving, with input from the QA Manager, proposals from marketing, in accordance with an established procedure for the review of requests and contracts. This procedure addresses the adequate definition of methods to be used for analysis and any limitations, the laboratory's capability and resources, the client's expectations. Differences are resolved before the contract is signed and work begins. A system documenting any significant changes is maintained, as well as pertinent discussions with the client regarding their requirements or the results of the analyses during the performance of the contract. All work subcontracted by the laboratory must be approved by the client. Any deviations from the contract must be disclosed to the client. Once the work has begun, any amendments to the contract must be discussed with the client and so documented.
- Monitoring the validity of the analyses performed and data generated in the laboratory. This activity begins with reviewing and supporting all new business contracts, insuring data quality, analyzing internal and external non-conformances to identify root cause issues and implementing the resulting corrective and preventive actions, facilitating the data review process (training, development, and accountability at the bench), and providing technical and troubleshooting expertise on routine and unusual or complex problems.
- Enhancing efficiency and improving quality through technical advances and improved LIMS utilization. Capital forecasting and instrument life cycle planning for second generation methods and instruments as well as asset inventory management.
- Compliance with ISO 17025 Standard.

4.2.4 Operations Manager

The Operations Manager reports to the Laboratory Director and oversees the daily operations of the analytical laboratory, maintaining a working environment that encourages open, constructive problem solving and continuous improvement.

The Operations Manager is responsible for supervision of laboratory staff, setting goals and objectives for the laboratory, ensuring compliance with project/client requirements and ensuring on-time performance, supervises maintenance of equipment and scheduling of repairs. Responsibilities also include implementation of the quality system in the laboratory and ensuring timely compliance with audit and QA corrective actions.

In addition, the Operations Manager works with the Technical Director in evaluating technical equipment, assessing capital budget needs and determining the most efficient instrument utilization. More specifically he:

- Evaluates the level of internal/external non-conformances for all departments.
- Continuously evaluates production capacity and improves capacity utilization.
- Continuously evaluates turnaround time and addresses any problems that may hinder meeting the required and committed turnaround time from the various departments.
- Develops and improves the training of all analysts in cooperation with the Technical Director and QA Manager and in compliance with regulatory requirements.
- Works with the Preventive Maintenance Coordinator to ensure that scheduled instrument maintenance is completed.
- Is responsible for efficient utilization of supplies.
- Constantly monitors and modifies the processing of samples through the departments.
- Fully supports the quality system and, if called upon in the absence of the QA Manager, serves as his substitute in the interim.

4.2.5 Department Managers

Department Managers report to the Operations Manager. The Department Managers serve as the technical experts on assigned projects, provide technical liaison, assist in resolving any technical issues within the area of their expertise; and implement established policies and procedures to assist the Operations Manager in achieving section goals. Each one is responsible to:

- Ensure that analysts in their department adhere to applicable SOPs and the QA Manual. They perform frequent SOP and QA Manual review to determine if analysts are in compliance and if new, modified, and optimized measures are feasible and should be added to these documents.
- With regard to analysts, participates in the selection, training, and development of performance objectives and standards of performance, appraisal (measurement of objectives), scheduling, counseling, discipline, and motivation of analysts and documents these activities in accordance with systems developed by the QA and Human Resources

Departments. They evaluate staffing sufficiency and overtime needs. Training consists of familiarization with SOP, QC, Safety, and computer systems.

- Encourage the development of analysts to become cross-trained in various methods and/or operate multiple instruments efficiently while performing maintenance and documentation, self-supervise, and function as a department team.
- Provide guidance to analysts in resolving problems encountered daily during sample prep/analysis in conjunction with the Technical Director, Operations Manager, and/or QA Manager. Each is responsible for 100% of the data review and documentation, non-conformance and CPAR issues, the timely and accurate completion of performance evaluation samples and MDLs, for his department.
- Ensure all logbooks are maintained, current, and properly labeled or archived.
- Report all non-conformance conditions to the QA Manager, Technical Director, Operations Manager, and/or Laboratory Director.
- Ensure that preventive maintenance is performed on instrumentation as detailed in the QA Manual or SOPs. He is responsible for developing and implementing a system for preventive maintenance, troubleshooting, and repairing or arranging for repair of instruments.
- Maintain adequate and valid inventory of reagents, standards, spare parts, and other relevant resources required to perform daily analysis.
- Achieve optimum turnaround time on analyses and compliance with holding times.
- Conduct efficiency and cost control evaluations on an ongoing basis to determine optimization of labor, supplies, overtime, first-run yield, capacity (designed vs. demonstrated), second- and third-generation production techniques/instruments, and long-term needs for budgetary planning.
- Develop, implement, and enhance calibration programs.
- Provide written responses to external and internal audit issues.

4.2.6 Environmental Health & Safety / Hazardous Waste Coordinator

The Health and Safety Coordinator is responsible for the safety and well-being of all employees while at the laboratory. This includes, but is not limited to, administering the Corporate Safety Manual that complies with federal regulations, MSDS training and review, conducting laboratory safety orientation and tours for all new employees, providing instructions on safety equipment, cleaning up laboratory spills, and instructing personnel of laboratory procedures for emergency situations. The Health and Safety Coordinator is on-call 24-hours a day, 7-days a week for all laboratory situations.

The Health and Safety Coordinator responsibilities additionally include waste management of laboratory generated hazardous waste in accordance with appropriate regulations. This includes maintenance of required documentation, such as waste manifests, segregation of waste in accordance with requirements, and training of personnel in proper segregation of waste and preparation of Safety related SOPs. The EHSC maintains overall EH&S program oversight, but may delegate specific day-to-day activities as necessary.

- Staying current with the hazardous waste regulations.
- Continuing training on hazardous waste issues.
- Reviewing and updating annually the Hazardous Waste Contingency Plan in the Environmental Health & Safety Manual.
- Auditing the staff with regard to compliance with the Hazardous Waste Contingency Plan.
- Contacting the hazardous waste subcontractors for review of procedures and opportunities for minimization of waste.
- Conduct ongoing, necessary safety training and conduct new employee safety orientation.
- Assist in developing and maintaining the Chemical Hygiene/Safety Manual.
- Administer dispersal of all Material Safety Data Sheet (MSDS) information.
- Perform regular chemical hygiene and housekeeping instruction.
- Give instruction on proper labeling and practice.
- Serve as chairman of the laboratory safety committee.
- Provide and train personnel on protective equipment.
- Oversee the inspection and maintenance of general safety equipment – fire extinguishers, safety showers, eyewash fountains, etc. and ensure prompt repairs as needed.
- Supervise and schedule fire drills and emergency evacuation drills.
- Determine what initial and subsequent exposure monitoring, if necessary to determine potential employee exposure to chemicals used in the laboratory.
- When determined necessary, conduct exposure monitoring assessments.
- Determine when a complaint of possible over-exposure is "reasonable" and should be referred for medical consultation.
- Assist in the internal and external coordination of the medical consultation/monitoring program conducted by Test America's medical consultants.

4.2.7 Laboratory Analysts

Laboratory analysts are responsible for conducting analysis and performing all tasks assigned to them by the group leader or supervisor. The responsibilities of the analysts are listed below:

- Perform analyses by adhering to analytical and quality control protocols prescribed by current SOPs, this QA Manual, and project-specific plans honestly, accurately, timely, safely, and in the most cost-effective manner.
- Document standard and sample preparation, instrument calibration and maintenance, data calculations, sample matrix effects, and any observed non-conformance on worklists, benchsheets, lab notebooks and/or the Non-Conformance Database.

- Report all non-conformance situations, instrument problems, matrix problems and QC failures, which might affect the reliability of the data, to their supervisor, the Technical Director, and/or the QA Manager or member of QA staff.
- Perform 100% review of the data generated prior to entering and submitting for secondary level review.
- Suggest method improvements to their supervisor, the Technical Director, and the QA Manager. These improvements, if approved, will be incorporated. Ideas for the optimum performance of their assigned area, for example, through the proper cleaning and maintenance of the assigned instruments and equipment, are encouraged.
- Work cohesively as a team in their department to achieve the goals of accurate results, optimum turnaround time, cost effectiveness, cleanliness, complete documentation, and personal knowledge of environmental analysis.

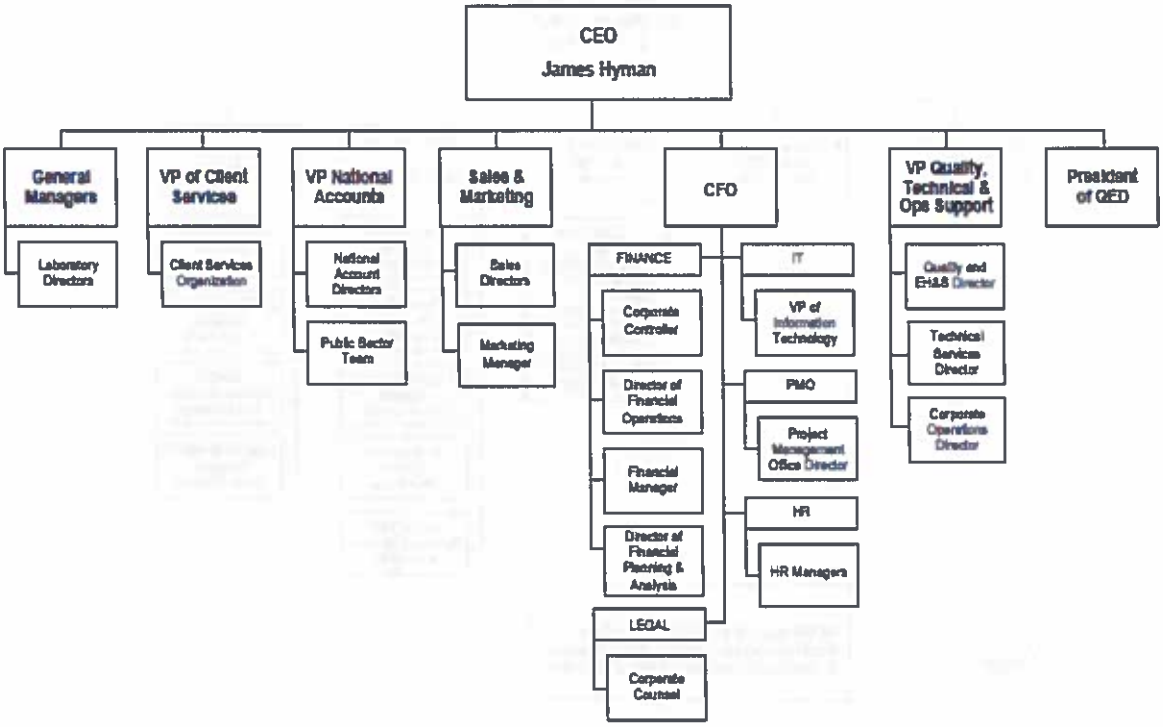
4.3 DEPUTIES

The following table defines who assumes the responsibilities of key personnel in their absence:

Key Personnel	Deputy	Comment
Laboratory Director	Operations Manager (1) Technical Director (2)	
QA Manager	QA Specialist (1) Operations Manager (2)	
Technical Director	Laboratory Director (1) Operations Manager (2)	
Operations Manager	Department Manager (1) Department Manager (2)	Selected based on availability
Customer Service Manager	Project Mng't Manager (1) Laboratory Director (2)	
Project Management Manager	Customer Srv. Manager (1) Project Manager (2)	(2) Selected based on availability
Project Manager	Project Manager (1) Project Management Asst. (2)	(1) 2° team PM (2) Team PMA
Organic Department Manager	Analyst (1) Analyst (2)	Selected based on department, experience and availability
Inorganic Department Manager	Analyst (1) Analyst (2)	Selected based on department, experience and availability
Data Validation / Data Packaging Manager	Data Validation Specialist Data Packaging Specialist	Selected based on department and availability
EHS Coordinator	Safety Officer (1) Sample Mng't Manager (2)	
Sample Management Manager	Sample Custodian (1) EHS Coordinator (2)	
Bottle Preparation / Shipping Manager	Bottle Prep Technician (1) Sample Mng't Manager (2)	

Figure 4-1.
Corporate and Laboratory Organization Charts

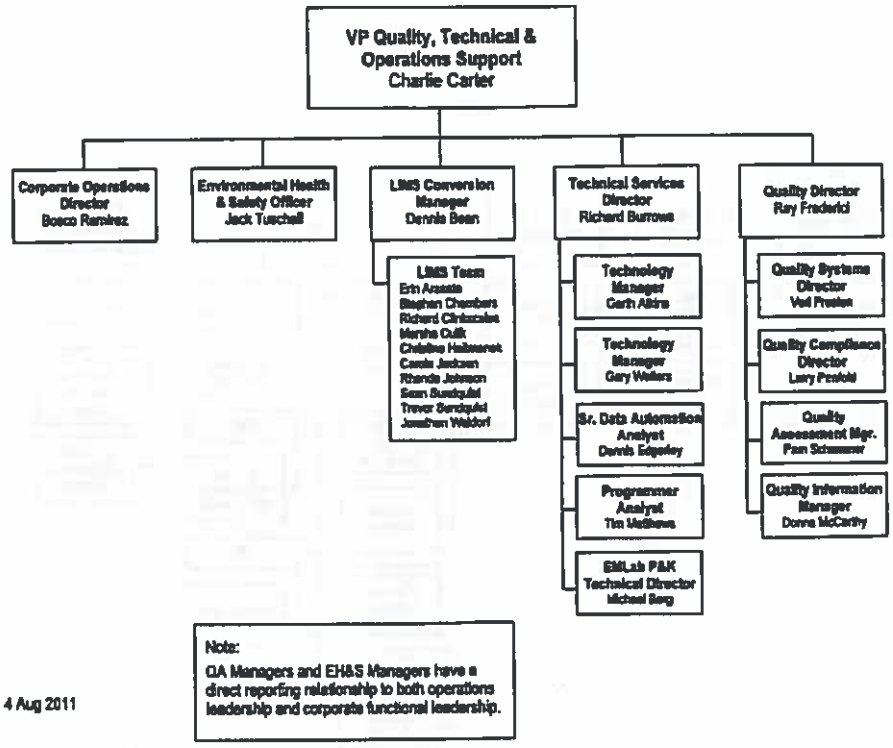
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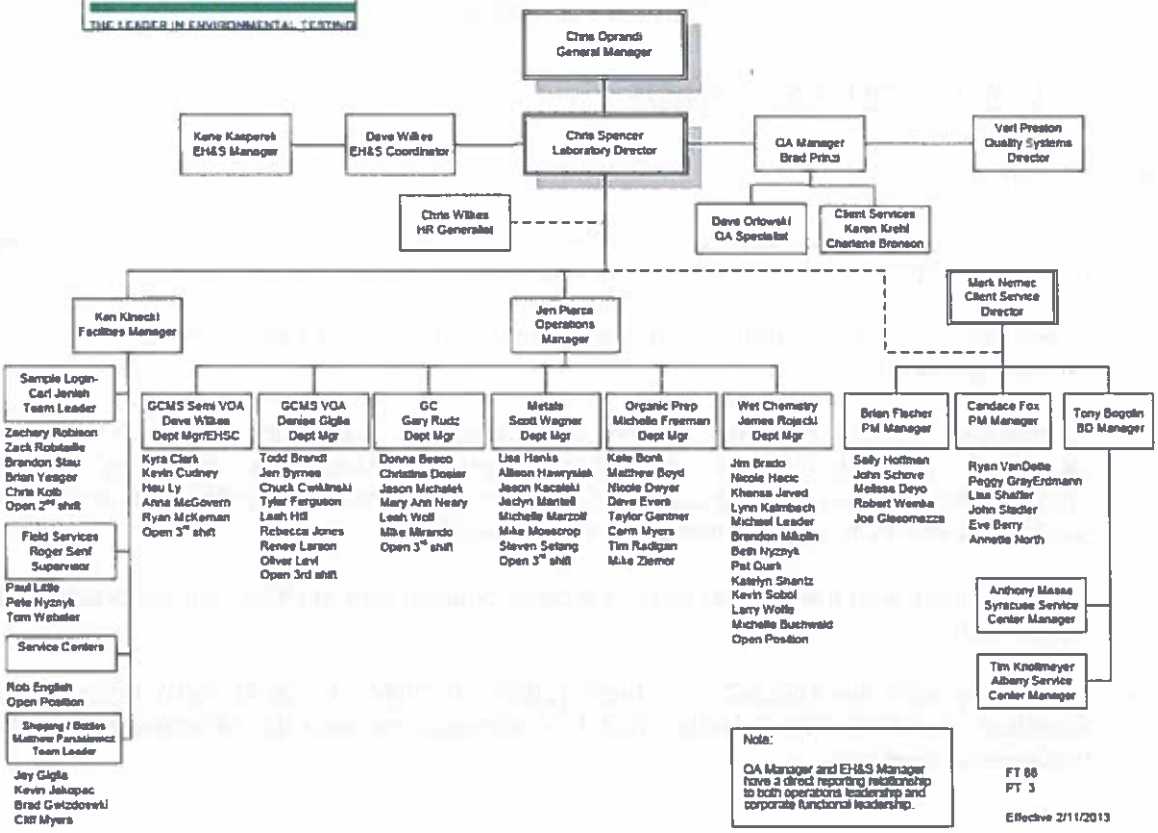
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Quality, Technical & Operations Support



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Buffalo Laboratory Organization



SECTION 5

QUALITY SYSTEM

5.1 QUALITY POLICY STATEMENT

It is TestAmerica's Policy to:

- Provide data of known quality to its clients by adhering to approved methodologies, regulatory requirements and the QA/QC protocols.
- Effectively manage all aspects of the laboratory and business operations by the highest ethical standards.
- Continually improve systems and provide support to quality improvement efforts in laboratory, administrative and managerial activities. TestAmerica recognizes that the implementation of a quality assurance program requires management's commitment and support as well as the involvement of the entire staff.
- Provide clients with the highest level of professionalism and the best service practices in the industry.
- To comply with the NELAC Standards (2003), ISO/IEC 17025:2005(E) International Standard, the 2009 TNI Standard and to continually improve the effectiveness of the management system.

Every staff member at the laboratory plays an integral part in quality assurance and is held responsible and accountable for the quality of their work. It is, therefore, required that all laboratory personnel are trained and agree to comply with applicable procedures and requirements established by this document.

5.2 ETHICS AND DATA INTEGRITY

TestAmerica is committed to ensuring the integrity of its data and meeting the quality needs of its clients. The 7 elements of TestAmerica's Ethics and Data Integrity Program include:

- An Ethics Policy (Corporate Policy No. CW-L-P-004) and Employee Ethics Statements.
- Ethics and Compliance Officers (ECOs).
- A training program.
- Self-governance through disciplinary action for violations.
- A confidential mechanism for anonymously reporting alleged misconduct and a means for conducting internal investigations of all alleged misconduct. (Corporate SOP No. CW-L-S-002)
- Procedures and guidance for recalling data if necessary (Corporate SOP No. CW-L-S-002).

- Effective external and internal monitoring system that includes procedures for internal audits (Section 15).
- Produce results, which are accurate and include QA/QC information that meets client pre-defined Data Quality Objectives (DQOs).
- Present services in a confidential, honest and forthright manner.
- Provide employees with guidelines and an understanding of the Ethical and Quality Standards of our industry.
- Operate our facilities in a manner that protects the environment and the health and safety of employees and the public.
- Obey all pertinent federal, state and local laws and regulations and encourage other members of our industry to do the same.
- Educate clients as to the extent and kinds of services available.
- Assert competency only for work for which adequate personnel and equipment are available and for which adequate preparation has been made.
- Promote the status of environmental laboratories, their employees, and the value of services rendered by them.

5.3 QUALITY SYSTEM DOCUMENTATION

The laboratory's Quality System is communicated through a variety of documents:

- Quality Assurance Manual – Each laboratory has a lab specific quality assurance manual.
- Corporate SOPs and Policies - Corporate SOPs and Policies are developed for use by all relevant laboratories. They are incorporated into the laboratories normal SOP distribution, training and tracking system. Corporate SOPs may be general or technical.
- Work Instructions - A subset of procedural steps, tasks or forms associated with an operation of a management system (e.g., checklists, preformatted bench sheets, forms).
- Laboratory SOPs – General and Technical
-

5.3.1 Order of Precedence

In the event of a conflict or discrepancy between policies, the order of precedence is as follows:

-
- Corporate Quality Management Plan (CQMP)
- Corporate SOPs and Policies
- Laboratory Quality Assurance Manual (QAM)
- Laboratory SOPs and Policies
- Other (Work Instructions (WI), memos, flow charts, etc.)

Note: The laboratory has the responsibility and authority to operate in compliance with regulatory requirements of the jurisdiction in which the work is performed. Where the CQMP conflicts with those regulatory requirements, the regulatory requirements of the jurisdiction shall hold primacy. The laboratory's QAM shall take precedence over the CQMP in those cases.

5.4 QA/QC OBJECTIVES FOR THE MEASUREMENT OF DATA

Quality Assurance (QA) and Quality Control (QC) are activities undertaken to achieve the goal of producing data that accurately characterize the sites or materials that have been sampled. Quality Assurance is generally understood to be more comprehensive than Quality Control. Quality Assurance can be defined as the integrated system of activities that ensures that a product or service meets defined standards.

Quality Control is generally understood to be limited to the analyses of samples and to be synonymous with the term *"analytical quality control"*. QC refers to the routine application of statistically based procedures to evaluate and control the accuracy of results from analytical measurements. The QC program includes procedures for estimating and controlling precision and bias and for determining reporting limits.

Request for Proposals (RFPs) and Quality Assurance Project Plans (QAPP) provide a mechanism for the client and the laboratory to discuss the data quality objectives in order to ensure that analytical services closely correspond to client needs. The client is responsible for developing the QAPP. In order to ensure the ability of the laboratory to meet the Data Quality Objectives (DQOs) specified in the QAPP, clients are advised to allow time for the laboratory to review the QAPP before being finalized. Additionally, the laboratory will provide support to the client for developing the sections of the QAPP that concern laboratory activities.

Historically, laboratories have described their QC objectives in terms of precision, accuracy, representativeness, comparability, completeness, selectivity and sensitivity (PARCCSS).

5.4.1 Precision

The laboratory objective for precision is to meet the performance for precision demonstrated for the methods on similar samples and to meet data quality objectives of the EPA and/or other regulatory programs. Precision is defined as the degree of reproducibility of measurements under a given set of analytical conditions (exclusive of field sampling variability). Precision is documented on the basis of replicate analysis, usually duplicate or matrix spike (MS) duplicate samples.

5.4.2 Accuracy

The laboratory objective for accuracy is to meet the performance for accuracy demonstrated for the methods on similar samples and to meet data quality objectives of the EPA and/or other regulatory programs. Accuracy is defined as the degree of bias in a measurement system. Accuracy may be documented through the use of laboratory control samples (LCS) and/or MS. A statement of accuracy is expressed as an interval of acceptance recovery about the mean recovery.

5.4.3 Representativeness

The laboratory objective for representativeness is to provide data which is representative of the sampled medium. Representativeness is defined as the degree to which data represent a characteristic of a population or set of samples and is a measurement of both analytical and field sampling precision. The representativeness of the analytical data is a function of the procedures used in procuring and processing the samples. The representativeness can be documented by the relative percent difference between separately procured, but otherwise identical samples or sample aliquots.

The representativeness of the data from the sampling sites depends on both the sampling procedures and the analytical procedures. The laboratory may provide guidance to the client regarding proper sampling and handling methods in order to assure the integrity of the samples.

5.4.4 Comparability

The comparability objective is to provide analytical data for which the accuracy, precision, representativeness and reporting limit statistics are similar to these quality indicators generated by other laboratories for similar samples, and data generated by the laboratory over time.

The comparability objective is documented by inter-laboratory studies carried out by regulatory agencies or carried out for specific projects or contracts, by comparison of periodically generated statements of accuracy, precision and reporting limits with those of other laboratories.

5.4.5 Completeness

The completeness objective for data is 90% (or as specified by a particular project), expressed as the ratio of the valid data to the total data over the course of the project. Data will be considered valid if they are adequate for their intended use. Data usability will be defined in a QAPP, project scope or regulatory requirement. Data validation is the process for reviewing data to determine its usability and completeness. If the completeness objective is not met, actions will be taken internally and with the data user to improve performance. This may take the form of an audit to evaluate the methodology and procedures as possible sources for the difficulty or may result in a recommendation to use a different method.

5.4.6 Selectivity

Selectivity is defined as: The capability of a test method or instrument to respond to a target substance or constituent in the presence of non-target substances. Target analytes are separated from non-target constituents and subsequently identified/detected through one or more of the following, depending on the analytical method: extractions (separation), digestions (separation), interelement corrections (separation), use of matrix modifiers (separation), specific retention times (separation and identification), confirmations with different columns or detectors (separation and identification), specific wavelengths (identification), specific mass spectra (identification), specific electrodes (separation and identification), etc..

5.4.7 Sensitivity

Sensitivity refers to the amount of analyte necessary to produce a detector response that can be reliably detected (Method Detection Limit) or quantified (Reporting Limit).

5.5 CRITERIA FOR QUALITY INDICATORS

The laboratory maintains *Quality Control Limit Data in their LIMS system.* A summary report is generated from LIMS to check the precision and accuracy acceptability limits for performed analyses on request. The summary report is generated and is managed by the laboratory's QA department. Some acceptability limits are derived from US EPA methods when they are required. Where US EPA method limits are not required, the laboratory has developed limits from evaluation of data from similar matrices. Criteria for development of control limits are contained in Section 24.

5.6 STATISTICAL QUALITY CONTROL

Statistically-derived precision and accuracy limits are required by selected methods (such as SW-846) and programs [such as the Ohio Voluntary Action Plan (VAP)]. The laboratory routinely utilizes statistically-derived limits to evaluate method performance and determine when corrective action is appropriate. The procedure for determining the statistical limits may be found in SOP BF-QA-002, Quality Control Limits. The analysts are instructed to use the current limits in the laboratory (dated and approved the QA Manager) and entered into the Laboratory Information Management System (LIMS). The Quality Assurance department maintains an archive of all limits used within the laboratory through date sensitive tables within the LIMs System. If a method defines the QC limits, the method limits are used.

If a method requires the generation of historical limits, the lab develops such limits from recent data in the QC database of the LIMS following the guidelines described in Section 24. All calculations and limits are documented and dated when approved and effective. On occasion, a client requests contract-specified limits for a specific project.

Surrogate recoveries are determined for a specific time period as defined above. The resulting ranges are entered in LIMS.

Current QC limits are entered and maintained in the LIMS analyte database. As sample results and the related QC are entered into LIMS, the sample QC values are compared with the limits in LIMS to determine if they are within the acceptable range. The analyst then evaluates if the sample needs to be rerun or re-extracted/rerun or if a comment should be added to the report explaining the reason for the QC outlier.

5.6.1 QC Charts

The QA Manager periodically evaluates these to determine if adjustments need to be made or for corrective actions to methods (SOP No. BF-QA-002). All findings are documented and kept on file.

5.7 QUALITY SYSTEM METRICS

In addition to the QC parameters discussed above, the entire Quality System is evaluated on a monthly basis through the use of specific metrics (refer to Section 16). These metrics are used to drive continuous improvement in the laboratory's Quality System.

SECTION 6

DOCUMENT CONTROL

6.1 OVERVIEW

The QA Department is responsible for the control of documents used in the laboratory to ensure that approved, up-to-date documents are in circulation and out-of-date (obsolete) documents are archived or destroyed. The following documents, at a minimum, must be controlled:

- Laboratory Quality Assurance Manual
- Laboratory Standard Operating Procedures (SOP)
- Laboratory Policies
- Work Instructions and Forms
- Corporate Policies and Procedures distributed outside the intranet

Corporate Quality posts Corporate Manuals, SOPs, Policies, Work Instructions, White Papers and Training Materials on the company intranet site. These Corporate documents are only considered controlled when they are read on the intranet site. Printed copies are considered uncontrolled unless the laboratory physically distributes them as controlled documents. A detailed description of the procedure for issuing, authorizing, controlling, distributing, and archiving corporate documents is found in Corporate SOP No. CW-Q-S-001, Corporate Document Control and Archiving. The laboratory's internal document control procedure is defined in SOP No. BF-QA-003.

The laboratory QA Department also maintains access to various references and document sources integral to the operation of the laboratory. This includes reference methods and regulations. Instrument manuals (hard or electronic copies) are also maintained by the laboratory.

The laboratory maintains control of records for raw analytical data and supporting records such as audit reports and responses, logbooks, standard logs, training files, MDL studies, Proficiency Testing (PT) studies, certifications and related correspondence, and corrective action notices. Raw analytical data consists of bound logbooks, instrument printouts, any other notes, magnetic media, electronic data and final reports.

6.2 DOCUMENT APPROVAL AND ISSUE

The pertinent elements of a document control system for each document include a unique document title and number, pagination, the total number of pages of the item, or an 'end of document' page, the effective date, revision number and the laboratory's name. The Quality personnel are responsible for the maintenance of the system.

Controlled documents are authorized by the QA Department and other management. In order to develop a new document, a Department Manager submits an electronic draft to the QA

Department for suggestions and approval before use. Upon approval, QA personnel add the identifying version information to the document and retain that document as the official document on file. That document is then provided to all applicable operational units. Controlled documents are identified as such and records of their distribution are kept by the QA Department. Document control may be achieved by either electronic or hardcopy distribution.

The QA Department maintains a list of the official versions of controlled documents.

Quality System Policies and Procedures will be reviewed at a minimum of every two years for the majority of procedures and every 1 year for Drinking Water programs. Changes to documents occur when a procedural change warrants.

6.3 PROCEDURES FOR DOCUMENT CONTROL POLICY

For changes to the QA Manual, refer to SOP No. BF-QA-003, "Writing, Reviewing and Revising Controlled Documents". Uncontrolled copies must not be used within the laboratory. Previous revisions and back-up data are stored by the QA department. A controlled electronic copy of the current version is maintained on the laboratory Intranet site and is available to all personnel.

For changes to SOPs, refer to SOP No. BF-QA-003, "Writing, Reviewing and Revising Controlled Documents".

Forms, worksheets, work instructions and information are organized by department in the QA office. Electronic versions are kept in a controlled access electronic folder in the QA department. As revisions are required, a new version number and revision date is assigned and the document placed on the laboratory Intranet (BufNet) for use.

6.4 OBSOLETE DOCUMENTS

All invalid or obsolete documents are removed, or otherwise prevented from unintended use. The laboratory has specific procedures as described above to accomplish this. In general, obsolete documents are collected from employees according to distribution lists and are marked obsolete on the cover or destroyed. At least one copy of the obsolete document is archived according to SOP No. BF-GP-015.

SECTION 7

SERVICE TO THE CLIENT

7.1 OVERVIEW

The laboratory has established procedures for the review of work requests and contracts, oral or written. The procedures include evaluation of the laboratory's capability and resources to meet the contract's requirements within the requested time period. All requirements, including the methods to be used, must be adequately defined, documented and understood. For many environmental sampling and analysis programs, testing design is site or program specific and does not necessarily "fit" into a standard laboratory service or product. It is the laboratory's intent to provide both standard and customized environmental laboratory services to our clients.

A thorough review of technical and QC requirements contained in contracts is performed to ensure project success. The appropriateness of requested methods, and the lab's capability to perform them must be established. Projects, proposals and contracts are reviewed for adequately defined requirements and the laboratory's capability to meet those requirements. Alternate test methods that are capable of meeting the clients' requirements may be proposed by the lab. A review of the lab's capability to analyze non-routine analytes is also part of this review process.

All projects, proposals and contracts are reviewed for the client's requirements in terms of compound lists, test methodology requested, sensitivity (detection and reporting levels), accuracy, and precision requirements (% Recovery and RPD). The reviewer ensures that the laboratory's test methods are suitable to achieve these requirements and that the laboratory holds the appropriate certifications and approvals to perform the work. The laboratory and any potential subcontract laboratories must be certified, as required, for all proposed tests.

The laboratory must determine if it has the necessary physical, personnel and information resources to meet the contract, and if the personnel have the expertise needed to perform the testing requested. Each proposal is checked for its impact on the capacity of the laboratory's equipment and personnel. As part of the review, the proposed turnaround time will be checked for feasibility.

Electronic or hard copy deliverable requirements are evaluated against the laboratory's capacity for production of the documentation.

If the laboratory cannot provide all services but intends to subcontract such services, whether to another TestAmerica facility or to an outside firm, this will be documented and discussed with the client prior to contract approval. (Refer to Section 8 for Subcontracting Procedures.)

The laboratory informs the client of the results of the review if it indicates any potential conflict, deficiency, lack of accreditation, or inability of the lab to complete the work satisfactorily. Any discrepancy between the client's requirements and the laboratory's capability to meet those requirements is resolved in writing before acceptance of the contract. It is necessary that the contract be acceptable to both the laboratory and the client. Amendments initiated by the client and/or TestAmerica, are documented in writing.

All contracts, QAPPs, Sampling and Analysis Plans (SAPs), contract amendments, and documented communications become part of the project record.

The same contract review process used for the initial review is repeated when there are amendments to the original contract by the client and the participating personnel are informed of the changes.

7.2 REVIEW SEQUENCE AND KEY PERSONNEL

Appropriate personnel will review the work request at each stage of evaluation.

For routine projects and other simple tasks, a review by the Project Manager (PM) is considered adequate. The PM confirms that the laboratory has any required certifications, that it can meet the clients' data quality and reporting requirements and that the lab has the capacity to meet the clients turn around needs. It is recommended that, where there is a sales person assigned to the account, an attempt should be made to contact that sales person to inform them of the incoming samples.

For new, complex or large projects, the proposed contract is given to the National Account Director, who will decide which lab will receive the work based on the scope of work and other requirements, including certification, testing methodology, and available capacity to perform the work. The contract review process is outlined in TestAmerica's Corporate SOP No. CA-L-P-002, Contract Compliance Policy.

This review encompasses all facets of the operation. The scope of work is distributed to the appropriate personnel, as needed based on scope of contract, to evaluate all of the requirements shown above (not necessarily in the order below):

- Legal & Contracts Director
- General Manager
- Customer Service Manager
- Operations Manager
- Laboratory and/or Corporate Technical Directors
- Corporate Information Technology Managers/Directors
- Regional and/or National Account representatives
- Laboratory and/or Corporate Quality
- Laboratory and/or Corporate Environmental Health and Safety Managers/Directors
- The Laboratory Director reviews the formal laboratory quote and makes final acceptance for their facility.

The National Account Director, Legal Contracts Director, or local account representative then submits the final proposal to the client.

In the event that one of the above personnel is not available to review the contract, his or her back-up will fulfill the review requirements.

The Legal & Contracts Director maintains copies of all signed contracts. The Customer Service Manager at the TestAmerica Buffalo facility also maintains copies of these documents.

7.3 DOCUMENTATION

Appropriate records are maintained for every contract or work request. All stages of the contract review process are documented and include records of any significant changes.

The contract will be distributed to and maintained by the appropriate sales/marketing personnel and the Regional Account Manager. A copy of the contract and formal quote will be filed with the laboratory PM and the Customer Service Manager.

Records are maintained of pertinent discussions with a client relating to the client's requirements or the results of the work during the period of execution of the contract. The PM keeps a phone log of conversations with the client.

7.3.1 Project-Specific Quality Planning

Communication of contract specific technical and QC criteria is an essential activity in ensuring the success of site specific testing programs. To achieve this goal, the laboratory assigns a PM to each client. The PM is the first point of contact for the client. It is the PM's responsibility to ensure that project specific technical and QC requirements are effectively evaluated and communicated to the laboratory personnel before and during the project. QA department involvement may be needed to assist in the evaluation of custom QC requirements. Specific information related to project planning may be found in SOP BF-PM-001, Project Information Requirements.

PM's are the primary client contact and they ensure resources are available to meet project requirements. Although PM's do not have direct reports or staff in production, they coordinate opportunities and work with laboratory management staff to ensure available resources are sufficient to perform work for the client's project. Project management is positioned between the client and laboratory resources.

Prior to work on a new project, the dissemination of project information and/or project opening meetings may occur to discuss schedules and unique aspects of the project. Items to be discussed may include the project technical profile, turnaround times, holding times, methods, analyte lists, reporting limits, deliverables, sample hazards, or other special requirements. The PM introduces new projects to the laboratory staff through project kick-off meetings or to the management staff during production meetings. These meetings provide direction to the laboratory staff in order to maximize production and client satisfaction, while maintaining quality. In addition, project notes may be associated with each sample batch as a reminder upon sample receipt and analytical processing.

During the project, any change that may occur within an active project is agreed upon between the client/regulatory agency and the PM/laboratory. These changes (e.g., use of a non-standard method or modification of a method) and approvals must be documented prior to implementation.

Documentation pertains to any document, e.g., letter, e-mail, variance, contract addendum, which has been signed by both parties.

Such changes are also communicated to the laboratory during production meetings. Such changes are updated to the project notes and are introduced to the managers at these meetings. The laboratory staff is then introduced to the modified requirements via the PM or the individual laboratory Department Manager.

The laboratory strongly encourages client visits to the laboratory and for formal/informal information sharing session with employees in order to effectively communicate ongoing client needs as well as project specific details for customized testing programs.

7.4 SPECIAL SERVICES

The laboratory cooperates with clients and their representatives to monitor the laboratory's performance in relation to work performed for the client. It is the laboratory's goal to meet all client requirements in addition to statutory and regulatory requirements. The laboratory has procedures to ensure confidentiality to clients (Section 15 and 25).

Note: ISO/IEC 17025 states that a laboratory "shall afford clients or their representative's cooperation to clarify the client's request". This topic is discussed in Section 7.

The laboratory's standard procedures for reporting data are described in Section 25. Special services are also available and provided upon request. These services include:

- Reasonable access for our clients or their representatives to the relevant areas of the laboratory for the witnessing of tests performed for the client.
- Assist client-specified third party data validators as specified in the client's contract.
- Supplemental information pertaining to the analysis of their samples. Note: An additional charge may apply for additional data/information that was not requested prior to the time of sample analysis or previously agreed upon.

7.5 CLIENT COMMUNICATION

Project managers are the primary communication link to the clients. They shall inform their clients of any delays in project completion as well as any non-conformances in either sample receipt or sample analysis. Project management will maintain ongoing client communication throughout the entire client project.

Technical Managers are available to discuss any technical questions or concerns that the client may have.

7.6 REPORTING

The laboratory works with our clients to produce any special communication reports required by the contract.

7.7 CLIENT SURVEYS

The laboratory assesses both positive and negative client feedback. The results are used to improve overall laboratory quality and client service.

TestAmerica's Sales and Marketing teams periodically develops lab and client specific surveys to assess client satisfaction.

SECTION 8

SUBCONTRACTING OF TESTS

8.1 OVERVIEW

For the purpose of this quality manual, the phrase subcontract laboratory refers to a laboratory external to the TestAmerica laboratories. The phrase "work sharing" refers to internal transfers of samples between the TestAmerica laboratories. The term outsourcing refers to the act of subcontracting tests.

When contracting with our clients, the laboratory makes commitments regarding the services to be performed and the data quality for the results to be generated. When the need arises to outsource testing for our clients because project scope, changes in laboratory capabilities, capacity or unforeseen circumstances, we must be assured that the subcontractors or work sharing laboratories understand the requirements and will meet the same commitments we have made to the client. Refer to TestAmerica's Corporate SOP's on Subcontracting Procedures (CA-L-S-002) and the Work Sharing Process SOP (CA-C-S-001).

When outsourcing analytical services, the laboratory will assure, to the extent necessary, that the subcontract or work sharing laboratory maintains a program consistent with the requirements of this document, the requirements specified in TNI/ISO 17025 and/or the client's Quality Assurance Project Plan (QAPP). All QC guidelines specific to the client's analytical program are transmitted to the subcontractor and agreed upon before sending the samples to the subcontract facility. Additionally, work requiring accreditation will be placed with an appropriately accredited laboratory. The laboratory performing the subcontracted work will be identified in the final report, as will non-TNI accredited work where required.

Project Managers (PMs), Customer Service Managers (CSM), or Regional Account Executives (RAE) for the Export Lab are responsible for obtaining client approval prior to outsourcing any samples. The laboratory will advise the client of a subcontract or work sharing arrangement in writing and when possible approval from the client shall be retained in the project folder.

Note: In addition to the client, some regulating agencies, such as the Department of Energy and the USDA, may require notification prior to placing such work.

Approval may be documented through reference in a quote / contract or e-mail correspondence.

8.2 QUALIFYING AND MONITORING SUBCONTRACTORS

Whenever a PM, Regional Account Executive (RAE) or Customer Service Manager (CSM) becomes aware of a client requirement or laboratory need where samples must be outsourced to another laboratory, the other laboratory(s) shall be selected based on the following:

- The first priority is to attempt to place the work in a qualified TestAmerica laboratory;
- Firms specified by the client for the task (Documentation that a subcontractor was

designated by the client must be maintained with the project file. This documentation can be

- as simple as placing a copy of an e-mail from the client in the project folder);
- Firms listed as pre-qualified and currently under a subcontract with TestAmerica. A listing of all approved subcontracting laboratories is available on the TestAmerica intranet site. Supporting documentation is maintained by corporate offices and by the TestAmerica laboratory originally requesting approval of the subcontract lab. Verify necessary accreditation, where applicable (e.g. on the subcontractors TNI, A2LA accreditation or State certification.
- Firms identified in accordance with the company's Small Business Subcontracting program as small, women-owned, veteran-owned and/or minority-owned businesses;
- TNI or A2LA accredited laboratories.
- In addition, the firm must hold the appropriate certification to perform the work required.

All TestAmerica laboratories are pre-qualified for work-sharing provided they hold the appropriate accreditations, can adhere to the project/program requirements, and the client approved sending samples to that laboratory. The client must provide acknowledgement that the samples can be sent to that facility (an e-mail is sufficient documentation or if acknowledgement is verbal, the date, time, and name of person providing acknowledgement must be documented). The originating laboratory is responsible for communicating all technical, quality, and deliverable requirements as well as other contract needs. (Corporate SOP No. CA-C-S-001, Work Sharing Process.

When the potential sub-contract laboratory has not been previously approved, then to begin the process, Account Executives or PMs may nominate a laboratory as a subcontractor based on need. The decision to nominate a laboratory must be approved by the Laboratory Director. The Laboratory Director requests that the QA Manager begin the process of approving the subcontract laboratory as outlined in Corporate SOP No. CA-L-S-002, Subcontracting Procedures. The client must provide acknowledgement that the samples can be sent to that facility (an e-mail is sufficient documentation or if acknowledgement is verbal, the date, time, and name of person providing acknowledgement must be documented).

8.2.1 Once the appropriate accreditation and legal information is received by the laboratory, it is evaluated for acceptability (where applicable) and forwarded to Corporate Contracts for formal contracting with the laboratory. They will add the lab to the approved list on the intranet site and notify the finance group for JD Edwards.

8.2.2 The client will assume responsibility for the quality of the data generated from the use of a subcontractor they have requested the lab to use. The qualified subcontractors on the intranet site are known to meet minimal standards. TestAmerica does not certify laboratories. The subcontractor is on our approved list and can only be recommended to the extent that we would use them.

8.2.3 The status and performance of qualified subcontractors will be monitored periodically by the Corporate Contracts and/or Quality Departments. Any problems identified will be brought to the attention of TestAmerica's Corporate Finance or Corporate Quality personnel.

- Complaints shall be investigated. Documentation of the complaint, investigation and
- Corrective action will be maintained in the subcontractor's file on the intranet site. Complaints are posted using the Vendor Performance Report (Form No. CW-F-WI-009).
- Information shall be updated on the intranet when new information is received from the subcontracted laboratories.
- Subcontractors in good standing will be retained on the intranet listing. The QA Manager will notify all TestAmerica laboratories and Corporate Quality and Corporate Contracts if any laboratory requires removal from the intranet site. This notification will be posted on the intranet site and e-mailed to all Laboratory Directors/Managers, QA Managers and Sales Personnel.

8.3 OVERSIGHT AND REPORTING

The PM must request that the selected subcontractor be presented with a subcontract, if one is not already executed between the laboratory and the subcontractor. The subcontract must include terms which flow down the requirements of our clients, either in the subcontract itself or through the mechanism of work orders relating to individual projects. A standard subcontract and the Lab Subcontractor Vendor Package (posted on the intranet) can be used to accomplish this, and the Legal & Contracts Director can tailor the document or assist with negotiations, if needed. The PM (or RAE or CSM, etc.) responsible for the project must advise and obtain client consent to the subcontract as appropriate, and provide the scope of work to ensure that the proper requirements are made a part of the subcontract and are made known to the subcontractor.

Prior to sending samples to the subcontracted laboratory, the PM confirms their certification status to determine if it's current and scope-inclusive. The information is documented on a Subcontract Laboratory Certification Verification Form (Figure 8-1) and the form is retained in the project folder. For TestAmerica laboratories, certifications can be viewed on the company TotalAccess Database.

The Sample Control department is responsible for ensuring compliance with QA requirements and applicable shipping regulations when shipping samples to a subcontracted laboratory.

All subcontracted samples must be accompanied by a TestAmerica Chain of Custody (COC). A copy of the original COC sent by the client must also be included with all samples workshared within TestAmerica. Client COCs are only forwarded to external subcontractors when samples are shipped directly from the project site to the subcontractor lab. Under routine circumstances, client COCs are not provided to external subcontractors.

Through communication with the subcontracted laboratory, the PM monitors the status of the subcontracted analyses, facilities successful execution of the work, and ensures the timeliness and completeness of the analytical report.

Non-TNI accredited work must be identified in the subcontractor's report as appropriate. If TNI accreditation is not required, the report does not need to include this information.

Reports submitted from subcontractor laboratories are not altered and are included in their original form in the final project report. This clearly identifies the data as being produced by a subcontractor facility. If subcontract laboratory data are incorporated into the laboratories EDD (i.e. imported), the report must explicitly indicate which lab produced the data for which methods and samples.

Note: The results submitted by TestAmerica work sharing laboratory may be transferred electronically and the results reported by the TestAmerica work sharing lab are identified on the final report. The report must explicitly indicate which lab produced the data for which methods and samples. The final report must include a copy of the completed COC for all work sharing reports.

8.4 CONTINGENCY PLANNING

The Laboratory Director may waive the full qualification of a subcontractor process temporarily to meet emergency needs; however, this decision & justification must be documented in the project files, and the 'Purchase Order Terms And Conditions For Subcontracted Laboratory Services' must be sent with the samples and Chain-of-Custody. In the event this provision is utilized, the laboratory (e.g., PM) will be required to verify and document the applicable accreditations of the subcontractor. All other quality and accreditation requirements will still be applicable, but the subcontractor need not have signed a subcontract with TestAmerica at this time. . The comprehensive approval process must then be initiated within 30 calendar days of subcontracting.

Figure 8-1 Subcontracting Laboratory Approval Form (Initial / Renewal)

SUBCONTRACTING LABORATORY APPROVAL

Reference: Section 8 – Quality Assurance Manual

Date: _____
Laboratory: _____
Address: _____
_____
Contact and e-mail address: _____
Phone: Direct _____ Fax _____

Requested Item[3]	Date Received	Reviewed/ Accepted	Date
1. Copy of State Certification[1]			
2. Insurance Certificate			
3. USDA Soil Permit			
4. Description of Ethics Program[3]			
5. QA Manual[3]			
6. Most Recent (and relevant) 2 Sets of WP/WS Reports with Corrective Action Response[1,3]			
7. State Audit with Corrective Action Response (or NELAC or A2LA Audit)[3]			
8. Sample Report[3]			
9. SOQ or Summary list of Technical Staff and Qualifications [3]			
10. SOPs for Methods to Be Loadshifted[2,3]			
11. For DoD Work: Statement that Lab quality system complies with QSM.			
12. For DoD Work: Approved by specific DoD Component laboratory approval process.			

1 - Required when emergency procedures are implemented.
2 - Some labs may not submit copies due to internal policies. In these cases, a copy of the first page and signature page of the SOP is acceptable. This requirement may also be fulfilled by supplying a table of SOPs with effective dates.
3 – If the laboratory has NELAC accreditation, Item #s 4 through 10 are not required.

On Site Audit Planned: YES NO If yes, Date Completed: _____ By Whom: _____

Comments: _____

Lab Acceptable for Subcontracting Work: YES NO Limitations: _____

QA Manager (Signature): _____ Date: _____

☐ Forwarded to Contract Coordinator, by: _____ Date: _____

SECTION 9

PURCHASING SERVICES AND SUPPLIES

9.1 OVERVIEW

Evaluation and selection of suppliers and vendors is performed, in part, on the basis of the quality of their products, their ability to meet the demand for their products on a continuous and short term basis, the overall quality of their services, their past history, and competitive pricing. This is achieved through evaluation of objective evidence of quality furnished by the supplier, which can include certificates of analysis, recommendations, and proof of historical compliance with similar programs for other clients. To ensure that quality critical consumables and equipment conform to specified requirements, which may affect quality, all purchases from specific vendors are approved by a member of the supervisory or management staff.

Capital expenditures are made in accordance with TestAmerica's Corporate Controlled Purchases Procedure, SOP No. CW-F-S-007

Contracts will be signed in accordance with TestAmerica's Corporate Authorization Matrix Policy, Policy No. CW-F-P-002. Request for Proposals (RFP's) will be issued where more information is required from the potential vendors than just price. Process details are available in TestAmerica's Corporate Procurement and Contracts Policy (Policy No. CW-F-P-004). RFP's allow TestAmerica to determine if a vendor is capable of meeting requirements such as supplying all of the TestAmerica facilities, meeting required quality standards and adhering to necessary ethical and environmental standards. The RFP process also allows potential vendors to outline any additional capabilities they may offer.

9.2 GLASSWARE

Glassware used for volumetric measurements must be Class A or verified for accuracy according to laboratory procedure. Pyrex (or equivalent) glass should be used where possible. For safety purposes, thick-wall glassware should be used where available.

9.3 REAGENTS, STANDARDS & SUPPLIES

Purchasing guidelines for equipment and reagents must meet the requirements of the specific method and testing procedures for which they are being purchased. Solvents and acids are pre-tested in accordance with TestAmerica's Corporate SOP on Solvent & Acid Lot Testing & Approval, SOP No. CA-Q-S-001 and TestAmerica Buffalo SOP on Solvent Purity, SOP BF-OP-013.

9.3.1 Purchasing

Chemical reagents, solvents, glassware and general supplies are ordered as needed to maintain sufficient quantities on hand. Materials used in the analytical process must be of a known quality. The wide variety of materials and reagents available makes it advisable to

specify recommendations for the name, brand, and grade of materials to be used in any determination. This information is contained in the method SOP. Purchase requisitions are placed into the J.D. Edwards system by designated departmental personnel. The listing of items available in the J.D. Edwards system has been approved for use by the corporate purchasing staff. Each purchase requisition receives final approval by the laboratory Operations Manager or purchasing coordinator before the order is submitted.

The analyst may also check the item out of the on-site consignment system that contains items approved for laboratory use.

9.3.2 Receiving

It is the responsibility of the purchasing coordinator to receive the shipment. It is the responsibility of the department that ordered the materials to date the material when received. Once the ordered reagents or materials are received, the department that submitted the order compares the information on the label or packaging to the original order to ensure that the purchase meets quality level specified. Material Safety Data Sheets (MSDSs) are available online through the Company's intranet website. Anyone may review these for relevant information on the safe handling and emergency precautions of on-site chemicals.

9.3.3 Specifications

Methods in use in the laboratory specify the grade of reagent that must be used in the procedure. If the quality of the reagent is not specified, analytical reagent grade will be used. It is the responsibility of the analyst to check the procedure carefully for the suitability of grade of reagent.

Chemicals must not be used past the manufacturer's expiration date and must not be used past the expiration time noted in a method SOP. If expiration dates are not provided, the laboratory may contact the manufacturer to determine an expiration date.

The laboratory assumes a five year expiration date on inorganic dry chemicals and solvents unless noted otherwise by the manufacturer or by the reference source method. Chemicals/solvents should not be used past the manufacturer's or SOP expiration date unless 'verified' (refer to item 3 listed below).

- An expiration date cannot not be extended if the dry chemical/solvent is discolored or appears otherwise physically degraded, the dry chemical/solvent must be discarded.

- Expiration dates can be extended if the dry chemical/solvent is found to be satisfactory based on acceptable performance of quality control samples (Continuing Calibration Verification (CCV), Blanks, Laboratory Control Sample (LCS), etc.).
- If the dry chemical/solvent is used for the preparation of standards, the expiration dates can be extended 6 months if the dry chemical/solvent is compared to an unexpired independent source in performing the method and the performance of the dry chemical/solvent is found to be satisfactory. The comparison must show that the dry chemical meets CCV limits. The

comparison studies are maintained along with the calibration raw data for which the reagent was used.

Wherever possible, standards must be traceable to national or international standards of measurement or to national or international reference materials. Records to that effect are available to the user.

Compressed gases in use are checked for pressure and secure positioning daily. To prevent a tank from going to dryness or introducing potential impurities, the pressure should be closely watched as it decreases to approximately 15% of the original reading, at which point it should be replaced. For example, a standard sized laboratory gas cylinder containing 3,000 psig of gas should be replaced when it drops to approximately 500 psig. The quality of the gases must meet method or manufacturer specification or be of a grade that does not cause any analytical interference.

Water used in the preparation of standards or reagents must have a specific conductivity of less than 1- umho/cm (or specific resistivity of greater than 1.0 megohm-cm) at 25°C. The specific conductivity is checked and recorded daily. If the water's specific conductivity is greater than the specified limit, the Facility Manager and appropriate Department Managers/Supervisors must be notified immediately in order to notify all departments, decide on cessation (based on intended use) of activities, and make arrangements for correction.

The laboratory may purchase reagent grade (or other similar quality) water for use in the laboratory. This water must be certified "clean" by the supplier for all target analytes or otherwise verified by the laboratory prior to use. This verification is documented.

Standard lots are verified before first time use if the laboratory switches manufacturers or has historically had a problem with the type of standard.

Purchased bottleware used for sampling must be certified clean and the certificates must be maintained. If uncertified sampling bottleware is purchased, all lots must be verified clean prior to use. This verification must be maintained.

Records of manufacturer's certification and traceability statements are maintained in the LIMS system, files or binders in each laboratory section. These records include date of receipt, lot number (when applicable), and expiration date (when applicable). Incorporation of the item into the record indicates that the analyst has compared the new certificate with the previous one for the same purpose and that no difference is noted, unless approved and so documented by the Technical Director or QA Manager.

9.3.4 Storage

Reagent and chemical storage is important from the aspects of both integrity and safety. Light-sensitive reagents may be stored in brown-glass containers. Storage conditions are per the Corporate Environmental Health & Safety Manual (Corp. DOC No. CW-E-M-001) and method SOPs or manufacturer instructions.

9.4 PURCHASE OF EQUIPMENT/INSTRUMENTS/SOFTWARE

When a new piece of equipment is needed, either for additional capacity or for replacing inoperable equipment, the analyst or supervisor makes a supply request to the Technical Director and/or the Laboratory Director. If they agree with the request the procedures outlined in TestAmerica's Corporate Policy No. CA-T-P-001, Qualified Products List, is followed. A decision is made as to which piece of equipment can best satisfy the requirements. The appropriate written requests are completed and purchasing places the order.

Upon receipt of a new or used piece of equipment, an identification name is assigned and added to the equipment list. IT must also be notified so that they can synchronize the instrument for back-ups. Its capability is assessed to determine if it is adequate or not for the specific application. For instruments, a calibration curve is generated, followed by MDLs, Demonstration of Capabilities (DOCs), and other relevant criteria (refer to Section 19). For software, its operation must be deemed reliable and evidence of instrument verification must be retained by the IT Department or QA Department. Software certificates supplied by the vendors are filed with the LIMS Administrator. The manufacturer's operation manual is retained at the bench.

9.5 SERVICES

Service to analytical instruments (except analytical balances) is performed on an as needed basis. Routine preventative maintenance is discussed in Section 20. The need for service is determined by analysts and/or Department Managers. The service providers that perform the services are approved by the Department Managers, Operations Manager and/or Technical Director.

9.6 SUPPLIERS

TestAmerica selects vendors through a competitive proposal / bid process, strategic business alliances or negotiated vendor partnerships (contracts). This process is defined in the Corporate Finance documents on Vendor Selection (SOP No. CW-F-S-018) and Procurements & Contracts Policy (Policy No. CW-F-P-004). The level of control used in the selection process is dependent on the anticipated spending amount and the potential impact on TestAmerica business. Vendors that provide test and measuring equipment, solvents, standards, certified containers, instrument related service contracts or subcontract laboratory services shall be subject to more rigorous controls than vendors that provide off-the-shelf items of defined quality that meet the end use requirements. The JD Edwards purchasing system includes all suppliers /vendors that have been approved for use.

Evaluation of suppliers is accomplished by ensuring the supplier ships the product or material ordered and that the material is of the appropriate quality. This is documented by signing off on packing slips or other supply receipt documents. The purchasing documents contain the data that adequately describe the services and supplies ordered.

Any issues of vendor performance are to be reported immediately by the laboratory staff to the Corporate Purchasing Group by completing a Vendor Performance Report.

The Corporate Purchasing Group will work through the appropriate channels to gather the information required to clearly identify the problem and will contact the vendor to report the

problem and to make any necessary arrangements for exchange, return authorization, credit, etc.

As deemed appropriate, the Vendor Performance Reports will be summarized and reviewed to determine corrective action necessary, or service improvements required by vendors

The laboratory has access to a listing of all approved suppliers of critical consumables, supplies and services. This information is provided through the JD Edwards purchasing system.

9.6.1 New Vendor Procedure

TestAmerica employees who wish to request the addition of a new vendor must complete a J.D. Edwards Vendor Add Request Form (available on the intranet site).

New vendors are evaluated based upon criteria appropriate to the products or services provided as well as their ability to provide those products and services at a competitive cost. Vendors are also evaluated to determine if there are ethical reasons or potential conflicts of interest with TestAmerica employees that would make it prohibitive to do business with them as well as their financial stability. The QA Department and/or the Technical Director are consulted with vendor and product selection that have an impact on quality.

SECTION 10

COMPLAINTS

10.1 OVERVIEW

The laboratory considers an effective client complaint handling processes to be of significant business and strategic value. Listening to and documenting client concerns captures 'client knowledge' that enables our operations to continually improve processes and client satisfaction. An effective client complaint handling process also provides assurance to the data user that the laboratory will stand behind its data, service obligations and products.

A client complaint is any expression of dissatisfaction with any aspect of our business services, e.g., communications, responsiveness, data, reports, invoicing and other functions expressed by any party, whether received verbally or in written form. Client inquiries, complaints or noted discrepancies are documented, communicated to management, and addressed promptly and thoroughly.

The laboratory has procedures for addressing with both external and internal complaints with the goal of providing satisfactory resolution to complaints in a timely and professional manner.

The nature of the complaint is identified, documented and investigated, and an appropriate action is determined and taken. In cases where a client complaint indicates that an established policy or procedure was not followed, the QA Department must evaluate whether a special audit must be conducted to assist in resolving the issue. A written confirmation or letter to the client, outlining the issue and response taken is recommended as part of the overall action taken.

The process of complaint resolution and documentation utilizes the procedures outlined in Section 12 (Corrective Actions) and is documented following the laboratory SOPs related to Data Quality Review (BF-QA-006) and Corrective Action (BF-QA-005).

10.2 EXTERNAL COMPLAINTS

An employee that receives a complaint initiates the complaint resolution process by first documenting the complaint according to SOPs BF-QA-006 and BF-QA-005.

Complaints fall into two categories: correctable and non-correctable. An example of a correctable complaint would be one where a report re-issue would resolve the complaint. An example of a non-correctable complaint would be one where a client complains that their data was repeatedly late. Non-correctable complaints should be reviewed for preventive action measures to reduce the likely hood of future occurrence and mitigation of client impact.

The general steps in the complaint handling process are:

- Receiving and Documenting Complaints
- Complaint Investigation and Service Recovery
- Process Improvement

The laboratory shall inform the initiator of the complaint of the results of the investigation and the corrective action taken, if any.

10.3 INTERNAL COMPLAINTS

Internal complaints include, but are not limited to: errors and non-conformances, training issues, internal audit findings, and deviations from methods. Corrective actions may be initiated by any staff member who observes a nonconformance and shall follow the procedures outlined in Section 13. In addition, Corporate Management, Sales and Marketing and Information Technology (IT) may initiate a complaint by contacting the laboratory or through the corrective action system described in Section 12.

10.4 MANAGEMENT REVIEW

The number and nature of client complaints is reported by the QA Manager to the laboratory and QA Director in the QA Monthly report. Monitoring and addressing the overall level and nature of client complaints and the effectiveness of the solutions is part of the Annual Management Review (Section 16)

SECTION 11

CONTROL OF NON-CONFORMING WORK

11.1 OVERVIEW

When data discrepancies are discovered or deviations and departures from laboratory standard procedures, policies and/or client requests have occurred, corrective action is taken immediately. First, the laboratory evaluates the significance of the nonconforming work. Then, a corrective action plan is initiated based on the outcome of the evaluation. If it is determined that the nonconforming work is an isolated incident, the plan could be as simple as adding a qualifier to the final results and/or making a notation in the case narrative. If it is determined that the nonconforming work is a systematic or improper practices issue, the corrective action plan could include a more in depth investigation and a possible suspension of an analytical method. In all cases, the actions taken are documented using the laboratory's corrective action system (refer to Section 12).

Due to the frequently unique nature of environmental samples, sometimes departures from documented policies and procedures are needed. When an analyst encounters such a situation, the problem is presented to the department manager for resolution. The department manager may elect to discuss it with the Technical Director, QA Manager or have a representative contact the client to decide on a logical course of action. Once an approach is agreed upon, the analyst documents it using the laboratory's job exception and corrective action system described in Section 12. This information can then be supplied to the client in the form of a footnote or a case narrative with the report.

Project Management may encounter situations where a client may request that a special procedure be applied to a sample that is not standard lab practice. Based on a technical evaluation, the lab may accept or opt to reject the request based on technical or ethical merit. An example might be the need to report a compound that the lab does not normally report. The lab would not have validated the method for this compound following the procedures in Section 19. The client may request that the compound be reported based only on the calibration. Such a request would need to be approved by the Laboratory Director, Technical Director, Operations Manager or QA Manager, documented and included in the project folder. Deviations must also be noted on the final report with a statement that the compound is not reported in compliance with the analytical method requirements and the reason.

11.2 RESPONSIBILITIES AND AUTHORITIES

TestAmerica's Corporate SOP entitled Internal Investigation of Potential Data Discrepancies and Determination for Data Recall (SOP No. CW-L-S-002) outlines the general procedures for the reporting and investigation of data discrepancies and alleged incidents of misconduct or violations of TestAmerica's data integrity policies as well as the policies and procedures related to the determination of the potential need to recall data.

Under certain circumstances the Laboratory Director, the Technical Director, the Operations Manager or the QA Manager may exceptionally authorize departures from documented procedures or policies. The departures may be a result of procedural changes due to the nature

of the sample; a one-time procedure for a client; QC failures with insufficient sample to reanalyze, etc. In most cases, the client will be informed of the departure prior to the reporting of the data. Any departures must be well documented using the laboratory's job exception and corrective action procedures described in Section 12. This information may also need to be documented in logbooks and/or data review checklists as appropriate. Any impacted data must be referenced in a case narrative and/or flagged with an appropriate data qualifier.

Any misrepresentation or possible misrepresentation of analytical data discovered by any laboratory staff member must be reported to facility senior laboratory management within 24-hours. The Senior Management staff is comprised of the Laboratory Director, Technical Director, Operations Manager, QA Manager, Customer Service Manager, Human Resources Manager and Business Development Manager. Suspected misrepresentation issues may also be reported to any member of the corporate staff as identified in Ethics Policy, CA-L-P-001. The data integrity hotline (1-800-736-9407) may also be used. The reporting of issues involving alleged violations of the company's Data Integrity or Manual Integration procedures must be conveyed to an Ethics and Compliance Officer (ECO), Director of Quality & Client Advocacy and the laboratory's Quality Director within 24 hours of discovery.

Whether an inaccurate result was reported due to calculation or quantitation errors, data entry errors, improper practices, or failure to follow SOPs, the data must be evaluated to determine the possible effect.

The Laboratory Director, QA Manager, ECOs, Corporate Quality, General Managers and the Quality Directors have the authority and responsibility to halt work, withhold final reports, or suspend an analysis for due cause as well as authorize the resumption of work.

11.3 EVALUATION OF SIGNIFICANCE AND ACTIONS TAKEN

For each nonconforming issue reported, an evaluation of its significance and the level of management involvement needed is made. This includes reviewing its impact on the final data, whether or not it is an isolated or systematic issue, and how it relates to any special client requirements.

TestAmerica's Corporate Data Investigation & Recall Procedure (SOP No. CW-L-S-002 distinguishes between situations when it would be appropriate for laboratory management to make the decision on the need for client notification (written or verbal) and data recall (report revision) and when the decision must be made with the assistance of the ECO's and Corporate Management. Laboratory level decisions are documented and approved using the laboratory's standard nonconformance/corrective action reporting in lieu of the data recall determination form contained in TestAmerica's Corporate SOP No. CW-L-S-002.

11.4 PREVENTION OF NONCONFORMING WORK

If it is determined that the nonconforming work could recur, further corrective actions must be made following the laboratory's corrective action system.

On a monthly basis, the QA Department evaluates non-conformances to determine if any nonconforming work has been repeated multiple times. If so, the laboratory's corrective action process may be followed.

11.5 METHOD SUSPENSION/RESTRICTION (STOP WORK PROCEDURES)

In some cases it may be necessary to suspend/restrict the use of a method or target compound which constitutes significant risk and/or liability to the laboratory. Suspension/restriction procedures can be initiated by any of the persons noted in Section 11.2, Paragraph 5.

Prior to suspension/restriction, confidentiality will be respected, and the problem with the required corrective and preventive action will be stated in writing and presented to the Laboratory Director.

The Laboratory Director shall arrange for the appropriate personnel to meet with the QA Manager as needed. This meeting shall be held to confirm that there is a problem, that suspension/restriction of the method is required and will be concluded with a discussion of the steps necessary to bring the method/target or test fully back on line. In some cases that may not be necessary if all appropriate personnel have already agreed there is a problem and there is agreement on the steps needed to bring the method, target or test fully back on line.

The QA Manager will also initiate a corrective action report as described in Section 12 if one has not already been started. A copy of any meeting notes and agreed upon steps should be faxed or e-mailed by the laboratory to the appropriate General Manager and member of Corporate QA. This fax/e-mail acts as notification of the incident.

After suspension/restriction, the lab will hold all reports to clients pending review. No faxing, mailing or distributing through electronic means may occur. The report must not be posted for viewing on the internet. It is the responsibility of the Laboratory Director to hold all reporting and to notify all relevant laboratory personnel regarding the suspension/restriction (i.e., Project Management, Log-in, etc...). Clients will NOT generally be notified at this time. Analysis may proceed in some instances depending on the non-conformance issue.

Within 72 hours, the QA Manager will determine if compliance is now met and reports can be released, OR determine the plan of action to bring work into compliance, and release work. A team, with all principals involved (Laboratory Director, Technical Director, Operations Manager, QA Manager, Department Manager) can devise a start-up plan to cover all steps from client notification through compliance and release of reports. Project Management and the Customer Service Manager and Sales and Marketing must be notified if clients must be notified or if the suspension/restriction affects the laboratory's ability to accept work. The QA Manager must approve start-up or elimination of any restrictions after all corrective action is complete. This approval is given by final signature on the completed corrective action report.

SECTION 12

CORRECTIVE ACTION

12.1 OVERVIEW

A major component of TestAmerica's Quality Assurance (QA) Program is the problem investigation and feedback mechanism designed to keep the laboratory staff informed on quality related issues and to provide insight to problem resolution. When nonconforming work or departures from policies and procedures in the quality system or technical operations are identified, the corrective action procedure provides a systematic approach to assess the issues, restore the laboratory's system integrity, and prevent reoccurrence. Corrective actions are documented using Non-Conformance Report (NCR) also know as Job Exception Reports (JER) and Corrective Action Reports (CAR) (refer to Figure 12-1).

12.2 GENERAL

Problems within the quality system or within analytical operations may be discovered in a variety of ways, such as QC sample failures, internal or external audits, proficiency testing (PT) performance, client complaints, staff observation, etc.

The purpose of a corrective action system is to:

- Identify non-conformance events and assign responsibility for investigating.
- Resolve non-conformance events and assign responsibility for any required corrective action.
- Identify systematic problems before they become serious.
- Identify and track client complaints and provide resolution

12.2.1 Non-Conformance Report (NCR) - (previously known as Job Exception Report and Data Quality Review (DQR) - is used to document the following types of corrective actions:

- Deviations from an established procedure or SOP
- QC outside of limits (non matrix related)
- Isolated reporting / calculation errors
- Client complaints
- Project Management concerns regarding specific analytical results
- Discrepancies in materials / goods received vs. manufacturer packing slips.

12.2.2 Corrective Action Report (CAR) - is used to document the following types of corrective actions:

- Questionable trends that are found in the monthly review of JERs.
- Issues found while reviewing JERs that warrant further investigation.
- Questionable trends that are found in the monthly review of DQRs or client complaints

- Internal and External Audit Findings
- Failed or Unacceptable PT results.
- Corrective actions that cross multiple departments in the laboratory.
- Systematic Reporting / Calculation Errors
- Client complaints
- Data recall investigations
- Identified poor process or method performance trends
- Excessive revised reports

This will provide background documentation to enable root cause analysis and preventive action.

12.3 CLOSED LOOP CORRECTIVE ACTION PROCESS

Any employee in the company can initiate a corrective action. There are four main components to a closed-loop corrective action process once an issue has been identified: Cause Analysis, Selection and Implementation of Corrective Actions (both short and long term), Monitoring of the Corrective Actions, and Follow-up.

12.3.1 Cause Analysis

- Upon discovery of a non-conformance event, the event must be defined and documented. A NCR or CAR must be initiated, someone is assigned to investigate the issue and the event is investigated for cause. Table 12-1 provides some general guidelines on determining responsibility for assessment.
- The cause analysis step is the key to the process as a long term corrective action cannot be determined until the cause is determined.
- If the cause is not readily obvious, the Department Manager, Operations Manager, Technical Director, or QA Manager (or QA designee) is consulted.

12.3.2 Selection and Implementation of Corrective Actions

- Where corrective action is needed, the laboratory shall identify potential corrective actions. The action(s) most likely to eliminate the problem and prevent recurrence are selected and implemented. Responsibility for implementation is assigned.
- Corrective actions shall be to a degree appropriate to the magnitude of the problem identified through the cause analysis.
- Whatever corrective action is determined to be appropriate, the laboratory shall document and implement the changes. The NCR or CAR is used for this documentation.

12.3.3 Root Cause Analysis

Root Cause Analysis is a class of problem solving (investigative) methods aimed at identifying the basic or causal factor(s) that underlie variation in performance or the occurrence of a significant failure. The root cause may be buried under seemingly innocuous events, many steps preceding the perceived failure. At first glance, the immediate response is typically directed at a symptom and not the cause. Typically, root cause analysis would be best with three or more incidents to triangulate a weakness.

Systematically analyze and document the Root Causes of the more significant problems that are reported. Identify, track, and implement the corrective actions required to reduce the likelihood of recurrence of significant incidents. Trend the Root Cause data from these incidents to identify Root Causes that, when corrected, can lead to dramatic improvements in performance by eliminating entire classes of problems.

Identify the one event associated with problem and ask why this event occurred. Brainstorm the root causes of failures; for example, by asking why events occurred or conditions existed; and then why the cause occurred 5 consecutive times until you get to the root cause. For each of these sub events or causes, ask why it occurred. Repeat the process for the other events associated with the incident.

Root cause analysis does not mean the investigation is over. Look at technique, or other systems outside the normal indicators. Often creative thinking will find root causes that ordinarily would be missed, and continue to plague the laboratory or operation.

12.3.4 Monitoring of the Corrective Actions

- The Department Manager, Operations Manager and QA Manager are responsible to ensure that the corrective action taken was effective.
- Ineffective actions are documented and re-evaluated until acceptable resolution is achieved. Department Managers and the Operations Manager are accountable to the Laboratory Director to ensure final acceptable resolution is achieved and documented appropriately.
- Each NCR and DQR are entered into a database and each CAR is entered into a spreadsheet for tracking purposes and a monthly summary of all corrective actions is printed out for review to aid in ensuring that the corrective actions have taken effect.
- The QA Manager reviews monthly NCR and CARs for trends. Highlights are included in the QA monthly report (refer to Section 16). If a significant trend develops that adversely affects quality, an audit of the area is performed and corrective action implemented.
- Any out-of-control situations that are not addressed acceptably at the laboratory level may be reported to the Corporate Quality Director by the QA Manager, indicating the nature of the out-of-control situation and problems encountered in solving the situation.

12.3.5 Follow-up Audits

- Follow-up audits may be initiated by the QA Manager and shall be performed as soon as possible when the identification of a nonconformance casts doubt on the laboratory's compliance with its own policies and procedures, or on its compliance with state or federal requirements.
- These audits often follow the implementation of the corrective actions to verify effectiveness. An additional audit would only be necessary when a critical issue or risk to business is discovered.
- Also refer to Section 15.1.4, Special Audits)

12.4 TECHNICAL CORRECTIVE ACTIONS

In addition to providing acceptance criteria and specific protocols for technical corrective actions in the method SOPs the laboratory has general procedures to be followed to determine when departures from the documented policies and procedures and quality control have occurred (refer to Section 11). The documentation of these procedures is through the use of a NCR or CAR.

Table 12-1 includes examples of general technical corrective actions. For specific criteria and corrective actions refer to the analytical methods or specific method SOPs. The laboratory may also maintain Work Instructions on these items that are available upon request.

Table 12-1 provides some general guidelines for identifying the individual(s) responsible for assessing each QC type and initiating corrective action. The table also provides general guidance on how a data set should be treated if associated QC measurements are unacceptable. Specific procedures are included in Method SOPs, work instructions, QAM Sections 19 and 20. All corrective actions are reviewed monthly at a minimum by the QA Manager and highlights are included in the QA monthly report.

To the extent possible, samples shall be reported only if all quality control measures are acceptable. If the deficiency does not impair the usability of the results, data will be reported with an appropriate data qualifier and/or the deficiency will be noted in the case narrative. Where sample results may be impaired, the Project Manager is notified by an NCR and appropriate corrective action (e.g., reanalysis) is taken and documented.

12.5 BASIC CORRECTIONS

When mistakes occur in records, each mistake shall be crossed-out, not obliterated (e.g. no white-out), and the correct value entered alongside. All such corrections shall be initialed (or signed) and dated by the person making the correction. In the case of records stored electronically, the original "uncorrected" file must be maintained intact and a second "corrected" file is created.

This same process applies to adding additional information to a record. All additions made later than the initial must also be initialed (or signed) and dated.

When corrections are due to reasons other than obvious transcription errors, the reason for the corrections (or additions) shall also be documented.

Figure 12-1.
Example – Corrective Action Notice

TestAmerica Buffalo

Corrective Action Summary

#	Source	Type	Audit Organization	Dept.	Method	Repeat Finding?	Category	Finding, Deficiency, Area Needing Improvement or Recommended Action	Laboratory Investigation Summary	Root Cause of Deficiency	Laboratory Corrective Action Plan	Resp. Person	Date Opened	Response Due	CA Due Date	Date Last Closed	Follow up notes	30-Jun-13	Follow-up Closed By
1																			
2																			
3																			
4																			
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Table 12-1.

Example – General Corrective Action Procedures

QC Activity *(Individual Responsible for Initiation/Assessment)*	Acceptance Criteria	Recommended Corrective Action
Initial Instrument Blank *(Analyst)*	- Instrument response < MDL.	- Prepare another blank. - If same response, determine cause of contamination: reagents, environment, instrument equipment failure, etc.
Initial Calibration Standards *(Analyst, Department Manager)*	- Correlation coefficient > 0.99 or standard concentration value. - % Recovery within acceptance range. - See details in Method SOP.	- Reanalyze standards. - If still unacceptable, remake standards and recalibrate instrument.
Independent Calibration Verification (Second Source) *(Analyst, Department Manager)*	- % Recovery within control limits.	- Remake and reanalyze standard. - If still unacceptable, then remake calibration standards or use new primary standards and recalibrate instrument.
Continuing Calibration Standards *(Analyst, Data Reviewer)*	% Recovery within control limits.	- Reanalyze standard. - If still unacceptable, then recalibrate and rerun affected samples.
Matrix Spike / Matrix Spike Duplicate (MS/MSD) *(Analyst, Data Reviewer)*	- % Recovery within limits documented in LIMs.	- If the acceptance criteria for duplicates or matrix spikes are not met because of matrix interferences, the acceptance of the analytical batch is determined by the validity of the LCS. - If the LCS is within acceptable limits the batch is acceptable. - The results of the duplicates, matrix spikes and the LCS are reported with the data set. -For matrix spike or duplicate results outside criteria the data for the data for that sample shall be reported with qualifiers.

QC Activity *(Individual Responsible for Initiation/Assessment)*	Acceptance Criteria	Recommended Corrective Action
Laboratory Control Sample (LCS) *(Analyst, Data Reviewer)*	- % Recovery within limits specified in LIMs.	- Batch must be re-prepared and re-analyzed. This includes any allowable marginal exceedance. When not using marginal exceedances, the following exceptions apply: 1) when the acceptance criteria for the positive control are exceeded high (i.e., high bias) and there are associated samples that are non-detects, then those non-detects may be reported with data qualifying codes; 2) When the acceptance criteria for the positive control are exceeded low (i.e., low bias), those sample results may be reported if they exceed a maximum regulatory limit/decision level with data qualifying codes. **Note:** If there is insufficient sample or the holding time cannot be met, contact client and report with flags.
Surrogates *(Analyst, Data Reviewer)*	- % Recovery within limits of method or within three standard deviations of the historical mean.	- Individual sample must be repeated. Place comment in LIMS. - Surrogate results outside criteria shall be reported with qualifiers.
Method Blank (MB) *(Analyst, Data Reviewer)*	< Reporting Limit [1]	- Reanalyze blank. - If still positive, determine source of contamination. If necessary, reprocess (i.e. digest or extract) entire sample batch. Report blank results. - Qualify the result(s) if the concentration of a targeted analyte in the MB is at or above the reporting limit AND is > 1/10 of the amount measured in the sample.
Proficiency Testing (PT) Samples *(QA Manager, Department Manager)*	- Criteria supplied by PT Supplier.	- Any failures or warnings must be investigated for cause. Failures may result in the need to repeat a PT sample to show the problem is corrected.

QC Activity *(Individual Responsible for Initiation/Assessment)*	Acceptance Criteria	Recommended Corrective Action
Internal / External Audits *(QA Manager, Department Manager, Operations Manager, Technical Director, Laboratory Director)*	- Defined in Quality System documentation such as SOPs, QAM, etc.	- Non-conformances must be investigated through CAR system and necessary corrections must be made.
Reporting / Calculation Errors *(Depends on issue – possible individuals include: Analysts, Data Reviewers, Project Managers, Department Manager, QA Manager, Corporate QA, Corporate Management)*	- SOP CW-L-S-002, Internal Investigation of Potential Data Discrepancies and Determination for Data Recall.	- Corrective action is determined by type of error. Follow the procedures in SOP CW-L-S-002.
Client Complaints *(Project Managers, Lab Director, Sales and Marketing, QA Manager)*	-	- Corrective action is determined by the type of complaint. For example, a complaint regarding an incorrect address on a report will result in the report being corrected and then follow-up must be performed on the reasons the address was incorrect (e.g., database needs to be updated).
QA Monthly Report (Refer to Section 17 for an example) *(QA Manager, Lab Director, Operations Manager Department Managers)*	- QAM, SOPs.	- Corrective action is determined by the type of issue. For example, CARs for the month are reviewed and possible trends are investigated.
Health and Safety Violation *(EH&S Coordinator, Lab Director, Operations Manager, Department Manager)*	- Environmental Health and Safety (EHS) Manual.	- Non-conformance is investigated and corrected through EH&S office.

Note:

1. Except as noted below for certain compounds, the method blank should be below the reporting limit. Concentrations up to five times the reporting limit will be allowed for the ubiquitous laboratory and reagent contaminants: methylene chloride, acetone, 2-butanone and phthalates provided they appear in similar levels in the reagent blank and samples. This allowance presumes that the reporting limit is significantly below any regulatory limit to which the data are to be compared and that blank subtraction will not occur. For benzene and ethylene dibromide (EDB) and the other analytes for which regulatory limits are extremely close to the detection limit, the method blank must be below the method detection limit.

SECTION 13.0

PREVENTIVE ACTION / IMPROVEMENT

13.1 OVERVIEW

The laboratory's preventive action programs improve, or eliminate potential causes of nonconforming product and/or nonconformance to the quality system. This preventive action process is a proactive and continuous process of improvement activities that can be initiated through feedback from clients, employees, business providers, and affiliates. The QA Department has the overall responsibility to ensure that the preventive action process is in place, and that relevant information on actions is submitted for management review.

Dedicating resources to an effective preventive action system emphasizes the laboratory's commitment to its Quality Program. It is beneficial to identify and address negative trends before they develop into complaints, problems and corrective actions. Additionally, customer service and client satisfaction can be improved through continuous improvements to laboratory systems.

Opportunities for improvement may be discovered during management reviews, the monthly QA Metrics Report, evaluation of internal or external audits, results & evaluations of proficiency testing (PT) performance, data analysis & review processing operations, client complaints, staff observation, etc.

The monthly Management Systems Metrics Report shows performance indicators in all areas of the laboratory and quality system. These areas include revised reports, corrective actions, audit findings, internal auditing and data authenticity audits, client complaints, PT samples, holding time violations, SOPs, ethics training, etc. These metrics are used in evaluating the management and quality system performance on an ongoing basis and provide a tool for identifying areas for improvement.

The laboratory's Corrective Action process is integral to implementation of preventive actions. A critical piece of the corrective action process is the implementation of actions to prevent further occurrence of a non-compliance event. Historical review of corrective action provides a valuable mechanism for identifying preventive action opportunities.

13.1.1 The following elements are part of a preventive action system:

- Identification of an opportunity for preventive action.
- Process for the preventive action.
- Define the measurements of the effectiveness of the process once undertaken.
- Execution of the preventive action.
- Evaluation of the plan using the defined measurements.
- Verification of the effectiveness of the preventive action.

- Close-Out by documenting any permanent changes to the Quality System as a result of the Preventive Action. Documentation of Preventive Action is incorporated into the monthly QA reports, corrective action process and management review

13.1.2 Any Preventive Actions undertaken or attempted shall be taken into account during the Annual Management Systems Review (Section 17). A highly detailed report is not required; however a summary of success and failure within the preventive action program is sufficient to provide management with a measurement for evaluation.

13.2 MANAGEMENT OF CHANGE

The Management of Change process is designed to manage significant events and changes that occur within the laboratory. Through these procedures, the potential risks inherent with a new event or change are identified and evaluated. The risks are minimized or eliminated through pre-planning and the development of preventive measures. The types of changes covered under this system include: Facility Changes, Major Accreditation Changes, Addition or Deletion to Division's Capabilities or Instrumentation, Key Personnel Changes, Laboratory Information Management System (LIMS) changes.

SECTION 14.0

CONTROL OF RECORDS

The laboratory maintains a records management system appropriate to its needs and that complies with applicable standards or regulations as required. The system produces unequivocal, accurate records that document all laboratory activities. The laboratory retains all original observations, calculations and derived data, calibration records and a copy of the analytical report for a minimum of five years after it has been issued. TestAmerica Buffalo SOP BF-GP-015, Record Storage and Retention specify additional storage, archiving and retention procedures.

14.1 OVERVIEW

The laboratory has established procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records. A record index is listed in Table 14-1. Quality records are maintained by the QA department in a database which is backed up as past of the regular laboratory backup. Records are of two types; either electronic or hard copy paper formats depending on whether the record is computer or hand generated (some records may be in both formats). Hardcopy technical records are maintained by the Data Deliverables Manager while electronic technical records are maintained by the IT Administrator.

Table 14-1. Record Index[1]

	Record Types [1]:	Retention Time:
Technical Records	- Raw Data - Logbooks[2] - Standards - Certificates - Analytical Records - MDLs/IDLs/DOCs - Lab Reports	5 Years from analytical report issue*
Official Documents	- Quality Assurance Manual (QAM) - Work Instructions - Policies - Policy Memorandums - SOPs - Manuals	5 Years from document retirement date*
QA Records	- Internal & External Audits/Responses - Certifications - Corrective/Preventive Actions - Management Reviews - Method & Software Validation / Verification Data - Data Investigation	5 Years from archival* **Data Investigation:** 5 years or the life of the affected raw data storage whichever is greater (beyond 5 years if ongoing project or pending investigation)

	Record Types [1]:	Retention Time:
Project Records	- Sample Receipt & COC Documentation - Contracts and Amendments - Correspondence - QAPP -SAP - Telephone Logbooks - Lab Reports	5 Years from analytical report issue*
Administrative Records	Finance and Accounting	10 years
	EH&S Manual, Permits	7 years
	Disposal Records	Indefinitely
	Employee Handbook	Indefinitely
	Personnel files, Employee Signature & Initials, Administrative Training Records (e.g., Ethics)	All HR docs have different retention times: Refer to HR Manual
	Administrative Policies Technical Training Records	7 years

[1] Record Types encompass hardcopy and electronic records.
[2] Examples of Logbook types: Maintenance, Instrument Run, Preparation (standard and samples), Standard and Reagent Receipt, Archiving, Balance Calibration, Temperature (hardcopy or electronic records).
* Exceptions listed in Table 14-2.

14.1.1 All records are stored and retained in such a way that they are secure and readily retrievable at the laboratory facility or an offsite location that provides a suitable environment to prevent damage or deterioration and to prevent loss. Retention of records is maintained on-site at the laboratory for at least 3 months after their generation and moved offsite for the remainder of the required storage time. Records are maintained for a minimum of five years unless other wise specified by a client or regulatory requirement. All records shall be protected against fire, theft, loss, environmental deterioration and vermin. In the case of electronic records, electronic or magnetic sources, storage media are protected from deterioration caused by magnetic fields and/or electronic deterioration. Access to the data is limited to laboratory and company employees and shall be documented with an access log.

Records archived off-site are stored in a secure location where a record is maintained of any entry into the storage facility. Whether on-site or off-site storage is used, logs are maintained in each storage box to note removal and return of records. Retention of records are maintained on-site at the laboratory for at least 1 year after their generation and moved offsite for the remainder of the required storage time. Records are maintained for a minimum of five years unless otherwise specified by a client or regulatory requirement.

For raw data and project records, record retention shall be calculated from the date the project report is issued. For other records, such as Controlled Documents, QA, or Administrative Records, the retention time is calculated from the date the record is formally retired. Records

related to the programs listed in Table 14-2 have lengthier retention requirements and are subject to the requirements in Section 14.1.3.

14.1.2 Programs with Longer Retention Requirements

Some regulatory programs have longer record retention requirements than the standard record retention time. These are detailed in Table 14-2 with their retention requirements. In these cases, the longer retention requirement is enacted. If special instructions exist such that client data cannot be destroyed prior to notification of the client, the container or box containing that data is marked as to who to contact for authorization prior to destroying the data. Specific Information related to archival of data for greater than 5 years may be found in TestAmerica Buffalo SOP BF-GP-015.

Table 14-2. Special Record Retention Requirements

Program	[1]Retention Requirement
Drinking Water – All States	5 years (project records) 10 years-Radiochemistry (project records)
Drinking Water Lead and Copper Rule	12 years (project records)
Commonwealth of MA – All environmental data 310 CMR 42.14	10 years
FIFRA – 40 CFR Part 160	Retain for life of research or marketing permit for pesticides regulated by EPA
Housing and Urban Development (HUD) Environmental Lead Testing	10 years
Alaska	10 years
Louisiana – All	10 years
Michigan Department of Environmental Quality – all environmental data	10 years
Navy Facilities Engineering Service Center (NFESC)	5 years
NY Potable Water NYCRR Part 55-2	10 years
TSCA - 40 CFR Part 792	10 years after publication of final test rule or negotiated test agreement

[1]Note: Extended retention requirements are noted with the archive documents or addressed in TestAmerica Buffalo facility-specific records retention procedure BF-GP-015.

14.1.3 All records are held secure and in confidence. Records maintained at the laboratory are located in the locked on-site storage room. Records archived off-site are stored in a secure location. Access to the off-site storage facility is controlled and logs are maintained for the documented removal/return of records

14.1.4 The laboratory has procedures to protect and back-up records stored electronically

and to prevent unauthorized access to or amendment of these records. All analytical data is maintained as hard copy or in a secure readable electronic format. TestAmerica Buffalo SOP BF-GP-015 also contains specific information for archival of scanned data.

14.1.5 The record keeping system allows for historical reconstruction of all laboratory activities that produced the analytical data, as well as rapid recovery of historical data (records stored off site should be accessible within 2 business days of a request for such records). The history of the sample from when the laboratory took possession of the samples must be readily understood through the documentation. This shall include inter-laboratory transfers of samples and/or extracts.

- The records include the identity of personnel involved in sampling, sample receipt, preparation, or testing. All analytical work contains the initials (at least) of the personnel involved. The laboratory's copy of the chain of custody is stored with the project file and the Job Number in TALS. The chain of custody would indicate the name of the sampler. If any sampling notes are provided with a work order, they are kept with this package.

- All information relating to the laboratory facilities equipment, analytical test methods, and related laboratory activities, such as sample receipt, sample preparation, or data verification are documented.

- The record keeping system facilitates the retrieval of all working files and archived records for inspection and verification purposes (e.g., set format for naming electronic files, set format for what is included with a given analytical data set. Instrument data is stored sequentially by instrument. Calibration data for a given sequence are maintained in the order of the analysis. Sample data are stored on a job number basis in the project file or as part of the daily batch or sequence. Run logs are maintained for each instrument or method; a copy of each day's run log or instrument sequence is stored with the data to aid in re-constructing an analytical sequence. Where an analysis is performed without an instrument, bound logbooks, bench sheets or excel spreadsheets are used to record and file data. Standard and reagent information is recorded in logbooks or on the raw data for each method as required.

- Changes to hardcopy records shall follow the procedures outlined in Section 13 and 20. Changes to electronic records in LIMS or instrument data are recorded in audit trails.

- The reason for a signature or initials on a document is clearly indicated in the records such as "sampled by," "prepared by," "reviewed by", or "analyzed by".

- All generated data except those that are generated by automated data collection systems, are recorded directly, promptly and legibly in permanent dark ink.

- Hard copy data may be scanned into PDF format for record storage as long as the scanning process can be verified in order to ensure that no data is lost and the data files and storage media must be tested to verify the laboratory's ability to retrieve the information prior to the destruction of the hard copy that was scanned. The procedure for this verification can be found in TestAmerica SOP BF-GP-015.

- Also refer to Section 19.14.1 'Computer and Electronic Data Related Requirements'.

14.2 TECHNICAL AND ANALYTICAL RECORDS

14.2.1 The laboratory retains records of original observations, derived data and sufficient information to establish an audit trail, calibration records, staff records and a copy of each analytical report issued, for a minimum of five years unless otherwise specified by a client or regulatory requirement. The records for each analysis shall contain sufficient information to enable the analysis to be repeated under conditions as close as possible to the original. The records shall include the identity of laboratory personnel responsible for the sampling, performance of each analysis and reviewing of results.

14.2.2 Observations, data and calculations are recorded real-time.

14.2.3 Changes to hardcopy records shall follow the procedures outlined in Section 13 and 20. Changes to electronic records in LIMS or instrument data are recorded in audit trails.
The essential information to be associated with analysis, such as strip charts, tabular printouts, computer data files, analytical notebooks, and run logs, include:

- laboratory sample ID code;
- Date of analysis; time of analysis is also required if the holding time is seventy-two (72) hours or less, or when time critical steps are included in the analysis (e.g., drying times, incubations, etc.); instrumental analyses have the date and time of analysis recorded as part of their general operations. Where a time critical step exists in an analysis, location for such a time is included as part of the documentation in a specific logbook or on a bench sheet.
- Instrumentation identification and instrument operating conditions/parameters. Operating conditions/parameters are typically recorded in the method specific SOPs, in the instrument method detail records or the instrument maintenance logs where available.
- analysis type;
- all manual calculations and manual integrations;
- analyst's or operator's initials/signature;
- sample preparation including cleanup, separation protocols, incubation periods, ID codes, volumes, weights, instrument printouts, meter readings, temperatures, calculations, reagents;
- test results;
- standard and reagent origin, receipt, preparation, and use;
- calibration criteria, frequency and acceptance criteria;
- data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions;
- quality control protocols and assessment;
- electronic data security, software documentation and verification, software and hardware

audits, backups, and records of any changes to automated data entries.

- Method performance criteria including expected quality control requirements. These are indicated both in the LIMS and on specific analytical report formats.

14.3 LABORATORY SUPPORT ACTIVITIES

In addition to documenting all the above-mentioned activities, the following are retained QA records and project records (previous discussions in this section relate where and how these data are stored):

- all original raw data, whether hard copy or electronic, for calibrations, samples and quality control measures, including analysts' work sheets and data output records (chromatograms, strip charts, and other instrument response readout records);
- a written description or reference to the specific test method used which includes a description of the specific computational steps used to translate parametric observations into a reportable analytical value;
- copies of final reports;
- archived SOPs;
- correspondence relating to laboratory activities for a specific project;
- all corrective action reports, audits and audit responses;
- proficiency test results and raw data; and
- results of data review, verification, and crosschecking procedures

14.3.1 Sample Handling Records

Records of all procedures to which a sample is subjected while in the possession of the laboratory are maintained. These include but are not limited to records pertaining to:

- sample preservation including appropriateness of sample container and compliance with holding time requirement;
- sample identification, receipt, acceptance or rejection and login;
- sample storage and tracking including shipping receipts, sample transmittal / COC forms; and
- Procedures for the receipt and retention of samples, including all provisions necessary to protect the integrity of samples.

14.4 ADMINISTRATIVE RECORDS

The laboratory also maintains the administrative records in either electronic or hard copy form. Refer to Table 14-1.

14.5 RECORDS MANAGEMENT, STORAGE AND DISPOSAL

14.5.1 All records (including those pertaining to test equipment), certificates and reports are safely stored, held secure and in confidence to the client. Certification related records are available upon request.

14.5.2 All information necessary for the historical reconstruction of data is maintained by the laboratory. Records that are stored only on electronic media must be supported by the hardware and software necessary for their retrieval.

14.5.3 Records that are stored or generated by computers or personal computers have hard copy, write-protected backup copies, or an electronic audit trail controlling access.

14.5.4 The laboratory has a record management system (also known as document control) for control of laboratory notebooks, instrument logbooks, standards logbooks, and records for data reduction, validation, storage and reporting. Laboratory notebooks are issued on a per instrument or analysis basis, and are numbered sequentially as they are issued. No instrument or analysis has more than one active notebook at a time, so all data are recorded sequentially within a series of sequential notebooks. Bench sheets and raw data sequence files are filed sequentially by date. Standard and reagent information is maintained in LIMS and logbooks which are maintained on a departmental basis and are numbered sequentially as they are issued or as they are archived by QA.

14.5.5 Records are considered archived when noted as such in the records management system (also known as document control). Access to archived hard-copy information is documented with an access log and in/out records is used to note data that is removed and returned.

14.5.6 Transfer of Ownership

In the event that the laboratory transfers ownership or goes out of business, the laboratory shall ensure that the records are maintained or transferred according to client's instructions. Upon ownership transfer, record retention requirements shall be addressed in the ownership transfer agreement and the responsibility for maintaining archives is clearly established. In addition, in cases of bankruptcy, appropriate regulatory and state legal requirements concerning laboratory records must be followed. In the event of the closure of the laboratory, all records will revert to the control of the corporate headquarters. Should the entire company cease to exist, as much notice as possible will be given to clients and the accrediting bodies who have worked with the laboratory during the previous 5 years of such action.

14.5.7 Records Disposal

14.5.7.1 Records are removed from the archive and destroyed after 5 years unless otherwise specified by a client or regulatory requirement. On a project specific or program

basis, clients may need to be notified prior to record destruction. Records are destroyed in a manner that ensures their confidentiality such as shredding, mutilation or incineration. (Refer to Tables 14-1 and 14-2).

14.5.7.2 Electronic copies of records must be destroyed by erasure or physically damaging off-line storage media so no records can be read.

14.5.7.3 If a third party records Management Company is hired to dispose of records, a "Certificate of Destruction" is required.

SECTION 15

AUDITS

15.1 INTERNAL AUDITS

Internal audits are performed to verify that laboratory operations comply with the requirements of the lab's quality system and with the external quality programs under which the laboratory operates. Audits are planned and organized by the QA staff. Personnel conducting the audits should be independent of the area being evaluated. Auditors will have sufficient authority, access to work areas, and organizational freedom necessary to observe all activities affecting quality and to report the assessments to laboratory management and when requested to corporate management.

Audits are conducted and documented as described in the TestAmerica Corporate SOP on performing Internal Auditing, SOP No. CA-Q-S-004. The types and frequency of routine internal audits are described in Table 15-1. Special or ad hoc assessments may be conducted as needed under the direction of the QA staff.

Table 15-1. Types of Internal Audits and Frequency

Description	Performed by	Frequency
Quality Systems Audits	QA Department, QA approved designee or Corporate QA	All areas of the laboratory annually
Method Audits *	Joint responsibility: a) QA Manager or designee b) Technical Manager or Designee (Refer to CA-Q-S-004)	Methods Audits Frequency: 50% of methods annually
Special	QA Department or Designee	Surveillance or spot checks performed as needed to monitor specific issues
Performance Testing	Coordinated by Corporate QA	Two successful per year for each TNI -NELAC field of testing or as dictated by regulatory requirements

* = all methods receive a QA Technical Audit or an SOP Method Compliance Audit annually.

15.1.1 Annual Quality Systems Audit

An annual quality systems audit is required to ensure compliance to analytical methods and SOPs, TestAmerica's Data Integrity and Ethics Policies, NELAC quality systems client and state requirements, and the effectiveness of the internal controls of the analytical process, including but not limited to data review, quality controls, preventive action and corrective action.

The completeness of earlier corrective actions is assessed for effectiveness & sustainability. The audit is divided into sections for each operating or support area of the lab, and each section is comprehensive for a given area. The area audits may be performed on a rotating schedule throughout the year to ensure adequate coverage of all areas. This schedule may change as situations in the laboratory warrant.

15.1.2 QA Technical Audits

QA technical audits are based on client projects, associated sample delivery groups, and the methods performed. Reported results are compared to raw data to verify the authenticity of results. The validity of calibrations and QC results are compared to data qualifiers, footnotes, and case narratives. Documentation is assessed by examining run logs and records of manual integrations. Manual calculations are checked. Where possible, Chrom AuditMiner is used to identify unusual manipulations of the data deserving closer scrutiny. QA technical audits will include all methods within a two-year period.

15.1.3 SOP Method Compliance

Compliance of all SOPs with the source methods and compliance of the operational groups with the SOPs will be assessed by the Technical Director or qualified designee at least every two years. It is also recommended that the work of each newly hired analyst assessed within 3 months of working independently, (e.g., completion of method IDOC). In addition, as analysts add methods to their capabilities, (new IDOC) reviews of the analyst work products will be performed within 3 months of completing the documented training.

15.1.4 Special Audits

Special audits are conducted on an as needed basis, generally as a follow up to specific issues such as client complaints, corrective actions, PT results, data audits, system audits, validation comments, regulatory audits or suspected ethical improprieties. Special audits are focused on a specific issue, and report format, distribution, and timeframes are designed to address the nature of the issue.

15.1.5 Performance Testing

The laboratory participates semi-annually in performance audits conducted through the analysis of PT samples provided by a third party. The laboratory generally participates in the following types of PT studies: Drinking Water, Nonpotable Water, Soil, and Air.

It is TestAmerica's policy that PT samples be treated as typical samples in the production process. Furthermore, where PT samples present special or unique problems, in the regular production process they may need to be treated differently, as would any special or unique request submitted by any client. The QA Manager must be consulted and in agreement with any decisions made to treat a PT sample differently due to some special circumstance.

Written responses to unacceptable PT results are required. In some cases it may be necessary for blind QC samples to be submitted to the laboratory to show a return to control.

15.2 EXTERNAL AUDITS

External audits are performed when certifying agencies or clients conduct on-site inspections or submit performance testing samples for analysis. It is TestAmerica's policy to cooperate fully with regulatory authorities and clients. The laboratory makes every effort to provide the auditors with access to personnel, documentation, and assistance. Laboratory supervisors are responsible for providing corrective actions to the QA Manager who coordinates the response for any deficiencies discovered during an external audit. Audit responses are due in the time allotted by the client or agency performing the audit. When requested, a copy of the audit report and the labs corrective action plan will be forwarded to Corporate Quality.

The laboratory cooperates with clients and their representatives to monitor the laboratory's performance in relation to work performed for the client. The client may only view data and systems related directly to the client's work. All efforts are made to keep other client information confidential.

15.2.1 Confidential Business Information (CBI) Considerations

During on-site audits, auditors may come into possession of information claimed as business confidential. A business confidentiality claim is defined as "a claim or allegation that business information is entitled to confidential treatment for reasons of business confidentiality or a request for a determination that such information is entitled to such treatment." When information is claimed as business confidential, the laboratory must place on (or attach to) the information at the time it is submitted to the auditor, a cover sheet, stamped or typed legend or other suitable form of notice, employing language such as "trade secret", "proprietary" or "company confidential". Confidential portions of documents otherwise non-confidential must be clearly identified. CBI may be purged of references to client identity by the responsible laboratory official at the time of removal from the laboratory. However, sample identifiers may not be obscured from the information. Additional information regarding CBI can be found in within the 2009 TNI standards.

15.3 AUDIT FINDINGS

Audit findings are documented using the corrective action process and database. The laboratory's corrective action responses for both types of audits may include action plans that could not be completed within a predefined timeframe. In these instances, a completion date must set and agreed to by operations management and the QA Manager.

Developing and implementing corrective actions to findings is the responsibility of the Department Manager where the finding originated. Findings that are not corrected by specified due dates are reported monthly to management in the QA monthly report. . When requested, a copy of the audit report and the labs corrective action plan will be forwarded to Corporate Quality.

If any audit finding casts doubt on the effectiveness of the operations or on the correctness or validity of the laboratory's test results, the laboratory shall take timely corrective action, and shall notify clients in writing if the investigations show that the laboratory results have been

affected. Once corrective action is implemented, a follow-up audit is scheduled to ensure that the problem has been corrected.

Clients must be notified promptly in writing, of any event such as the identification of defective measuring or test equipment that casts doubt on the validity of results given in any test report or amendment to a test report. The investigation must begin within 24-hours of discovery of the problem and all efforts are made to notify the client within two weeks after the completion of the investigation.

SECTION 16

MANAGEMENT REVIEWS

16.1 QUALITY ASSURANCE REPORT

A comprehensive QA Report shall be prepared each month by the laboratory's QA Department and forwarded to the Laboratory Director for review and comments. The final report shall be submitted to the Operation Manager as well as the appropriate Quality Director and General Manager. All aspects of the QA system are reviewed to evaluate the suitability of policies and procedures. During the course of the year, the Laboratory Director, General Manager or Corporate QA may request that additional information be added to the report.

On a monthly basis, Corporate QA compiles information from all the monthly laboratory reports. The Corporate Quality Director prepares a report that includes a compilation of all metrics and notable information and concerns regarding the QA programs within the laboratories. The report also includes a listing of new regulations that may potentially impact the laboratories. This report is presented to the Senior Management Team and General Managers.

16.2 ANNUAL MANAGEMENT REVIEW

The senior lab management team (Laboratory Director, Technical Director, Operations Manager, Customer Service Manager, and QA Manager) conducts a review annually of its quality systems and LIMS to ensure its continuing suitability and effectiveness in meeting client and regulatory requirements and to introduce any necessary changes or improvements. It will also provide a platform for defining goals, objectives and action items that feed into the laboratory planning system. Corporate Operations and Corporate QA personnel may be included in this meeting at the discretion of the Laboratory Director. The LIMS review consists of examining any audits, complaints or concerns that have been raised through the year that are related to the LIMS. The laboratory will summarize any critical findings that can not be solved by the lab and report them to Corporate IT.

This management systems review (Corporate SOP No. CA-Q-S-008 & Work Instruction No. CA-Q-WI-020) uses information generated during the preceding year to assess the "big picture" by ensuring that routine actions taken and reviewed on a monthly basis are not components of larger systematic concerns. The monthly review should keep the quality systems current and effective; therefore, the annual review is a formal senior management process to review specific existing documentation. Significant issues from the following documentation are compiled or summarized by the QA Manager prior to the review meeting:

- Matters arising from the previous annual review.
- Prior Monthly QA Reports issues.
- Laboratory QA Metrics.
- Review of report reissue requests.
- Review of client feedback and complaints.

- Issues arising from any prior management or staff meetings.
- Minutes from prior senior lab management meetings. Issues that may be raised from these meetings include:
  - Adequacy of staff, equipment and facility resources.
  - Adequacy of policies and procedures.
  - Future plans for resources and testing capability and capacity.
- The annual internal double blind PT program sample performance (if performed),
- Compliance to the Ethics Policy and Data Integrity Plan. Including any evidence/incidents of inappropriate actions or vulnerabilities related to data Integrity.

A report is generated by the QA Manager and management. The report is distributed to the appropriate General Manager and the Quality Director. The report includes, but is not limited to:

- The date of the review and the names and titles of participants.
- A reference to the existing data quality related documents and topics that were reviewed.
- Quality system or operational changes or improvements that will be made as a result of the review [e.g., an implementation schedule including assigned responsibilities for the changes.

Changes to the quality systems requiring update to the laboratory QA Manual shall be included in the next revision of the QA Manual.

16.3 POTENTIAL INTEGRITY RELATED MANAGERIAL REVIEWS

Potential integrity issues (data or business related) must be handled and reviewed in a confidential manner until such time as a follow-up evaluation, full investigation, or other appropriate actions have been completed and issues clarified. The TestAmerica Corporate Data Investigation/ Recall SOP shall be followed (SOP No. CW-L-S-002). All investigations that result in finding of inappropriate activity are documented and include any disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients.

TestAmerica's CEO, VP of Quality, Technical & Operations Support, General Managers and Quality Directors receive a monthly report from the Corporate Quality Director summarizing any current data integrity or data recall investigations. The General Manager's are also made aware of progress on these issues for their specific labs.

SECTION 17

PERSONNEL

17.1 OVERVIEW

The laboratory's management believes that its highly qualified and professional staff is the single most important aspect in assuring a high level of data quality and service. The staff consists of professionals and support personnel as outlined in the organization chart in Figure 4-1.

All personnel must demonstrate competence in the areas where they have responsibility. Any staff that is undergoing training shall have appropriate supervision until they have demonstrated their ability to perform their job function on their own. Staff shall be qualified for their tasks based on appropriate education, training, experience and/or demonstrated skills as required.

The laboratory employs sufficient personnel with the necessary education, training, technical knowledge and experience for their assigned responsibilities.

All personnel are responsible for complying with all QA/QC requirements that pertain to the laboratory and their area of responsibility. Each staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of their particular area of responsibility. Technical staff must also have a general knowledge of lab operations, test methods, QA/QC procedures and records management.

Laboratory management is responsible for formulating goals for lab staff with respect to education, training and skills and ensuring that the laboratory has a policy and procedures for identifying training needs and providing training of personnel. The training shall be relevant to the present and anticipated responsibilities of the lab staff.

The laboratory only uses personnel that are employed by or under contract to, the laboratory. Contracted personnel, when used, must meet competency standards of the laboratory and work in accordance to the laboratory's quality system.

17.2 EDUCATION AND EXPERIENCE REQUIREMENTS FOR TECHNICAL PERSONNEL

The laboratory makes every effort to hire analytical staff that possesses a college degree (AA, BA, BS) in an applied science with some chemistry in the curriculum. Exceptions can be made based upon the individual's experience and ability to learn. Selection of qualified candidates for laboratory employment begins with documentation of minimum education, training, and experience prerequisites needed to perform the prescribed task. Minimum education and training requirements for TestAmerica employees are outlined in job descriptions and are generally summarized for analytical staff in the table below.

The laboratory maintains job descriptions for all personnel who manage, perform or verify work affecting the quality of the environmental testing the laboratory performs. Job Descriptions are

located in the TestAmerica Buffalo Human Resource office (Also see Section 4 for position descriptions/responsibilities).

Experience and specialized training are occasionally accepted in lieu of a college degree (basic lab skills such as using a balance, pipette, quantitation techniques, etc. are also considered).

As a general rule for analytical staff:

Specialty	Education	Experience
Extractions, Digestions, some electrode methods (pH, DO, Redox, etc.), or Titrimetric and Gravimetric Analyses	H.S. Diploma	On the job training (OJT)
CVAA, Single component or short list Chromatography (e.g., Fuels, BTEX-GC, IC)	A college degree in an applied science or 2 years of college and at least 1 year of college chemistry	Or 2 years prior analytical experience is required
ICP, ICPMS, Long List or complex chromatography (e.g., Pesticides, PCB, Herbicides, HPLC, etc.), GCMS	A college degree in an applied science or 2 years of college chemistry	or 5 years of prior analytical experience
Spectra Interpretation	A college degree in an applied science or 2 years of college chemistry	And 2 years relevant experience Or 5 years of prior analytical experience
Technical Directors/Department Managers – <u>General</u>	Bachelors Degree in an applied science or engineering with 24 semester hours in chemistry An advanced (MS, PhD.) degree may substitute for one year of experience	And 2 years experience in environmental analysis of representative analytes for which they will oversee

When an analyst does not meet these requirements, they can perform a task under the direct supervision of a qualified analyst, peer reviewer or Department Manager, and are considered an analyst in training. The person supervising an analyst in training is accountable for the quality of the analytical data and must review and approve data and associated corrective actions.

17.3 TRAINING

The laboratory is committed to furthering the professional and technical development of employees at all levels.

Orientation to the laboratory's policies and procedures, in-house method training, and employee attendance at outside training courses and conferences all contribute toward employee proficiency. Below are examples of various areas of required employee training:

Required Training	Time Frame	Employee Type
Environmental Health & Safety	Prior to lab work	All
Ethics – New Hires	1 week of hire	All
Ethics - Comprehensive	90 days of hire	All
Data Integrity	30 days of hire	Technical and PMs
Quality Assurance	90 days of hire	All
Ethics – Refresher	Annually	All
Initial Demonstration of Capability (DOC)	Prior to unsupervised method performance	Technical

The laboratory maintains records of relevant authorization/competence, education, professional qualifications, training, skills and experience of technical personnel (including contracted personnel) as well as the date that approval/authorization was given. These records are kept on file at the laboratory. Also refer to "Demonstration of Capability" in Section 19.

The training of technical staff is kept up to date by:

- Each employee must have documentation in their training file that they have read, understood and agreed to follow the most recent version of the laboratory QA Manual and SOPs in their area of responsibility. This documentation is updated as SOPs are updated.
- Documentation from any training courses or workshops on specific equipment, analytical techniques or other relevant topics are maintained in their training file.
- Documentation of proficiency (refer to Section 20).
- An Ethics Agreement signed by each staff member (renewed each year) and evidence of annual ethics training.
- A Confidentiality Agreement signed by each staff member signed at the time of employment.
- The Human Resource office maintains documentation and attestation forms on employment status & records; benefit programs; timekeeping/payroll; and employee conduct (e.g., ethics violations). This information is maintained in the employee's secured personnel file.

Further details of the laboratory's training program are described in TestAmerica Buffalo SOP BF-QA-004, Laboratory Personnel Training.

17.4 DATA INTEGRITY AND ETHICS TRAINING PROGRAM

Establishing and maintaining a high ethical standard is an important element of a Quality System. Ethics and data integrity training is integral to the success of TestAmerica and is provided for each employee at TestAmerica. It is a formal part of the initial employee orientation within 1 week of hire followed by technical data integrity training within 30 days, comprehensive

training within 90 days, and an annual refresher for all employees. Senior management at each facility performs the ethics training for their staff.

In order to ensure that all personnel understand the importance TestAmerica places on maintaining high ethical standards at all times; TestAmerica has established a Corporate Ethics Policy No. CW-L-P-004 and an Ethics Statement. All initial and annual training is documented by signature on the signed Ethics demonstrating that the employee has participated in the training and understands their obligations related to ethical behavior and data integrity.

Violations of this Ethics Policy will not be tolerated. Employees who violate this policy will be subject to disciplinary actions up to and including termination. Criminal violations may also be referred to the Government for prosecution. In addition, such actions could jeopardize TestAmerica's ability to do work on Government contracts, and for that reason, TestAmerica has a Zero Tolerance approach to such violations.

Employees are trained as to the legal and environmental repercussions that result from data misrepresentation. Key topics covered in the presentation include:

- Organizational mission and its relationship to the critical need for honesty and full disclosure in all analytical reporting.
- Ethics Policy
- How and when to report ethical/data integrity issues. Confidential reporting.
- Record keeping.
- Discussion regarding data integrity procedures.
- Specific examples of breaches of ethical behavior (e.g. peak shaving, altering data or computer clocks, improper macros, etc., accepting/offering kickbacks, illegal accounting practices, unfair competition/collusion)
- Internal monitoring. Investigations and data recalls.
- Consequences for infractions including potential for immediate termination, debarment, or criminal prosecution.
- Importance of proper written narration / data qualification by the analyst and project manager with respect to those cases where the data may still be usable but are in one sense or another partially deficient.

Additionally, a data integrity hotline (1-800-736-9407) is maintained by TestAmerica and administered by the Corporate Quality Department.

SECTION 18

ACCOMMODATIONS AND ENVIRONMENTAL CONDITIONS

18.1 OVERVIEW

TestAmerica Buffalo is a 32,000 ft^2 secure laboratory facility with controlled access and designed to accommodate an efficient workflow and to provide a safe and comfortable work environment for employees. All visitors sign in and are escorted by laboratory personnel. Access is controlled by various measures.

The laboratory is equipped with structural safety features. Each employee is familiar with the location, use, and capabilities of general and specialized safety features associated with their workplace. The laboratory provides and requires the use of protective equipment including safety glasses, protective clothing, gloves, etc. OSHA and other regulatory agency guidelines regarding required amounts of bench and fume hood space, lighting, ventilation (temperature and humidity controlled), access, and safety equipment are met or exceeded.

Traffic flow through sample preparation and analysis areas is minimized to reduce the likelihood of contamination. Adequate floor space and bench top area is provided to allow unencumbered sample preparation and analysis space. Sufficient space is also provided for storage of reagents and media, glassware, and portable equipment. Ample space is also provided for refrigerated sample storage before analysis and archival storage of samples after analysis. Laboratory HVAC and deionized water systems are designed to minimize potential trace contaminants.

The laboratory is separated into specific areas for field operations, bottle kit preparation, sample receiving, sample preparation, volatile organic sample analysis, non-volatile organic sample analysis, inorganic sample analysis and administrative functions.

18.2 ENVIRONMENT

Laboratory accommodation, test areas, energy sources, lighting are adequate to facilitate proper performance of tests. The facility is equipped with heating, ventilation, and air conditioning (HVAC) systems appropriate to the needs of environmental testing performed at this laboratory.

The environment in which these activities are undertaken does not invalidate the results or adversely affect the required accuracy of any measurements.

The laboratory provides for the effective monitoring, control and recording of environmental conditions that may affect the results of environmental tests as required by the relevant specifications, methods, and procedures. Such environmental conditions include humidity, voltage, temperature, and vibration levels in the laboratory. Key equipment has been provided with back-up power supply in the event of a power outage.

When any of the method or regulatory required environmental conditions change to a point where they may adversely affect test results, analytical testing will be discontinued until the environmental conditions are returned to the required levels.

Environmental conditions of the facility housing the computer network and LIMS are regulated to protect against raw data loss.

18.3 WORK AREAS

There is effective separation between neighboring areas when the activities therein are incompatible with each other. Examples include:

- Volatile organic chemical handling areas, including sample preparation and waste disposal, and volatile organic chemical analysis areas.

Access to and use of all areas affecting the quality of analytical testing is defined and controlled by secure access to the laboratory building as described below in the Building Security section.

Adequate measures are taken to ensure good housekeeping in the laboratory and to ensure that any contamination does not adversely affect data quality. These measures include regular cleaning to control dirt and dust within the laboratory.

Work areas are available to ensure an unencumbered work area. Work areas include:

- Access and entryways to the laboratory.
- Sample receipt areas.
- Sample storage areas.
- Chemical and waste storage areas.
- Data handling and storage areas.
- Sample processing areas.
- Sample analysis areas.

18.4 FLOOR PLAN

A floor plan can be found in Appendix 1.

18.5 BUILDING SECURITY

Building pass cards and alarm codes are distributed to all facility employees.

Visitors to the laboratory sign in and out in a visitor's logbook. A visitor is defined as any person who visits the laboratory who is not an employee of the laboratory. [The reason for this is that it is important to know who is in the building in case of a safety emergency. The visitors logbook is used to ensure that everyone got out of the building safely.] In addition to signing into the

laboratory, the Environmental, Health and Safety Manual contains requirements for visitors and vendors. There are specific safety forms that must be reviewed and signed.
Visitors (with the exception of company employees) are escorted by laboratory personnel at all times, or the location of the visitor is noted in the visitor's logbook.

SECTION 19.0

TEST METHODS AND METHOD VALIDATION

19.1 OVERVIEW

The laboratory uses methods that are appropriate to meet our clients' requirements and that are within the scope of the laboratory's capabilities. These include sampling, handling, transport, storage and preparation of samples, and, where appropriate, an estimation of the measurement of uncertainty as well as statistical techniques for analysis of environmental data.

Instructions are available in the laboratory for the operation of equipment as well as for the handling and preparation of samples. All instructions, Standard Operating Procedures (SOPs), reference methods and manuals relevant to the working of the laboratory are readily available to all staff. Deviations from published methods are documented (with justification) in the laboratory's approved SOPs. SOPs are submitted to clients for review at their request. Significant deviations from published methods require client approval and regulatory approval where applicable.

19.2 STANDARD OPERATING PROCEDURES (SOPs)

The laboratory maintains SOPs that accurately reflect all phases of the laboratory such as assessing data integrity, corrective actions, handling customer complaints as well as all analytical methods and sampling procedures. The method SOPs are derived from the most recently promulgated/approved, published methods and are specifically adapted to the laboratory facility. Modifications or clarifications to published methods are clearly noted in the SOPs. All SOPs are controlled in the laboratory:

- All SOPs contain a revision number, effective date, and appropriate approval signatures. Controlled copies are available to all staff.
- Procedures for writing an SOP are incorporated by reference to TestAmerica's Corporate SOP CW-Q-S-002, Writing a Standard Operating Procedure (SOP) and Laboratory SOP BF-QA-003, Procedure for Writing, Reviewing and Revising Controlled Quality Documents (QAM, SOP, etc)
- SOPs are reviewed at a minimum of every 2 years (annually for Drinking Water SOPs), and where necessary, revised to ensure continuing suitability and compliance with applicable requirements.

19.3 LABORATORY METHODS MANUAL

For each test method, the laboratory shall have available the published referenced method as well as the laboratory developed SOP.

Note: If more stringent standards or requirements are included in a mandated test method or regulation than those specified in this manual, the laboratory shall demonstrate that such requirements are met. If it is not clear which requirements are more stringent, the standard from the method or regulation is to be followed. Any exceptions or deviations from the referenced methods or regulations are noted in the specific analytical SOP.

The laboratory maintains an SOP Index for both technical and non-technical SOPs. Technical SOPs are maintained to describe a specific test method. Non-technical SOPs are maintained to describe functions and processes not related to a specific test method.

19.4 SELECTION OF METHODS

Since numerous methods and analytical techniques are available, continued communication between the client and laboratory is imperative to assure the correct methods are utilized. Once client methodology requirements are established, this and other pertinent information is summarized by the Project Manager. These mechanisms ensure that the proper analytical methods are applied when the samples arrive for log-in. For non-routine analytical services (e.g., special matrices, non-routine compound lists, etc.), the method of choice is selected based on client needs and available technology. The methods selected should be capable of measuring the specific parameter of interest, in the concentration range of interest, and with the required precision and accuracy.

19.4.1 Sources of Methods

Routine analytical services are performed using standard EPA-approved methodology. In some cases, modification of standard approved methods may be necessary to provide accurate analyses of particularly complex matrices. When the use of specific methods for sample analysis is mandated through project or regulatory requirements, only those methods shall be used.

When clients do not specify the method to be used or methods are not required, the methods used will be clearly validated and documented in an SOP and available to clients and/or the end user of the data.

19.4.1.1 The analytical methods used by the laboratory are those currently accepted and approved by the U. S. EPA and the state or territory from which the samples were collected. Reference methods include:

- *Method 1664, Revision A: N-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM); Non-polar Material) by Extraction and Gravimetry, EPA-821-R-98-002, February 1999*
- *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, US EPA, January 1996.*
- *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, and Appendix A-C; 40 CFR Part 136, USEPA Office of Water. Revised as of July 1, 1995, Appendix A to Part 136 - Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (EPA 600 Series)*
- *Methods for Chemical Analysis of Water and Wastes, EPA 600 (4-79-020), 1983.*
- *Methods for the Determination of Inorganic Substances in Environmental Samples, EPA-600/R-93/100, August 1993.*
- *Methods for the Determination of Metals in Environmental Samples, EPA/600/4-91/010, June 1991. Supplement I: EPA-600/R-94/111, May 1994.*

- *Methods for the Determination of Organic Compounds in Drinking Water, EPA-600/4-88-039, December 1988, Revised, July 1991, Supplement I, EPA-600-4-90-020, July 1990, Supplement II, EPA-600/R-92-129, August 1992. Supplement III EPA/600/R-95/131 - August 1995 (EPA 500 Series) (EPA 500 Series methods)*
- *Technical Notes on Drinking Water Methods, EPA-600/R94-173, October 1994*
- *NIOSH Manual of Analytical Methods, 4th ed., August 1994.*
- *Statement of Work for Inorganics & Organics Analysis, SOM and ISM, current versions, USEPA Contract Laboratory Program Multi-media, Multi-concentration.*
- *Standard Methods for the Examination of Water and Wastewater, 18th/19th /20th / on-line edition; Eaton, A.D. Clesceri, L.S. Greenberg, A.E. Eds; American Water Works Association, Water Pollution Control Federation, American Public Health Association: Washington, D.C.*
- *Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846), Third Edition, September 1986, Final Update I, July 1992, Final Update IIA, August 1993, Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996; Final Update IV, January 2008.*
- *Annual Book of ASTM Standards, American Society for Testing & Materials (ASTM), Philadelphia, PA.*
- *National Status and Trends Program, National Oceanographic and Atmospheric Administration, Volume I-IV, 1985-1994.*
- *Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-R-05-004, January 2005) **(DW labs only)***
- *Code of Federal Regulations (CFR) 40, Parts 136, 141, 172, 173, 178, 179 and 261*
- *New York State DEC Analytical Services Protocol, 2005*
- *New York State DOH Methods Manual*

The laboratory reviews updated versions to all the aforementioned references for adaptation based upon capabilities, instrumentation, etc., and implements them as appropriate. As such, the laboratory strives to perform only the latest versions of each approved method as regulations allow or require.

Other reference procedures for non-routine analyses may include methods established by specific states (e.g., Underground Storage Tank methods), ASTM or equipment manufacturers. Sample type, source, and the governing regulatory agency requiring the analysis will determine the method utilized.

The laboratory shall inform the client when a method proposed by the client may be inappropriate or out of date. After the client has been informed, and they wish to proceed contrary to the laboratory's recommendation, it will be documented.

19.4.2 Demonstration of Capability

Before the laboratory may institute a new method and begin reporting results, the laboratory shall confirm that it can properly operate the method. In general, this demonstration does not test the performance of the method in real world samples, but in an applicable and available

clean matrix sample. If the method is for the testing of analytes that are not conducive to spiking, demonstration of capability may be performed on quality control samples.

19.4.2.1 A demonstration of capability (BF-QA-004) is performed whenever there is a significant change in instrument type (e.g., new instrumentation), method or personnel.

19.4.2.2 The initial demonstration of capability must be thoroughly documented and approved by the Operations Manager and QA Manager prior to independently analyzing client samples. All associated documentation must be retained in accordance with the laboratories archiving procedures.

19.4.2.3 The laboratory must have an approved SOP, demonstrate satisfactory performance, and conduct a method detection limit study (when applicable). There may be other requirements as stated within the published method or regulations (i.e., retention time window study).

Note: In some instances, a situation may arise where a client requests that an unusual analyte be reported using a method where this analyte is not normally reported. If the analyte is being reported for regulatory purposes, the method must meet all procedures outlined within this QA Manual (SOP, MDL, and Demonstration of Capability). If the client states that the information is not for regulatory purposes, the result may be reported as long as the following criteria are met:

- The instrument is calibrated for the analyte to be reported using the criteria for the method and ICV/CCV criteria are met (unless an ICV/CCV is not required by the method or criteria are per project DQOs).
- The laboratory's nominal or default reporting limit (RL) is equal to the quantitation limit (QL), must be at or above the lowest non-zero standard in the calibration curve and must be reliably determined. Project RLs are client specified reporting levels which may be higher than the QL. Results reported below the QL must be qualified as estimated values. Also see Section 19.6.1.3, Relationship of Limit of Detection (LOD) to Quantitation Limit (QL).
- The client request is documented and the lab informs the client of its procedure for working with unusual compounds. The final report must be footnoted: *Reporting Limit based on the low standard of the calibration curve.*

19.4.3 Initial Demonstration of Capability (IDOC) Procedures

Procedures for generation of IDOCs are detailed below and in laboratory SOP BF-QA-004, Laboratory Personnel Training.

19.4.3.1 The spiking standard used must be prepared independently from those used in instrument calibration.

19.4.3.2 The analyte(s) shall be diluted in a volume of clean matrix sufficient to prepare four aliquots at the concentration specified by a method or the laboratory SOP.

19.4.3.3 At least four aliquots shall be prepared (including any applicable clean-up procedures) and analyzed according to the test method (either concurrently or over a period of days).

19.4.3.4 Using all of the results, calculate the mean recovery in the appropriate reporting units and the standard deviations for each parameter of interest.

19.4.3.5 When it is not possible to determine the mean and standard deviations, such as for presence, absence and logarithmic values, the laboratory will assess performance against criteria described in the Method SOP.

19.4.3.6 Compare the information obtained above to the corresponding acceptance criteria for precision and accuracy in the test method (if applicable) or in laboratory generated acceptance criteria (LCS or interim criteria) if there is no mandatory criteria established. If any one of the parameters do not meet the acceptance criteria, the performance is unacceptable for that parameter.

19.4.3.7 When one or more of the tested parameters fail at least one of the acceptance criteria, the analyst must proceed according to either option listed below:

- Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with 19.4.3.3 above.
- Beginning with 19.4.3.3 above, repeat the test for all parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with 20.4.3.1 above.

Note: Results of successive LCS analyses can be used to fulfill the DOC requirement.

A certification statement (see Figure 19-1) shall be used to document the completion of each initial demonstration of capability. A copy of the certification is archived in the analyst's training folder.

19.5 LABORATORY DEVELOPED METHODS AND NON-STANDARD METHODS

Any new method developed by the laboratory must be fully defined in an SOP and validated by qualified personnel with adequate resources to perform the method. Method specifications and the relation to client requirements must be clearly conveyed to the client if the method is a non-standard method (not a published or routinely accepted method). The client must also be in agreement to the use of the non-standard method.

19.6 VALIDATION OF METHODS

Validation is the confirmation by examination and the provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

All non-standard methods, laboratory designed/developed methods, standard methods used outside of their scope, and major modifications to published methods must be validated to confirm they are fit for their intended use. The validation will be as extensive as necessary to meet the needs of the given application. The results are documented with the validation procedure used and contain a statement as to the fitness for use.

19.6.1 Method Validation and Verification Activities for All New Methods

While method validation can take various courses, the following activities can be required as part of method validation. Method validation records are designated QC records and are archived accordingly.

19.6.1.1 Determination of Method Selectivity

Method selectivity is the demonstrated ability to discriminate the analyte(s) of interest from other compounds in the specific matrix or matrices from other analytes or interference. In some cases to achieve the required selectivity for an analyte, a confirmation analysis is required as part of the method.

19.6.1.2 Determination of Method Sensitivity

Sensitivity can be both estimated and demonstrated. Whether a study is required to estimate sensitivity depends on the level of method development required when applying a particular measurement system to a specific set of samples. Where estimations and/or demonstrations of sensitivity are required by regulation or client agreement, such as the procedure in 40 CFR Part 136 Appendix B, under the Clean Water Act, these shall be followed.

19.6.1.3 Relationship of Limit of Detection (LOD) to the Quantitation Limit (QL)

An important characteristic of expression of sensitivity is the difference in the LOD and the QL. The LOD is the minimum level at which the presence of an analyte can be reliably concluded. The QL is the minimum concentration of analyte that can be quantitatively determined with acceptable precision and bias. For most instrumental measurement systems, there is a region where semi-quantitative data is generated around the LOD (both above and below the estimated MDL or LOD) and below the QL. In this region, detection of an analyte may be confirmed but quantification of the analyte is unreliable within the accuracy and precision guidelines of the measurement system. When an analyte is detected below the QL, and the presence of the analyte is confirmed by meeting the qualitative identification criteria for the analyte, the analyte can be reliably reported, but the amount of the analyte can only be estimated. If data is to be reported in this region, it must be done so with a qualification that denotes the semi-quantitative nature of the result.

19.6.1.4 Determination of Interferences

A determination that the method is free from interferences in a blank matrix is performed.

19.6.1.5 Determination of Range

Where appropriate to the method, the quantitation range is determined by comparison of the response of an analyte in a curve to established or targeted criteria. Generally the upper quantitation limit is defined by highest acceptable calibration concentration. The lower quantitation limit or QL cannot be lower than the lowest non-zero calibration level, and can be constrained by required levels of bias and precision.

19.6.1.6 Determination of Accuracy and Precision

Accuracy and precision studies are generally performed using replicate analyses, with a resulting percent recovery and measure of reproducibility (standard deviation, relative standard deviation) calculated and measured against a set of target criteria.

19.6.1.7 Documentation of Method

The method is formally documented in an SOP. If the method is a minor modification of a standard laboratory method that is already documented in an SOP, an SOP Attachment describing the specific differences in the new method is acceptable in place of a separate SOP.

19.6.1.8 Continued Demonstration of Method Performance

Continued demonstration of Method Performance is addressed in the SOP. Continued demonstration of method performance is generally accomplished by batch specific QC samples such as LCS, method blanks or PT samples.

19.7 METHOD DETECTION LIMITS (MDL)/ LIMITS OF DETECTION (LOD)

Method detection limits (MDL) are initially determined in accordance with 40 CFR Part 136, Appendix B or alternatively by other technically acceptable practices that have been accepted by regulators. MDL is also sometimes referred to as Limit of Detection (LOD). The MDL theoretically represents the concentration level for each analyte within a method at which the Analyst is 99% confident that the true value is not zero. The MDL is determined for each analyte initially during the method validation process and updated as required in the analytical methods, whenever there is a significant change in the procedure or equipment, or based on project specific requirements (refer to 19.7.10). Generally the analyst prepares at least seven replicates of solution spiked at one to five times the estimated method detection limit (most often at the lowest standard in the calibration curve) into the applicable matrix with all the analytes of interest. Each of these aliquots is extracted (including any applicable clean-up procedures) and analyzed in the same manner as the samples. Where possible, the seven replicates should be analyzed over 2-4 days to provide a more realistic MDL. To allow for some flexibility, this low level standard may be analyzed every batch or every week or some other frequency rather than doing the study all at once. In addition, a larger number of data points may be used if the appropriate t-value multiplier is used.

Refer to the Corporate SOP No. CA-Q-S-006 or the laboratory's SOP No. BF-QA-001 for details on the laboratory's MDL process.

19.8 INSTRUMENT DETECTION LIMITS (IDL)

19.8.1 The IDL is sometimes used to assess the reasonableness of the MDLs or in some cases required by the analytical method or program requirements. IDLs are most used in metals analyses but may be useful in demonstration of instrument performance in other areas.

19.8.2 IDLs are calculated to determine an instrument's sensitivity independent of any preparation method. IDLs are calculated either using 7 replicate spike analyses, like MDL but without sample preparation, or by the analysis of 10 instrument blanks and calculating 3 x the absolute value of the standard deviation. (For CLP procedures, the IDL is determined using the standard deviation of 7 replicate spike analyses on each of 3 non-consecutive days.)

19.8.3 If IDL is > than the MDL, it may be used as the reported MDL.

19.9 VERIFICATION OF DETECTION AND REPORTING LIMITS

19.9.1 Once an MDL is established, it must be verified, on each instrument, by analyzing a quality control sample (prepared as a sample) at no more than 3 times the calculated MDL for single analyte analyses (e.g. most wet chemistry methods, CVAA, etc.) and no more than 4 times the calculated MDL for multiple analyte methods (e.g. GC, GCMS, ICP, etc.). The analytes must be qualitatively identified or see section 20.7.9 for other options. This verification does not apply to methods that are not readily spiked (e.g. pH, turbidity, etc.) or where the lab does not report to the MDL. If the MDL does not verify, then the lab will not report to the MDL, or redevelop their MDL or use the level where qualitative identification is established. MDLs must be verified at least annually.

19.9.2 When the laboratory establishes a quantitation limit, it must be initially verified by the analysis of a low level standard or QC sample at 1-2 the reporting limit and annually thereafter. The annual requirement is waved for methods that have an annually verified MDL. The laboratory will comply with any regulatory requirement.

19.10 RETENTION TIME WINDOWS

Most organic analyses and some inorganic analyses use chromatography techniques for qualitative and quantitative determinations. For every chromatography analysis each analyte will have a specific time of elution from the column to the detector. This is known as the analyte's retention time. The variance in the expected time of elution is defined as the retention time window. As the key to analyte identification in chromatography, retention time windows must be established on every column for every analyte used for that method. These records are kept with the files associated with an instrument for later quantitation of the analytes. Complete details are available in the laboratory's SOPs.

19.11 EVALUATION OF SELECTIVITY

The laboratory evaluates selectivity by following the checks within the applicable analytical methods, which include mass spectral tuning, second column confirmation, ICP interelement interference checks, chromatography retention time windows, sample blanks, and specific electrode response factors.

19.12 ESTIMATION OF UNCERTAINTY OF MEASUREMENT

19.12.1 Uncertainty is "a parameter associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand" (as defined by the International Vocabulary of Basic and General Terms in Metrology, ISO Geneva, 1993, ISBN 92-67-10175-1). Knowledge of the uncertainty of a measurement provides additional confidence in a result's validity. Its value accounts for all the factors which could possibly affect the result, such as adequacy of analyte definition, sampling, matrix effects and interferences, climatic conditions, variances in weights, volumes, and standards, analytical procedure, and random variation. Some national accreditation organizations require the use of an "expanded uncertainty": the range within which the value of the measurand is believed to lie within at least a 95% confidence level with the coverage factor k=2.

19.12.2 Uncertainty is not error. Error is a single value, the difference between the true result and the measured result. On environmental samples, the true result is never known. The measurement is the sum of the unknown true value and the unknown error. Unknown error is a combination of systematic error, or bias, and random error. Bias varies predictably, constantly, and independently from the number of measurements. Random error is unpredictable, assumed to be Gaussian in distribution, and reducible by increasing the number of measurements.

19.12.3 The minimum uncertainty associated with results generated by the laboratory can be determined by using the Laboratory Control Sample (LCS) accuracy range for a given analyte. The LCS limits are used to assess the performance of the measurement system since they take into consideration all of the laboratory variables associated with a given test over time (except for variability associated with the sampling and the variability due to matrix effects). The percent recovery of the LCS is compared either to the method-required LCS accuracy limits or to the statistical, historical, in-house LCS accuracy limits.

19.12.4 To calculate the uncertainty for the specific result reported, multiply the result by the decimal of the lower end of the LCS range percent value for the lower end of the uncertainty range, and multiply the result by the decimal of the upper end of the LCS range percent value for the upper end of the uncertainty range. These calculated values represent uncertainties at approximately the 99% confidence level with a coverage factor of k = 3. As an example, for a reported result of 1.0 mg/L with an LCS recovery range of 50 to 150%, the estimated uncertainty in the result would be 1.0 ±0.5 mg/L.

19.12.5 In the case where a well recognized test method specifies limits to the values of major sources of uncertainty of measurement (e.g. 524.2, 525, etc) and specifies the form of presentation of calculated results, no further discussion of uncertainty is required.

19.13 SAMPLE REANALYSIS GUIDELINES

Because there is a certain level of uncertainty with any analytical measurement, a sample repreparation (where appropriate) and subsequent analysis (hereafter referred to as "reanalysis") may result in either a higher or lower value from an initial sample analysis. There are also variables that may be present (e.g., sample homogeneity, analyte precipitation over time, etc.) that may affect the results of a reanalysis. Based on the above comments, the laboratory will reanalyze samples at a client's request with the following caveats. Client specific Contractual Terms & Conditions for reanalysis protocols may supersede the following items.

- Homogenous samples: If a reanalysis agrees with the original result to within the RPD limits for MS/MSD or Duplicate analyses, or within $\pm$ 1 reporting limit for samples $\leq$ 5x the reporting limit, the original analysis will be reported. At the client's request, both results may be reported on the same report but not on two separate reports.

- If the reanalysis does not agree (as defined above) with the original result, then the laboratory will investigate the discrepancy and reanalyze the sample a third time for confirmation if sufficient sample is available.

- Any potential charges related to reanalysis are discussed in the contract terms and conditions or discussed at the time of the request. The client will typically be charged for reanalysis unless it is determined that the lab was in error.

- Due to the potential for increased variability, reanalysis may not be applicable to Non-homogenous, Encore, and Sodium Bisulfate preserved samples. See the Department Supervisor or Laboratory Director/Manager if unsure.

19.14 CONTROL OF DATA

The laboratory has policies and procedures in place to ensure the authenticity, integrity, and accuracy of the analytical data generated by the laboratory.

19.14.1 Computer and Electronic Data Related Requirements

The three basic objectives of our computer security procedures and policies are shown below. The laboratory is currently running the 'TALS Data System' which is a LIMs system that has been highly customized to meet the needs of the laboratory. It is referred to as LIMS for the remainder of this section. The LIMS utilizes a SQL server which is an industry standard relational database platform. It is referred to as Database for the remainder of this section.

19.14.1.1 Maintain the Database Integrity

Assurance that data is reliable and accurate through data verification (review) procedures, password-protecting access, anti-virus protection, and data change requirements, as well as an internal LIMS permissions procedure.

- LIMS Database Integrity is achieved through data input validation, internal user controls, and data change requirements.

- Spreadsheets and other software developed in-house must be verified with documentation through hand calculations prior to use. Cells containing calculations must be lock-protected and controlled.
- Instrument hardware and software adjustments are safeguarded through maintenance logs, audit trails and controlled access.

19.14.1.2 Ensure Information Availability

Protection against loss of information or service is ensured through scheduled back-ups, stable file server network architecture, storage of media, line filter, Uninterruptible Power Supply (UPS), and maintaining older versions of software as revisions are implemented.

19.14.1.3 Maintain Confidentiality

Ensure data confidentiality through physical access controls such as password protection or website access approval, when electronically transmitting data.

19.14.2 Data Reduction

The complexity of the data reduction depends on the analytical method and the number of discrete operations involved (e.g., extractions, dilutions, instrument readings and concentrations). The analyst calculates the final results from the raw data or uses appropriate computer programs to assist in the calculation of final reportable values.

For manual data entry, e.g., Wet Chemistry, the data is reduced by the analyst and then verified by the Department Manager or alternate analyst prior to updating the data in LIMS. The data review sheets, or any other type of applicable documents, are signed by both the analyst and alternate reviewer to confirm the accuracy of the manual entry(s).

Manual integration of peaks will be documented and reviewed and the raw data will be flagged in accordance with the TestAmerica Corporate SOP CA-Q-S-002, *Acceptable Manual Integration Practices*.

Analytical results are reduced to appropriate concentration units specified by the analytical method, taking into account factors such as dilution, sample weight or volume, etc. Blank correction will be applied only when required by the method or per manufacturer's indication; otherwise, it should not be performed. Calculations are independently verified by appropriate laboratory staff. Calculations and data reduction steps for various methods are summarized in the respective analytical SOPs or program requirements.

19.14.2.1 All raw data must be retained in the project job folder, computer file, and/or run log. All criteria pertinent to the method must be recorded. The documentation is recorded at the time observations or calculations are made and must be signed or initialed/dated (month/day/year). It must be easily identifiable who performed which tasks if multiple people were involved.

19.14.2.2 In general, concentration results are reported in milligrams per liter (mg/l) or micrograms per liter (µg/l) for liquids and milligrams per kilogram (mg/kg) or micrograms per kilogram (µg/kg) for solids. For values greater than 10,000 mg/l, results can be reported in percent, i.e., 10,000 mg/l = 1%. Units are defined in each lab SOP.

19.14.2.3 In reporting, the analyst or the instrument output records the raw data result using values of known certainty plus one uncertain digit. If final calculations are performed external to LIMS, the results should be entered in LIMS with at least three significant figures. In general, final inorganic results are reported to 2 significant figures for values less than 10 and 3 significant figures for values greater than 10 on the final report. Organic results are generally reported to 1 significant figure for values less than 10 and 2 significant figures for values greater than 10 on the final report. The number of significant figures may be adjusted based on client or project requirements.

19.14.2.4 For those methods that do not have an instrument printout, an instrumental output or a calculation spreadsheet upload compatible with the LIMS System, the final results and dilution factors are entered directly into LIMS by the analyst, and the software formats the final result for the analytical report. LIMS has a defined significant figure criterion for each analyte.

19.14.2.5 The laboratory strives to import data directly from instruments or calculation spreadsheets to ensure that the reported data are free from transcription and calculation errors. For those analyses with an instrumental output compatible with the LIMS, the raw results and dilution factors are transferred into LIMS electronically after reviewing the quantitation report, and removing unrequested or poor spectrally-matched compounds. The analyst prints a copy of what has been entered to check for errors. This printout and the instrument's printout of calibrations, concentrations, retention times, chromatograms, and mass spectra, if applicable, are retained with the data file. The data file is automatically transferred to the network server and, eventually, to a back-up tape file.

19.14.3 Logbook / Worksheet Use Guidelines

Logbooks and worksheets are filled out 'real time' and have enough information on them to trace the events of the applicable analysis/task. (e.g. calibrations, standards, analyst, sample ID, date, time on short holding time tests, temperatures when applicable, calculations are traceable, etc.)

- Corrections are made following the procedures outlined in Section 12.
- Logbooks are controlled by the QA department. A record is maintained of all logbooks in the lab.
- Unused portions of pages must be "Z"'d out, signed and dated.
- Worksheets are created with the approval of the Technical Director/QA Manager at the facility. The QA Manager controls all worksheets following the procedures in Section 6.

19.14.4 Review / Verification Procedures

Review procedures are out lined in several laboratory SOPs (e.g. BF-SR-002, "Receipt of Analytical Samples", BF-GP-012, "Technical Data Review", and BF-PM-001, "Project Information Requirements") to ensure that reported data are free from calculation and transcription errors, that QC parameters have been reviewed and evaluated before data is reported. The laboratory also has an SOP discussing Manual Integrations to ensure the authenticity of the data (BF-GP-013, Manual Integration). The general review concepts are discussed below, more specific information can be found in the SOPs.

19.14.4.1 The data review process at the laboratory starts at the Sample Control level. Sample Control personnel review chain-of-custody forms and input the sample information and required analyses into a computer LIMS. The Project Managers perform review of the chain-of-custody forms and inputted information and approve the input in LIMs to make the samples available to the laboratory departments for batching and processing.

19.14.4.2 The next level of data review occurs with the Analysts. As results are generated, analysts review their work to ensure that the results generated meet QC requirements and relevant EPA methodologies. The Analysts transfer the data into the LIMS and add any manual data qualifiers or dilution codes if applicable. To ensure data compliance, a different analyst performs a second level of review. Second level review is accomplished by checking reported results against raw data and evaluating the results for accuracy. During the second level review, blank runs, QA/QC check results, initial and continuing calibration results, laboratory control samples, sample data, qualifiers and spike information are evaluated. Where calibration is not required on a daily basis, secondary review of the initial calibration results may be conducted at the time of calibration. Approximately 10% of all sample data from manual methods and from automated methods, all GC/MS spectra and all manual integrations are reviewed. Issues that deem further review include the following:

- QC data are outside the specified control limits for accuracy and precision
- Reviewed sample data does not match with reported results
- Unusual detection limit changes are observed
- Samples having unusually high results
- Samples exceeding a known regulatory limit
- Raw data indicating some type of contamination or poor technique
- Inconsistent peak integration
- Transcription errors
- Results outside of calibration range

- Results deviate from historical trends (if history available)

19.14.4.3 Unacceptable analytical results may require reanalysis of the samples. Any unusual or uncharacteristic circumstances are brought to the attention of the Department Manager. The Department Manager may involve the Project Manager, the Technical Director and/or the QA Manager for further investigation depending on the issue. Corrective action is initiated whenever necessary.

19.14.4.4 The results are then entered or directly transferred into the computer database and a hard copy (or .pdf) is printed for the client.

19.14.4.5 As a final review prior to the release of the report, the Project Manager reviews the results for appropriateness and completeness. This review and approval ensures that client requirements have been met and that the final report has been properly completed. The process includes, but is not limited to, verifying that chemical relationships are evaluated, COC is followed, cover letters/ narratives are present, flags are appropriate, and project specific requirements are met.

19.14.4.6 Any project that requires a data package is subject to a tertiary data review for transcription errors and acceptable quality control requirements. The Project Manager then signs the final report and creates the invoice. When complete, the report is issued to the client.

19.14.5 Manual Integrations

Computerized data systems provide the analyst with the ability to re-integrate raw instrument data in order to optimize the interpretation of the data. Though manual integration of data is an invaluable tool for resolving variations in instrument performance and some sample matrix problems, when used improperly, this technique would make unacceptable data appear to meet quality control acceptance limits. Improper re-integrations lead to legally indefensible data, a poor reputation, or possible laboratory decertification. Because guidelines for re-integration of data are not provided in the methods and most methods were written prior to widespread implementation of computerized data systems, the laboratory trains all analytical staff on proper manual integration techniques using SOP CA-Q-S-002 as the guidelines.

19.14.5.1 The analyst must adjust baseline or the area of a peak in some situations, for example when two compounds are not adequately resolved or when a peak shoulder needs to be separated from the peak of interest. The analyst must use professional judgment and common sense to determine when manual integrating is required. Analysts are encouraged to ask for assistance from a senior analyst or manager when in doubt.

19.14.5.2 Analysts shall not increase or decrease peak areas for the sole purpose of achieving acceptable QC recoveries that would have otherwise been unacceptable. The intentional recording or reporting of incorrect information (or the intentional omission of correct information) is against company principals and policy and is grounds for immediate termination.

19.14.5.3 Client samples, performance evaluation samples, and quality control samples are all treated equally when determining whether or not a peak area or baseline should be manually adjusted.

19.14.5.4 All manual integrations receive a second level review. Manual integrations must be indicated on an expanded scale "after" chromatograms such that the integration performed can be easily evaluated during data review. Expanded scale "before" chromatograms are also required for all manual integrations on QC parameters (calibrations, calibration verifications, laboratory control samples, internal standards, surrogates, etc.) unless the laboratory has another documented corporate approved procedure in place that can demonstrate an active process for detection and deterrence of improper integration practices.

Figure 19-1.
Example - Demonstration of Capability Documentation

TestAmerica

DOC Cert. Statement
Revision 11
January 23, 2013

TESTAMERICA LABORATORIES, INC.

TRAINING & DEMONSTRATION OF CAPABILITY CERTIFICATION STATEMENT

Employee: _____ Page _____of_____

Method Number: _____ Date: _____

Parameters or Analytes: _____

Initial Demonstration of Capability: ☐

SOP Number: _____Revision # _____ Date Read_____

Trained By: _____

Date training began: _____ Date training completed: _____

Continued Demonstration of Capability: ☐

SOP Number: _____Revision # _____ Date Read_____

I CERTIFY that I have read, understand and agree to use the SOP identified above. I have also submitted data associated with the demonstration of capability.

_____ _____
Employee Signature Date

We, the undersigned, CERTIFY that:

1. The analyst identified above, using the cited test method(s), which is in use at this facility for the analyses of samples under the National Environmental Laboratory Accreditation Program, have met the Demonstration of Capability.

2. The test method(s) was performed by the analyst(s) identified on this certification.

3. A copy of the test method(s) and the laboratory-specific Sops are available for all personnel on-site.

4. The data associated with the demonstration capability are true, accurate, complete and self-explanatory.

5. All raw data (including a copy of this certification form) necessary to reconstruct and validate these analyses have been retained at this facility, and that the associated information is well organized and available for review by authorized assessors.

Jennifer Pierce _____ _____
Operations Manager Signature Date

_____ _____ _____
Quality Assurance Officer Signature Date

SECTION 20

EQUIPMENT (AND CALIBRATIONS)

20.1 OVERVIEW

The laboratory purchases the most technically advanced analytical instrumentation for sample analyses. Instrumentation is purchased on the basis of accuracy, dependability, efficiency and sensitivity. Each laboratory is furnished with all items of sampling, preparation, analytical testing and measurement equipment necessary to correctly perform the tests for which the laboratory has capabilities. Each piece of equipment is capable of achieving the required accuracy and complies with specifications relevant to the method being performed. Before being placed into use, the equipment (including sampling equipment) is calibrated and checked to establish that it meets its intended specification. The calibration routines for analytical instruments establish the range of quantitation. Calibration procedures are specified in laboratory SOPs. A list of laboratory equipment and instrumentation is presented in Table 20-1.

Equipment is only operated by authorized and trained personnel. Manufacturer's instructions for equipment use are readily accessible to all appropriate laboratory personnel.

20.2 PREVENTIVE MAINTENANCE

20.2.1 The laboratory follows a well-defined maintenance program to ensure proper equipment operation and to prevent the failure of laboratory equipment or instrumentation during use. This program of preventive maintenance helps to avoid delays due to instrument failure.

20.2.2 Routine preventive maintenance procedures and frequency, such as lubrication, cleaning, and replacements, should be performed according to the procedures outlined in the manufacturer's manual. Qualified personnel must also perform maintenance when there is evidence of degradation of peak resolution, a shift in the calibration curve, loss of sensitivity, or failure to continually meet one of the quality control criteria.

20.2.3 Table 20-2 lists examples of scheduled routine maintenance. It is the responsibility of each Department Manager to ensure that instrument maintenance logs are kept for all equipment in his/her department. Preventative maintenance procedures may also be outlined in analytical SOPs or instrument manuals. (Note: for some equipment, the log used to monitor performance is also the maintenance log. Multiple pieces of equipment may share the same log as long as it is clear as to which instrument is associated with an entry.)

20.2.4 Instrument maintenance logs are controlled and are used to document instrument problems, instrument repair and maintenance activities. Maintenance logs shall be kept for all major pieces of equipment. Instrument maintenance logs may also be used to specify instrument parameters.

20.2.4.1 Documentation must include all major maintenance activities such as contracted preventive maintenance and service and in-house activities such as the replacement of electrical components, lamps, tubing, valves, columns, detectors, cleaning and adjustments.

20.2.4.2 Each entry in the instrument log includes the Analyst's initials, the date, a detailed description of the problem (or maintenance needed/scheduled), a detailed explanation of the solution or maintenance performed, and a verification that the equipment is functioning properly (state what was used to determine a return to control. e.g. CCV run on *'date'* was acceptable, or instrument recalibrated on 'date' with acceptable verification, etc.) must also be documented in the instrumentation records.

20.2.4.3 When maintenance or repair is performed by an outside agency, service receipts detailing the service performed can be affixed into the logbooks adjacent to pages describing the maintenance performed. This stapled in page must be signed across the page entered and the logbook so that it is clear that a page is missing if only half a signature is found in the logbook.

20.2.5 If an instrument requires repair (subjected to overloading or mishandling, gives suspect results, or otherwise has shown to be defective or outside of specified limits) it shall be taken out of operation and tagged as out of service or otherwise isolated until such a time as the repairs have been made and the instrument can be demonstrated as operational by calibration and/or verification or other test to demonstrate acceptable performance. The laboratory shall examine the effect of this defect on previous analyses

20.2.6 In the event of equipment malfunction that cannot be resolved, service shall be obtained from the instrument vendor manufacturer, or qualified service technician, if such a service can be tendered. If on-site service is unavailable, arrangements shall be made to have the instrument shipped back to the manufacturer for repair. Back up instruments, which have been approved, for the analysis shall perform the analysis normally carried out by the malfunctioning instrument. If the back up is not available and the analysis cannot be carried out within the needed timeframe, the samples shall be subcontracted.

If an instrument is sent out for service or transferred to another facility, it must be recalibrated and verified (including new initial MDL study) prior to return to lab operations.

20.3 SUPPORT EQUIPMENT

This section applies to all devices that may not be the actual test instrument, but are necessary to support laboratory operations. These include but are not limited to: balances, ovens, refrigerators, freezers, incubators, water baths, field sampling devices, temperature measuring devices and volumetric dispensing devices if quantitative results are dependent on their accuracy, as in standard preparation and dispensing or dilution into a specified volume. All raw data records associated with the support equipment are retained to document instrument performance. Laboratory SOPs BF-GP-001,"Calibration of Autopipettes and Repipetters" and BF-GP-002, "Support Equipment: Maintenance, Record Keeping and Corrective Actions of Analytical Balances, Temperature Control Devises and Reagent Water" provide additional detail on the monitoring and record keeping for support equipment.

20.3.1 Weights and Balances

The accuracy of the balances used in the laboratory is checked every working day, before use. All balances are placed on stable counter tops.

Each balance is checked prior to initial serviceable use with at least two certified ASTM type 1 weights spanning its range of use (weights that have been calibrated to ASTM type 1 weights may also be used for daily verification). ASTM type 1 weights used only for calibration of other weights (and no other purpose) are inspected for corrosion, damage or nicks at least annually and if no damage is observed, they are calibrated at least every 5 years by an outside calibration laboratory. Any weights (including ASTM Type 1) used for daily balance checks or other purposes are recalibrated/recertified annually to NIST standards (this may be done internally if laboratory maintains "calibration only" ASTM type 1 weights).

All balances are serviced annually by a qualified service representative, who supplies the laboratory with a certificate that identifies traceability of the calibration to the NIST standards.

All of this information is recorded in logs, and the recalibration/recertification certificates are kept on file.

20.3.2 pH, Conductivity, and Turbidity Meters

The pH meters used in the laboratory are accurate to ± 0.1 pH units, and have a scale readability of at least 0.05 pH units. The meters automatically compensate for the temperature, and are calibrated with at least two working range buffer solutions before each use.

Conductivity meters are also calibrated before each use with a known standard to demonstrate the meters do not exceed an error of 1% or one umhos/cm.

Turbidity meters are also calibrated before each use. All of this information is documented in logs.

Consult pH and Conductivity, and Turbidity SOPs for further information.

20.3.3 Thermometers

All reusable thermometers are calibrated on an annual basis with a NIST-traceable thermometer at temperatures bracketing the range of use. Disposable thermometers are discarded upon expiration and replaced with newly purchased thermometers. IR thermometers should be calibrated over the full range of use, including ambient, iced (4 degrees) and frozen (0 to -5 degrees), per the Drinking Water Manual. The IR thermometers are verified daily and calibrated annually. Digital probes and thermocouples are calibrated quarterly.

The NIST Mercury thermometer is recalibrated every five years (unless thermometer has been exposed to temperature extremes or apparent separation of internal liquid) by an approved outside service and the provided certificate of traceability is kept on file. The NIST digital

thermometer is recalibrated every one year (unless thermometer has been exposed to temperature extremes or apparent separation of internal liquid) by an approved outside service and the provided certificate of traceability is kept on file The NIST thermometer(s) have increments of 1 degree (0.5 degree or less increments are required for drinking water microbiological laboratories) and have ranges applicable to method and certification requirements. The NIST traceable thermometer is used for no other purpose than to calibrate other thermometers.

All of this information is documented in logbooks. Monitoring method-specific temperatures, including incubators, heating blocks, water baths, and ovens, is documented in method-specific logbooks. More information on this subject can be found in the laboratory SOP BF-GP-020, "Thermometer Calibration".

20.3.4 Refrigerators/Freezer Units, Waterbaths, Ovens and Incubators

The temperatures of all refrigerator units and freezers used for sample and standard storage are monitored each working day.

Ovens, waterbaths and incubators are monitored on days of use.

All of this equipment has a unique identification number, and is assigned a unique thermometer for monitoring.

Sample storage refrigerator temperatures are kept between > 0°C and ≤ 6 °C.

Specific temperature settings/ranges for other refrigerators, ovens waterbaths, and incubators can be found in method specific SOPs.

All of this information is documented in Daily Temperature Logbooks and method-specific logbooks.

20.3.5 Autopipettors, Dilutors, and Syringes

Mechanical volumetric dispensing devices including burettes (except Class A Glassware and Glass microliter syringes) are given unique identification numbers and the delivery volumes are verified gravimetrically at a minimum on a quarterly basis.

For those dispensers that are not used for analytical measurements, a label is applied to the device stating that it is not calibrated. Any device not regularly verified can not be used for any quantitative measurements.

Micro-syringes are purchased from Hamilton Company. Each syringe is traceable to NIST. The laboratory keeps on file an "Accuracy and Precision Statement of Conformance" from Hamilton attesting established accuracy.

20.3.6 Field Sampling Devices (Isco Auto Samplers)

Each Auto Sampler (ISCO) is assigned a unique identification number in order to keep track of the calibration. This number is also recorded on the sampling documentation.

The Auto Sampler is calibrated monthly (or if not utilized monthly, immediately prior to its usage) by setting the sample volume to 100ml and recording the volume received. The results are filed in a logbook/binder. The Auto Sampler is programmed to run three (3) cycles and each of the three cycles is measured into a graduated cylinder to verify 100ml are received.

If the RSD (Relative Standard Deviation) between the 3 cycles is greater than 10%, the procedure is repeated and if the result is still greater than 10%, then the Auto Sampler is taken out of service until it is repaired and calibration verification criteria can be met. The results of this check are kept in a logbook/binder.

Additional calibration and use information is detailed in laboratory SOP BF-FS-006, "Calibration of Field Meter".

20.4 INSTRUMENT CALIBRATIONS

Calibration of analytical instrumentation is essential to the production of quality data. Strict calibration procedures are followed for each method. These procedures are designed to determine and document the method detection limits, the working range of the analytical instrumentation and any fluctuations that may occur from day to day.

Sufficient raw data records are retained to allow an outside party to reconstruct all facets of the initial calibration. Records contain, but are not limited to, the following: calibration date, method, instrument, analyst(s) initials or signatures, analysis date, analytes, concentration, response, type of calibration (Avg RF, curve, or other calculations that may be used to reduce instrument responses to concentration.)

Sample results must be quantitated from the initial calibration and may not be quantitated from any continuing instrument calibration verification unless otherwise required by regulation, method or program.

If the initial calibration results are outside of the acceptance criteria, corrective action is performed and any affected samples are reanalyzed if possible. If the reanalysis is not possible, any data associated with an unacceptable initial calibration will be reported with appropriate data qualifiers (refer to Section 12).

Note: Instruments are calibrated initially and as needed after that and at least annually.

20.4.1 Calibration Standards

Calibration standards are prepared using the procedures indicated in the Reagents and Standards section of the determinative method SOP. If a reference method does not specify the number of calibration standards, a minimum of 3 calibration points (exception being ICP and ICP/MS methods) will be used.

20.4.1.1 Standards for instrument calibration are obtained from a variety of sources. All standards are traceable to national or international standards of measurement, or to national or international standard reference materials.

20.4.1.2 The lowest concentration calibration standard that is analyzed during an initial calibration must be at or below the stated reporting limit for the method based on the final volume of extract (or sample).

20.4.1.3 The other concentrations define the working range of the instrument/method or correspond to the expected range of concentrations found in actual samples that are also within the working range of the instrument/method. Results of samples not bracketed by initial instrument calibration standards (within calibration range to at least the same number of significant figures used to report the data) must be reported as having less certainty, e.g., defined qualifiers or flags (additional information may be included in the case narrative). The exceptions to these rules are methods where the referenced method does not specify two or more standards.

20.4.1.4 All initial calibrations are verified with a standard obtained from a second source and traceable to a national standard, when available (or vendor certified different lot if a second source is not available). For unique situations, such as air analysis where no other source or lot is available, a standard made by a different analyst would be considered a second source. This verification occurs immediately after the calibration curve has been analyzed, and before the analysis of any samples.

20.4.2 Calibration Verification

The calibration relationship established during the initial calibration must be verified at least daily as specified in the laboratory method SOPs in accordance with the referenced analytical methods and NELAC (2003) standard, Section 5.5.5.10. The process of calibration verification applies to both external standard and internal standard calibration techniques, as well as to linear and non-linear calibration models. Initial calibration verification is with a standard source secondary (second source standard) to the calibration standards, but continuing calibration verifications may use the same source standards as the calibration curve.

Note: The process of calibration verification referred to is fundamentally different from the approach called "calibration" in some methods. As described in those methods, the calibration factors or response factors calculated during calibration are used to update the calibration factors or response factors used for sample quantitation. This approach, while employed in other EPA programs, amounts to a daily single-point calibration.

All target analytes and surrogates, including those reported as non-detects, must be included in periodic calibration verifications for purposes of retention time confirmation and to demonstrate that calibration verification criteria are being met i.e., RPD, per NELAC (2003) Standard, Section 5.5.5.10.

All samples must be bracketed by periodic analyses of standards that meet the QC acceptance criteria (e.g., calibration and retention time). The frequency is found in the determinative methods or SOPs.

Note: If an internal standard calibration is being used (basically GCMS) then bracketing standards are not required, only daily verifications are needed. The results from these verification standards must meet the calibration verification criteria and the retention time criteria (if applicable).

Generally, the initial calibrations must be verified at the beginning of each 12-hour analytical shift during which samples are analyzed. (Some methods may specify more or less frequent verifications). The 12-hour analytical shift begins with the injection of the calibration verification standard (or the MS tuning standard in MS methods). The shift ends after the completion of the analysis of the last sample, QC, or standard that can be injected within 12 hours of the beginning of the shift.

A continuing instrument calibration verification (CCV) must be repeated at the beginning and, for methods that have quantitation by external calibration models, at the end of each analytical batch. Some methods have more frequent CCV requirements see specific SOPs. Most Inorganic methods require the CCV to be analyzed after ever 10 samples or injections, including matrix or batch QC samples.

Note: If an internal standard calibration is being used (basically GCMS) then bracketing standards are not required, only daily verifications are needed. The results from these verification standards must meet the calibration verification criteria and the retention time criteria (if applicable).

If the results of a CCV are outside the established acceptance criteria and analysis of a second consecutive (and immediate) CCV fails to produce results within acceptance criteria, corrective action shall be performed. Once corrective actions have been completed & documented, the laboratory shall demonstrate acceptable instrument / method performance by analyzing two consecutive CCVs, or a new initial instrument calibration shall be performed.

Sample analyses and reporting of data may not occur or continue until the analytical system is calibrated or calibration verified. However, data associated with an unacceptable calibration verification may be fully useable under the following special conditions:

a).when the acceptance criteria for the CCV are exceeded high (i.e., high bias) and the associated samples within the batch are non-detects, then those non-detects may be reported with a footnote or case narrative explaining the high bias. Otherwise the samples affected by the unacceptable CCV shall be re-analyzed after a new calibration curve has been established, evaluated and accepted; or

b).when the acceptance criteria for the CCV are exceeded low (i.e., low bias), those sample results may be reported if they exceed a maximum regulatory limit/decision level. Otherwise the samples affected by the unacceptable CCV shall be re-analyzed after a new calibration curve has been established, evaluated and accepted.

Samples reported by the 2 conditions identified above will be appropriately flagged.

20.4.2.1 Verification of Linear and Non-Linear Calibrations

Calibration verification for calibrations involves the calculation of the percent drift or the percent difference of the instrument response between the initial calibration and each subsequent analysis of the verification standard. (These calculations are available in the laboratory method SOPs.) Verification standards are evaluated based on the % Difference from the average CF or RF of the initial calibration or based on % Drift or % Recovery if a linear or quadratic curve is used.

Regardless of whether a linear or non-linear calibration model is used, if initial verification criterion is not met, then no sample analyses may take place until the calibration has been verified or a new initial calibration is performed that meets the specifications listed in the method SOPs. If the calibration cannot be verified after the analysis of a single verification standard, then adjust the instrument operating conditions and/or perform instrument maintenance, and analyze another aliquot of the verification standard. If the calibration cannot be verified with the second standard, then a new initial calibration is performed.

- When the acceptance criteria for the calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported. Otherwise, the samples affected by the unacceptable calibration verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted.

- When the acceptance criteria for the calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level. Otherwise, the samples affected by the unacceptable verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted. Alternatively, a reporting limit standard may be analyzed to demonstrate that the laboratory can still support non-detects at their reporting limit.

20.5 TENTATIVELY IDENTIFIED COMPOUNDS (TICS) – GC/MS ANALYSIS

For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by the purpose of the analyses being conducted. Data system library search routines should not use normalization routines that would misrepresent the library or unknown spectra when compared to each other.

Note: If the TIC compound is not part of the client target analyte list but is calibrated by the laboratory and is both qualitatively and/or quantitatively identifiable, it should not be reported as a TIC. If the compound is reported on the same form as true TICs, it should be qualified and/or narrated that the reported compound is qualitatively and quantitatively (if verification in control) reported compared to a known standard that is in control (where applicable).

For example, the RCRA permit or waste delisting requirements may require the reporting of non-target analytes. Only after visual comparison of sample spectra with the nearest library searches may the analyst assign a tentative identification. See laboratory SOP's BF-MB-005 and BF-MV-007 for guidelines for making tentative identifications

Note:
For general reporting if TICs are requested, the ten (10), largest non-target analyte peaks whose area count exceeds 10% of the nearest internal standard will be termed "Tentatively Identified Compounds" (TICs). More or fewer TICs may be identified based on client requirements.

20.6 GC/MS TUNING

Prior to any GCMS analytical sequence, including calibration, the instrument parameters for the tune and subsequent sample analyses within that sequence must be set.

Prior to tuning/auto-tuning the mass spec, the parameters may be adjusted within the specifications set by the manufacturer or the analytical method. These generally don't need any adjustment but it may be required based on the current instrument performance. If the tune verification does not pass it may be necessary to clean the source or perform additional maintenance. Any maintenance is documented in the maintenance log.

Table 20-1. Laboratory Equipment and Instrumentation – TestAmerica Buffalo

Equipment/ Instrument	Manufacturer	Model Number	Serial Number	Year Put into Service	Condition When Received
GC/MS Instrumentation	Agilent	5975	CN10833020	2009	good
GC/MS Instrumentation	Agilent	5975	US80838844	2008	good
GC/MS Instrumentation	Agilent	5973	US44621446	2005	good
GC/MS Instrumentation	Agilent	5973	US52420646	2005	good
GC/MS Instrumentation	Agilent	5973	US41720721	2004	good
GC/MS Instrumentation	Agilent	5973	US35120354	2004	good
GC/MS Instrumentation	Agilent	5973	US41720707	2004	good
GC/MS Instrumentation	Agilent	5973	US10241053	2003	good
GC/MS Instrumentation	Agilent	5973	US30965634	2003	good
GC/MS Instrumentation	Agilent	5973	US03965692	2003	good
GC/MS Instrumentation	Agilent	5973	US05060076	2001	good
GC/MS Instrumentation	Agilent	5973	US05060084	2001	good
GC/MS Instrumentation	Agilent	5973	US03950346	2001	good
GC/MS Instrumentation	Agilent	5973	US82321636	2001	good
GC Instrumentation	Perkin Elmer	Clarus 608 dual uECD	680S10042901	2012	good
GC Instrumentation	Perkin Elmer	Clarus 600 dual FID	665S10020401	2012	good
GC Instrumentation	Agilent	6890 dual uECD	CN10520009	2005	good
GC Instrumentation	Agilent	6890 dual uECD	CN10520010	2005	good
GC Instrumentation	Agilent	6890 dual uECD	CN10448015	2005	good
GC Instrumentation	Hewlett Packard	5890II dual ECD	3336A53126	1994	good
GC Instrumentation	Hewlett Packard	5890II dual ECD	3336A63465	1994	good
GC Instrumentation	Hewlett Packard	5890II dual ECD	3336A53464	1994	good
GC Instrumentation	Hewlett Packard	5890II dual ECD	3336A53463	1994	good
GC Instrumentation	Hewlett Packard	5890II dual ECD	3336A54409	1994	good
GC Instrumentation	Hewlett Packard	5890II dual ECD	3336A54408	1994	good
GC Instrumentation	Hewlett Packard	5890II FID/FID	3115A34892	1994	good
GC Instrumentation	Hewlett Packard	5890II PID/FID	3336A60622	1994	good
GC Instrumentation	Hewlett Packard	5890II Hall/PID	3235A54089	1994	good
GC Instrumentation	Hewlett Packard	5890II PID/FID	3336A53465	1994	good
GC Instrumentation	Hewlett Packard	5890II dual FID	3336A53727	1994	good
GC Instrumentation	Hewlett Packard	5890II dual ECD	3310A47661	1993	good
GC Instrumentation	Hewlett Packard	5890II dual ECD	3336A53325	1993	good

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GC Instrumentation	Hewlett Packard	5890II PID/FID	3133A37157	1993	good
GC Instrumentation	Hewlett Packard	5890II dual ECD	3203A42206	1992	good
GC Instrumentation	Hewlett Packard	5890II dual FID	3019A28433	1991	good
GC Instrumentation	Hewlett Packard	5890II Hall/PID	3121A35782	1990	good
Metals Instrumentation	Perkin Elmer	Elan 9000 ICP-MS	P0230202	2002	good
Metals Instrumentation	Leeman	PS200 II	HG9045	2000	good
Metals Instrumentation	Leeman	PS200 II	HG0033	2000	good
Metals Instrumentation	Thermo	ICAP 6000 Duo	ICP-20094603	2010	good
Metals Instrumentation	Thermo	ICAP 6000 Duo	ICP-20094602	2010	good
Water Quality Instrumentation	Konelab	Aqua20	SEA032	2009	good
Water Quality Instrumentation	Flash Point Analyzer		Herzog	2007	good
Water Quality Instrumentation	OI	Carbon Analyzer Model 1030	A54TB0578P	2006	good
Water Quality Instrumentation	OI	Carbon Analyzer Model 1030	E616130020E	2006	good
Water Quality Instrumentation	Thermo	ECA 1200 TOX	2006.0373	2006	good
Water Quality Instrumentation	Horizon	Speed Vap	03-0415	2005	good
Water Quality Instrumentation	Konelab	20XT	E3719731	2005	good
Water Quality Instrumentation	Thermo	ECA 1200 TOX	2004.901	2004	good
Water Quality Instrumentation	Dionex	Ion Chromatograph #DX-120	20126	2004	good
Water Quality Instrumentation	Konelab	20	S5019455	2004	good
Water Quality Instrumentation	Glastron	CN Midi-distillation	2502	2003	good
Water Quality Instrumentation	Glastron	Phenol Midi-distillation	2069	2003	good
Water Quality Instrumentation	Glastron	Phenol Midi-distillation	2053	2003	good
Water Quality Instrumentation	Labtronics	BOD Magic - Autoanalyzer	270H3XB531	2004	good
Water Quality Instrumentation	Labtronics	BOD Magic - Autoanalyzer	270J2XB669	2003	good
Water Quality Instrumentation	ManTech	PC Titrator	MS-OK2-607	2003	good
Water Quality Instrumentation	HACH	Spectrophotometer #DR/2500	30200004886	2003	good
Water Quality Instrumentation	Dionex	Ion Chromatograph #DX-120	2060196	2002	good
Water Quality Instrumentation	Spectronic	Genesis 4001/4	3SGC199091	2000	good

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Water Quality Instrumentation	Lachat	Quickchem 8000 Autoanalyzer	A83000-1527	2000	good
Water Quality Instrumentation	OI	Carbon Analyzer Model 1010 #1	H92170411	1999	good
Water Quality Instrumentation	Lachat	Quickchem 8000 Autoanalyzer	A83000-1439	1999	good
Water Quality Instrumentation	Dionex	Ion Chromatograph #DX-120	99010157	1999	good
Water Quality Instrumentation	Dionex	Ion Chromatograph #DX-120	99110569	1999	good
Water Quality Instrumentation	Orion	Ion Meter #230A	2229	1999	good
Water Quality Instrumentation	VWR	Ion Meter #2100	1083	1997	good
Water Quality Instrumentation	YSI	Oxygen Meter #57	93J09826	1995	good
Water Quality Instrumentation	BOD chamber		Revco	1994	good
Sample Preparation Equipment	TurboVap	II	TV0529N12427	2006	good
Sample Preparation Equipment	TurboVap	II	TV0529N12428	2006	good
Sample Preparation Equipment	J2	ACCUPREP GPC	03F-10723	2003	good
Sample Preparation Equipment	TurboVap	II	TV9445N5816	1996	good
Sample Preparation Equipment	TurboVap	II	TV9427N4133	1996	good
Sample Preparation Equipment	TurboVap	II	TV944N5819	1996	good
Sample Preparation Equipment	TurboVap	II	TV944N5820	1996	good
Sample Preparation Equipment	TurboVap	II	TV0024N9623	2000	good
Sample Preparation Equipment	TurboVap	II	TV0022N9604	2000	good
Sample Preparation Equipment	TurboVap	II	TV0312N11592	2003	good
Sample Preparation Equipment	TurboVap	II	TV0312N11591	2003	good
Sample Preparation Equipment	Organomation	Rot-X-Tractor	16902	1999	good
Sample Preparation Equipment	Organomation	Rot-X-Tractor	16907	1999	good
Sample Preparation Equipment	Organomation	Rot-X-Tractor	16913	1999	good
Sample Preparation Equipment	Heat Systems	Sonicator #XL-2020	G1647/C5659	1994	good
Sample Preparation Equipment	Heat Systems	Sonicator #XL-2020	G2665/C5674	1994	good
Sample Preparation Equipment	Heat Systems	Sonicator #XL-2020	G2620/C5660	1994	good

Sample Preparation Equipment	Heat Systems	Sonicator #XL-2020	G2245/C6328	1995	good
Sample Preparation Equipment	Heat Systems	Sonicator #XL-2020	G2621/C6733	1995	good
Sample Preparation Equipment	Heat Systems	Sonicator #XL-2020	G2713/C6732	1995	good
Sample Preparation Equipment	Heat Systems	Sonicator #XL-2020	G1643/C6837	1995	good
Sample Preparation Equipment	Heat Systems	Sonicator #XL-2020	G2742/C6842	1995	good

Table 20-2.

Schedule of Routine Maintenance

Instrument	Procedure	Frequency
Leeman Mercury Analyzer	Check tubing for wear	Daily
	Fill rinse tank with 10% HCl	Daily
	Change dryer tube	As Needed
	Fill reductant bottle with 10% Stannous Chloride	Daily
ICP & ICP/MS	Check pump tubing	Daily
	Check liquid argon supply	Daily
	Check fluid level in waste container	Daily
	Check re-circulator levels	Monthly
	Clean or replace filters	As required
	Check torch	Daily
	Check sample spray chamber for debris	Monthly
	Clean and align nebulizer	Monthly
	Change pump oil	Monthly
	Change Cones	As required
	Change printer cartridge	As required
	Replace pump tubing	As required
UV-Vis Spectrophotometer	Clean ambient flow cell	As required
	Precision check/alignment of flow cell	As required
	Wavelength verification check	Annually
Auto Analyzers	Clean sampler	Daily
	Check all tubing	Daily
	Clean inside of colorimeter	Daily
	Clean pump well and pump rollers	Quarterly
	Clean wash fluid receptacle	Weekly
	Oil rollers/chains/side rails	Weekly
	Clean optics and cells	Quarterly
Agilent GC/MS	Pump oil-level check	Monthly
	Pump oil changing	Annually
	Analyzer bake-out	As required
	Analyzer cleaning	As required
	Resolution adjustment	As required
	COMPUTER SYSTEM AND PRINTER:	
	Air filter cleaning	As required
	Change data system air filter	As required
	Printer head carriage lubrication	As required
	Paper sprocket cleaning	As required
	Drive belt lubrication	As required

Instrument	Procedure	Frequency
Gas Chromatograph	Compare standard response to previous day or since last initial calibration	Daily
	Check carrier gas flow rate in column	Daily via use of known compound retention
	Check temp. of detector, inlet, column oven	Daily
	Septum replacement	As required
	Glass wool replacement	As required
	Check system for gas leaks with SNOOP	W/cylinder change as required
	Check for loose/frayed power wires and insulation	As Required
	Bake injector/column	As Required
	Change/remove sections of guard column	As Required
	Replace connectors/liners	As Required
	Change/replace column(s)	As Required
Electron Capture Detector (ECD)	Detector wipe test (Ni-63)	Semi-annually
	Detector cleaning	As required
Flame Ionization Detector (FID)	Detector cleaning	As required
Photoionization Detector (PID)	Change O-rings	As required
	Clean lamp window	As required
HPLC	Change guard columns	As required
	Change lamps	As required
	Change pump seals	Semi-annually or as required
	Replace tubing	As required
	Change fuses in power supply	As required
	Filter all samples and solvents	Daily
	Change autosampler rotor/stator	As required
Vacuum Pumps/ Air Compressor	Drained	Weekly
	Belts checked	Monthly
	Lubricated	Semi-annually
Centrifuge	Check brushes and bearings	Every 6 months or as needed

Table 20-3.

Periodic Calibration

Instrument	Type of Calibration/ Number of Standards	Frequency	Acceptance Limits	Corrective Action
Analytical Balance	Accuracy determined using "S" NIST traceable weights. Minimum of 2 standards bracketing the weight of interest. Inspected and calibrated by A2LA accredited person annually.	Daily, when used Annual	± 0.2%	Clean, check level, insure lack of drafts, and that unit is warmed up, recheck. If fails, call service.
Top Loading Balance	Accuracy determined using "S" NIST traceable. Minimum of 2 standards bracketing the weight of interest. Inspected and calibrated by A2LA accredited person annually.	Daily, when used Annual	± 0.5%	Clean. Replace.
NIST Certified Weights	Accuracy determined by accredited weights and measurement laboratory.	1 year	As per certificate.	Replace.
NIST-Traceable Thermometer-Mercury	Accuracy determined by accredited measurement laboratory.	3 years	As per certificate.	Replace.
NIST-Traceable Thermometer-Digital	Accuracy determined by accredited measurement laboratory.	1 year	As per certificate	Replace.
Thermometer	Against NIST-traceable thermometer	Yearly at appropriate temperature range for intended use	± 1.2°C	Replace
Minimum-Maximum Thermometers	Against NIST-traceable thermometer	Yearly	± 1.5°C	Replace

Instrument	Type of Calibration/ Number of Standards	Frequency	Acceptance Limits	Corrective Action
InfraRed Temperature Guns	Against NIST-traceable thermometer Accuracy determined by accredited measurement laboratory.	Daily at appropriate temperature range for intended use. Annual	± 1.5°C	Repair/replace
Dial-type Thermometers	Against NIST-traceable thermometer	Quarterly at appropriate temperature range for intended use.	± 1.5°C	Replace
Refrigerator	Temperature checked using NIST-traceable thermometer.	Daily. If out of range, check again in two hours.	0-6°C	Adjust. Repair. While waiting for repair, seal door, attach "Out of Service" sign, move items to functional unit. Notify supervisor.
Freezer	Temperature checked using NIST-traceable thermometer	Daily. If out of range, check again in two hours.	(-10)-(-20)°C	Adjust. Repair. While waiting for repair, seal door, attach "Out of Service" sign, move items to functional unit. Notify supervisor.
Oven	Temperature checked using NIST-traceable thermometer.	When in use.	104 ± 1°C (drying) 180 ± 2°C (TDS)	Adjust. Replace.
Water Bath	Temperature checked using NIST-traceable thermometer.	When in use.	± 2°C	Adjust. Replace.
Volumetric Dispensing Devices (Eppendorf ® pipette, automatic dilutor or dispensing devices)	One delivery by weight. Using DI water or solvent of use, dispense into tared vessel. Record weight with device ID number. Calibrate using 4 replicate gravimetric measurements	Each day of use Quarterly	± 2% Calculate accuracy by dividing weight by stated volume times 100 for percent.	Adjust. Replace.

Instrument	Type of Calibration/ Number of Standards	Frequency	Acceptance Limits	Corrective Action
Glass Microliter Syringes	None	Accuracy must be initially demonstrated if syringe was not received with a certificate attesting to established accuracy.	± 1%	Not applicable.
Deionized Water	Check in-line conductivity meter on system with conductivity meter in Inorganics Department.	Daily	<1.0 µmho at 25°C	Record on log. Report discrepancies to QA Manager, Operations Manager or Technical Director.

SECTION 21

MEASUREMENT TRACEABILITY

21.1 OVERVIEW

Traceability of measurements shall be assured using a system of documentation, calibration, and analysis of reference standards. Laboratory equipment that are peripheral to analysis and whose calibration is not necessarily documented in a test method analysis or by analysis of a reference standard shall be subject to ongoing certifications of accuracy. At a minimum, these must include procedures for checking specifications of ancillary equipment: balances, thermometers, temperature, Deionized (DI) and Reverse Osmosis (RO) water systems, automatic pipettes and other volumetric measuring devices. (Refer to Section 20.3). With the exception of Class A Glassware and Glass microliter syringes, quarterly accuracy checks are performed for all mechanical volumetric devices. Wherever possible, subsidiary or peripheral equipment is checked against standard equipment or standards that are traceable to national or international standards. Class A Glassware and Glass microliter syringes should be routinely inspected for chips, acid etching or deformity (e.g. bent needle). If the Class A glassware or syringe is suspect, the accuracy of the glassware will be assessed prior to use.

21.2 NIST-TRACEABLE WEIGHTS AND THERMOMETERS

Reference standards of measurement shall be used for calibration only and for no other purpose, unless it can be shown that their performance as reference standards would not be invalidated.

For NIST-traceable weights and thermometers, the laboratory requires that all calibrations be conducted by a calibration laboratory accredited by A2LA, NVLAP (National Voluntary Laboratory Accreditation Program), or another accreditation organization that is a signatory to a MRA (Mutual Recognition Arrangement) of one or more of the following cooperations – ILAC (International Laboratory accreditation Cooperation) or APLAC (Asia – Pacific Laboratory Accreditation Cooperation)..A certificate and scope of accreditation is kept on file at the laboratory.

The calibration report or certificate submitted to ***TestAmerica Buffalo*** contains, in a well designed format, a traceability statement, the conditions under which the calibrations were made in the context of any potential influence, a compliance statement with an identified metrological specification and the pertinent clauses, a clearly identified record of the quantities and functional test results before and after re-calibration, and no recommendation on the calibration interval. Opinions and interpretations of results are presented along with the basis upon which they were made and identified as such. The report may be submitted by facsimile or other electronic means as long as the requirements of the International Standard are achieved. If significant amendments are made to a calibration certificate, a supplemental certificate for the serial-number-specified piece of equipment is so identified. When a new certificate is offered, it uniquely identifies and references the one it replaces. All calibration reports are filed in the QA Office.

An external certified service engineer services laboratory balances on an annual basis. This service is documented on each balance with a signed and dated certification sticker. Balance calibrations are checked each day of use. All mercury thermometers are calibrated annually against a traceable reference thermometer. Temperature readings of ovens, refrigerators, and incubators are checked on each day of use.

21.3 REFERENCE STANDARDS / MATERIALS

Reference standards/materials, where commercially available, are traceable to certified reference materials. Commercially prepared standard materials are purchased from vendors accredited by A2LA or NVLAP with an accompanying Certificate of Analysis that documents the standard purity. If a standard cannot be purchased from a vendor that supplies a Certificate of Analysis, the purity of the standard is documented by analysis. The receipt of all reference standards must be documented. Reference standards are labeled with a unique Standard Identification Number and expiration date. All documentation received with the reference standard is retained as a QC record and references the Standard Identification Number.

All reference, primary and working standards/materials, whether commercially purchased or laboratory prepared, must be checked regularly to ensure that the variability of the standard or material from the 'true' value does not exceed method requirements. The accuracy of calibration standards is checked by comparison with a standard from a second source. In cases where a second standard manufacturer is not available, a vendor certified different lot is acceptable for use as a second source. For unique situations, such as air analysis where no other source or lot is available, a standard made by a different analyst would be considered a second source. The appropriate Quality Control (QC) criteria for specific standards are defined in laboratory SOPs. In most cases, the analysis of an Initial Calibration Verification (ICV) or LCS (where there is no sample preparation) is used as the second source confirmation. These checks are generally performed as an integral part of the analysis method (e.g. calibration checks, laboratory control samples).

All standards and materials must be stored and handled according to method or manufacturer's requirements in order to prevent contamination or deterioration. Refer to the Corporate Environmental Health & Safety Manual or laboratory SOPs. Method specific information may also be found in the laboratory method SOPs in the "Standards and Reagents" sections. For safety requirements, please refer to method SOPs and the laboratory Environmental Health and Safety Manual.

Standards and reference materials shall not be used after their expiration dates unless their reliability is verified by the laboratory and their use is approved by the Quality Assurance Manager. The laboratory must have documented contingency procedures for re-verifying expired standards.

21.4 DOCUMENTATION AND LABELING OF STANDARDS, REAGENTS, AND REFERENCE MATERIALS

Reagents must be at a minimum the purity required in the test method. The date of reagent receipt and the expiration date are documented. The lots for most of the common solvents and

acids are tested for acceptability prior to company wide purchase. Refer to SOP No. CA-Q-S-001, Solvent and Acid Lot Testing and Approval.

All manufacturer or vendor supplied Certificate of Analysis or Purity must be retained, stored appropriately, and readily available for use and inspection. These records are maintained by each department in bound or electronic folders. Records must be kept of the date of receipt and date of expiration of standards, reagents and reference materials. In addition, records of preparation of laboratory standards, reagents, and reference materials must be retained, stored appropriately, and be readily available for use and inspection. For detailed information on documentation and labeling, please refer laboratory SOP BF-GP-019, "Standard Traceability and Preparation" and also to the method specific SOPs.

Commercial materials purchased for preparation of calibration solutions, spike solutions, etc.., are usually accompanied with an assay certificate or the purity is noted on the label. If the assay purity is 96% or better, the weight provided by the vendor may be used without correction. If the assay purity is less than 96% a correction will be made to concentrations applied to solutions prepared from the stock commercial material.

21.4.1 All standards, reagents, and reference materials must be labeled in an unambiguous manner. Standards are logged into the laboratory department's chemical history log and are assigned a unique identification number. Preparation of working standards or reagents prepared from the stock is documented in the laboratory Department's Standard Preparation Log. The following information is typically recorded:

- Standard ID
- Description of Standard
- Department
- Preparer's name
- Final volume and number of vials prepared
- Solvent type and lot number
- Preparation Date
- Expiration Date
- Standard source type (stock or daughter)
- Standard type (spike, surrogate, other)
- Parent standard ID (if applicable)
- Parent Standard Analyte Concentration (if applicable)
- Parent Standard Amount used (if applicable)
- Component Analytes
- Final concentration of each analyte
- Comment section

Records are maintained for standard and reference material preparation. These records show the traceability to purchased stocks or neat compounds. These records also include method of preparation, date of preparation, expiration date and preparer's name or initials. Preparation procedures are provided in the Method SOPs.

21.4.2 All standards, reagents, and reference materials must be clearly labeled with a minimum of the following information:

- Expiration Date
- Standard ID from LIMS.
- Special Health/Safety warnings if applicable

Records must also be maintained of the date of receipt for commercially purchased items or date of preparation for laboratory prepared items. Special Health/Safety warnings must also be available to the analyst. This information is maintained ***in the LIMS system.***

21.4.3 In addition, the following information may be helpful:

- Date of receipt for commercially purchased items or date of preparation for laboratory prepared items
- Date opened (for multi-use containers, if applicable)
- Description of standard (if different from manufacturer's label or if standard was prepared in the laboratory)
- Recommended Storage Conditions
- Concentration (if applicable)
- Initials of analyst preparing standard or opening container

All containers of prepared reagents must include an expiration date and an ID number to trace back to preparation.

Procedures for preparation of reagents can be found in the Method SOPs.

Standard ID numbers must be traceable through associated logbooks, worksheets and raw data.

All reagents and standards must be stored in accordance to the following priority: 1) with the manufacturer's recommendations; 2) with requirements in the specific analytical methods as specified in the laboratory SOPs.

SECTION 22.0

SAMPLING

22.1 OVERVIEW

The laboratory provides sampling services. Sampling procedures are described in the following SOPs:

BF-FS-001	Chain of Custody Documentation
BF-FS-002	Sample Packaging and Shipment Off-Site
BF-FS-003	Groundwater Sampling Field Data Collection
BF-FS-004	Equipment Decontamination
BF-FS-005	Groundwater/Surface Water Sampling
BF-FS-006	Calibration of Field Meter
BF-FS-007	Low Flow Sampling Procedures
BF-FS-008	Surface and Subsurface Soil/Sediment Sampling

22.2 SAMPLING CONTAINERS

The laboratory offers clean sampling containers for use by clients. These containers are obtained from reputable container manufacturers and meet EPA specifications as required. Any certificates of cleanliness that are provided by the supplier are maintained at the laboratory.

22.2.1 Preservatives

Upon request, preservatives are provided to the client in pre-cleaned sampling containers. In some cases containers may be purchased pre-preserved from the container supplier. Whether prepared by the laboratory or bought pre-preserved, the grades of the preservatives are at a minimum:

- Hydrochloric Acid – Reagent ACS (Certified VOA Free) or equivalent
- Methanol – Purge and Trap grade
- Nitric Acid – Instra-Analyzed or equivalent
- Sodium Bisulfate – ACS Grade or equivalent
- Sodium Hydroxide – Instra-Analyzed or equivalent
- Sulfuric Acid – Instra-Analyzed or equivalent
- Sodium Thiosulfate – ACS Grade or equivalent

22.3 DEFINITION OF HOLDING TIME

The date and time of sampling documented on the chain-of-custody (COC) form establishes the day and time zero. As a general rule, when the maximum allowable holding time is expressed in "days" (e.g. 14 days, 28 days), the holding time is based on calendar day measured. Holding times expressed in "hours" (e.g. 6 hours, 24 hours, etc.) are measured from date and time zero. The

first day of holding time for time critical parameters ends twenty-four hours after sampling. Holding times for analysis include any necessary reanalysis. However there are some programs that determine holding time compliance based on the date and specific time of analysis compared to the time of sampling regardless of how long the holding time is. These programs will be addressed on a case-by-case basis.

22.4 SAMPLING CONTAINERS, PRESERVATION REQUIREMENTS, HOLDING TIMES

The preservation and holding time criteria specified in the following tables are derived from the source documents for the methods. If method required holding times, this info is in the SOP or preservation requirements are not met, the reports will be qualified using a flag, footnote or case narrative. As soon as possible or "ASAP" is an EPA designation for tests for which rapid analysis is advised, but for which neither EPA nor the laboratory have a basis for a holding time.

22.5 SAMPLE ALIQUOTS / SUBSAMPLING

Taking a representative sub-sample from a container is necessary to ensure that the analytical results are representative of the sample collected in the field. The size of the sample container, the quantity of sample fitted within the container, and the homogeneity of the sample need consideration when sub-sampling for sample preparation. It is the laboratory's responsibility to take a representative subsample or aliquot of the sample provided for analysis.

Analysts should handle each sample as if it is potentially dangerous. At a minimum, safety glasses, gloves, and lab coats must be worn when preparing aliquots for analysis.

The following information provides general guidance for homogenization and subsampling. For laboratory specific procedures refer to SOP BF-GP-005, "Sample Homogenization and Subsampling".

SECTION 23

HANDLING OF SAMPLES

Sample management procedures at the laboratory ensure that sample integrity and custody are maintained and documented from sampling/receipt through disposal.

23.1 CHAIN OF CUSTODY (COC)

The COC form is the written documented history of any sample and is initiated when bottles are sent to the field, or at the time of sampling. This form is completed by the sampling personnel and accompanies the samples to the laboratory where it is received and stored under the laboratory's custody. The purpose of the COC form is to provide a legal written record of the handling of samples from the time of collection until they are received at the laboratory. It also serves as the primary written request for analyses from the client to the laboratory. The COC form acts as a purchase order for analytical services when no other contractual agreement is in effect. An example of a COC form may be found in Figure 23-1.

23.1.1 Field Documentation

The information the sampler needs to provide at the time of sampling on the container label is:

- Sample identification
- Date and time
- Preservative

During the sampling process, the COC form is completed and must be legible (see Figure 23-1). This form includes information such as:

- Client name, address, phone number and fax number (if available)
- Project name and/or number
- The sample identification
- Date, time and location of sampling
- Sample collectors name
- The matrix description
- The container description
- The total number of each type of container
- Preservatives used
- Analysis requested
- Requested turnaround time (TAT)
- Any special instructions
- Purchase Order number or billing information (e.g. quote number) if available
- The date and time that each person received or relinquished the sample(s), including their signed name.

When the sampling personnel deliver the samples directly to TestAmerica personnel the samples are stored in a cooler with ice, as applicable, and remain solely in the possession of the client's field technician until the samples are delivered to the laboratory. The sample collector must assure that each container is in his/her physical possession or in his/her view at all times, or stored in such a place and manner to preclude tampering. The field technician relinquishes the samples in writing on the COC form to the sample control personnel at the laboratory or to a TestAmerica courier. When sampling personnel deliver the samples through a common carrier (Fed-Ex, UPS), the CoC relinquished date/time is completed by the field personnel and samples are released to the carrier. Samples are only considered to be received by lab when personnel at the fixed laboratory facility have physical contact with the samples.

Note: Independent couriers are not required to sign the COC form. The COC is usually kept in the sealed sample cooler. The shipping documents are retained with the project files.

23.1.2 Legal / Evidentiary Chain-of-Custody

If samples are identified for legal/evidentiary purposes on the COC or in the project notes, sample management will initiate Strict Chain of Custody procedures as defined in SOP BF-GP-018, "Strict Internal Chain-of-Custody".

23.2 SAMPLE RECEIPT

Samples are received at the laboratory by designated sample receiving personnel and a unique laboratory project identification number is assigned. Each sample container shall be assigned a unique sample identification number that is cross-referenced to the client identification number such that traceability of test samples is unambiguous and documented. Each sample container is affixed with a durable sample identification label. Sample acceptance, receipt, tracking and storage procedures are summarized in the following sections.

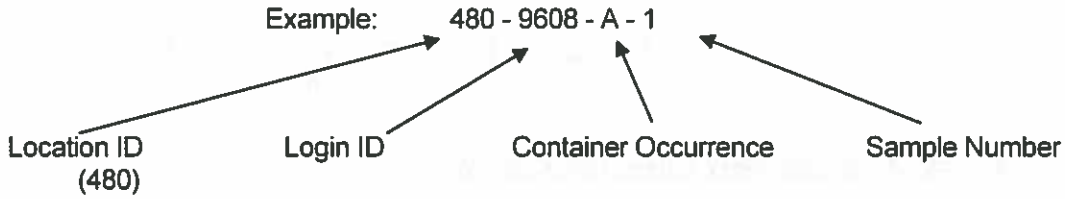
23.2.1 Laboratory Receipt

When samples arrive at the laboratory, sample receiving personnel inspect the coolers and samples. The integrity of each sample must be determined by comparing sample labels or tags with the COC and by visual checks of the container for possible damage. Any non-conformance, irregularity, or compromised sample receipt must be documented on the Sample Login Form – and brought to the immediate attention of the client. The COC, shipping documents, documentation of any non-conformance, irregularity, or compromised sample receipt, record of client contact, and resulting instructions become part of the project record.

23.2.1.1 Unique Sample Identification

All samples that are processed through the laboratory receive a unique sample identification to ensure that there can be no confusion regarding the identity of such samples at anytime. This system includes identification for all samples, subsamples and subsequent extracts and/or digestates.

The laboratory assigns a unique identification (e.g., Sample ID) code to each sample container received at the laboratory. This Primary ID is made up of the following information (consisting of 4 components):



The above example states that TestAmerica Buffalo Laboratory (Location 480). Login ID is 9608 (unique to a particular client/job occurrence). The container code indicates it is the first container ("A") of Sample #1.

If the primary container goes through a prep step that creates a "new" container, then the new container is considered secondary and gets another ID. An example of this being a client sample in a 1-Liter amber bottle is sent through a Liquid/Liquid Extraction and an extraction vial is created from this step. The vial would be a SECONDARY container. The secondary ID has 5 components.

Example: XXX - 9608 - A - 1 - **A** ← **Secondary Container Occurrence**

Example: 220-9608-A-1-A, would indicate the PRIMARY container listed above that went through a step that created the 1st occurrence of a Secondary container.

With this system, a client sample can literally be tracked throughout the laboratory in every step from receipt to disposal.

23.3 SAMPLE ACCEPTANCE POLICY

The laboratory has a written sample acceptance policy (Figure 23-2) that clearly outlines the circumstances under which samples shall be accepted or rejected. These include:

- a COC filled out completely;
- samples must be properly labeled;
- proper sample containers with adequate volume for the analysis (Sampling Guide) and necessary QC;

- samples must be preserved according to the requirements of the requested analytical method (Sampling Guide);
- sample holding times must be adhered to (Sampling Guide);
- The project manager will be notified if any sample is received in damaged condition.

Data from samples which do not meet these criteria are flagged and the nature of the variation from policy is defined.

23.3.1 After inspecting the samples, the sample receiving personnel sign and date the COC form, make any necessary notes of the samples' conditions and store them in appropriate refrigerators or storage locations.

23.3.2 Any deviations from these checks described in Section 23.1.1.1 that question the suitability of the sample for analysis, or incomplete documentation as to the tests required will be resolved by consultation with the client. If the sample acceptance policy criteria are not met, the laboratory shall either:

- Retain all correspondence and/or records of communications with the client regarding the disposition of rejected samples, or

- Fully document any decision to proceed with sample analysis that does not meet sample acceptance criteria.

Once sample acceptance is verified, the samples are logged into the LIMS according SOP No. BF-SR-002.

23.4 SAMPLE STORAGE

In order to avoid deterioration, contamination or damage to a sample during storage and handling, from the time of receipt until all analyses are complete, samples are stored in refrigerators, freezers or protected locations suitable for the sample matrix. Aqueous samples designated for metals analysis are stored at ambient temperature. In addition, samples to be analyzed for volatile organic parameters are stored in separate refrigerators designated for volatile organic parameters only. Samples are never to be stored with reagents, standards or materials that may create contamination.

To ensure the integrity of the samples during storage, refrigerator blanks are maintained in the volatile sample refrigerators and analyzed at a minimum of every two weeks.

Analysts and technicians provide a request form to the cooler custodian who then retrieves the requested samples. In the absence of the cooler custodian, the analysts may personally retrieve the sample containers allocated to their analysis from the designated refrigerator. The samples are placed on carts, transported the analytical area and analyzed. Following analysis the remaining sample is returned to the refrigerator from which it originally came. All unused portions of samples are returned to the secure sample control area. All samples are kept in the refrigerators for two to four weeks after analysis, which meets or exceeds most sample holding

times. After two to four weeks the samples are moved to dry room temperature, sample archive area where they are retained a minimum of 2 weeks after the final report has been issued to the client at which time disposal occurs. Special arrangements may be made to store samples for longer periods of time. Extended archival periods allow additional metal analyses to be performed on the archived sample and assists clients in dealing with legal matters or regulatory issues.

Access to the laboratory is controlled such that sample storage need not be locked at all times unless a project specifically demands it. Samples are accessible to laboratory personnel only. Visitors to the laboratory are prohibited from entering the refrigerator and laboratory areas unless accompanied by an employee of TestAmerica.

23.5 HAZARDOUS SAMPLES AND FOREIGN SOILS

To minimize exposure to personnel and to avoid potential accidents, samples which are known or suspected to be hazardous are segregated and a notification is issued to all laboratory personnel.
All hazardous samples are either returned to the client or disposed of appropriately through a hazardous waste disposal firm. All soil samples, including foreign soil samples are heat treated or incinerated in accordance with USDA permit requirements and are transported / disposed by USEPA approved facilities.

Unused portions of samples found or suspected to be hazardous according to state or federal guidelines may be returned to the client upon completion of the analytical work.

23.6 SAMPLE SHIPPING

In the event that the laboratory needs to ship samples, the samples are placed in a cooler with enough ice to ensure the samples remain just above freezing and at or below 6.0°C during transit. The samples are carefully surrounded by packing material to avoid breakage (yet maintain appropriate temperature). For sample shipments which include water/solid volatile organic analyses (see Note), a trip blank is enclosed when required by method specifications or state or regulatory programs. The chain-of-custody form is signed by the sample control technician and attached to the shipping paperwork. Samples are generally shipped overnight express or hand-delivered by a TestAmerica courier to maintain sample integrity. All personnel involved with shipping and receiving samples must be trained to maintain the proper chain-of-custody documentation and to keep the samples intact and on ice. The Environmental, Health and Safety Manual contains additional shipping requirements.

Note: If a client does not request trip blank analysis on the COC or other paperwork, the laboratory will analyze the trip blanks that were supplied.

23.7 SAMPLE DISPOSAL

Samples should be retained for a minimum of 30 days after the project report is sent, however, provisions may be made for earlier disposal of samples once the holding time is exceeded. Some samples are required to be held for longer periods based on regulatory or client requirements (e.g., 60 days after project report is sent). The laboratory must follow the longer sample retention requirements where required by regulation or client agreement. Several possibilities for sample disposal exist: the sample may be consumed completely during analysis, the sample may be returned to the customer or location of sampling for disposal, or the sample may be disposed of in accordance with the laboratory's waste disposal procedures (SOP: BF-WM-001, "Waste Management".) All procedures in the laboratory Environmental, Health and Safety Manual are followed during disposal. Samples are normally maintained in the laboratory no longer than six weeks from receipt unless otherwise requested. Unused portions of samples found or suspected to be hazardous according to state or federal guidelines may be returned to the client upon completion of the analytical work.

If a sample is part of a known litigation, the affected legal authority, sample data user, and/or submitter of the sample may request to participate in the decision about the sample's disposal. All documentation and correspondence concerning the disposal decision process must be kept on file. Pertinent information includes the date of disposal and nature of disposal (such as sample depletion, hazardous waste facility disposal, and return to client). All disposal of sample containers is accomplished through incineration. A Waste Disposal Record should be completed.

Figure 23-1.

Example: Chain of Custody (COC)

[redacted]

Chain of Custody Record

Temperature on Receipt _____

Drinking Water? Yes☐ No☐

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DL-4134 (1007)

Client	Project Manager	Date	Chain of Custody Number 193232
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page _____ of _____
City / State / Zip Code	Site Contact	Lab Contact	Analysis (Attach list if more space is needed)
Project Name and Location (State)	Carrier/Waybill Number		Special Instructions/ Conditions of Receipt
Contract/Purchase Order/Quote No.	Matrix / Containers & Preservatives		

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Solid	Unpres.	HNO3	H2SO4	HCl	NaOH	ZnAc/ NaOH

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other_____

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Figure 23-2.

Example: Sample Acceptance Policy

All incoming work will be evaluated against the criteria listed below. Where applicable, data from any samples that do not meet the criteria listed below will be noted on the laboratory report defining the nature and substance of the variation. In addition the client will be notified either by telephone, fax or e-mail ASAP after the receipt of the samples.

1) Samples must arrive with labels intact with a Chain of Custody filled out completely. The following information must be recorded.
   - *Client name, address, phone number and fax number (if available)*
   - *Project name and/or number*
   - *The sample identification*
   - *Date, time and location of sampling*
   - *The collectors name*
   - *The matrix description*
   - *The container description*
   - *The total number of each type of container*
   - *Preservatives used*
   - *Analysis requested*
   - *Requested turnaround time (TAT)*
   - *Any special instructions*
   - *Purchase Order number or billing information (e.g. quote number) if available*
   - *The date and time that each person received or relinquished the sample(s), including their signed name.*
   - ***The date and time of receipt must be recorded between the last person to relinquish the samples and the person who receives the samples in the lab, and they must be exactly the same.***
   - **Information must be legible**

2) Samples must be properly labeled.
   - Use durable labels (labels provided by TestAmerica are preferred)
   - Include a unique identification number
   - Include sampling date and time & sampler ID
   - Include preservative used.
   - Use indelible ink
   - **Information must be legible**

3) Proper sample containers with adequate volume for the analysis and necessary QC are required for each analysis requested.

4) Samples must be preserved according to the requirements of the requested analytical method. See lab Sampling Guide.
   Note: Samples that are hand delivered to the laboratory immediately after collection may not have had time to cool sufficiently. In this case the samples will be considered acceptable as long as there is evidence that the chilling process has begun (arrival on ice).

- Chemical preservation (pH) will be verified prior to analysis and documented, either in sample control or at the analyst's level. The project manager will be notified immediately if there is a discrepancy. If analyses will still be performed, all affected results will be flagged to indicate improper preservation.

- For Volatile Organic analyses in drinking water (Method 524.2). Residual chlorine must be neutralized prior to preservation. If there is prior knowledge that the samples are not chlorinated, state it on the COC and use the VOA vials pre-preserved with HCl. The following are other options for a sampler and laboratory where the presence of chlorine is not known:
  - 1. Test for residual chlorine in the field prior to sampling.
    - If no chlorine is present, the samples are to be preserved using HCl as usual.
    - If chlorine is present, add either ascorbic acid or sodium thiosulfate prior to adding HCl.
  - 2. Use VOA vials pre-preserved with sodium thiosulfate or ascorbic acid and add HCl after filling the VOA vial with the sample.
- **FOR WATER SAMPLES TESTED FOR CYANIDE – for NPDES samples by Standard Methods or EPA 335**
  - In the Field: Samples are to be tested for Sulfide using lead acetate paper prior to the addition of Sodium Hydroxide (NaOH). If sulfide is present, the sample must be treated with Cadmium Chloride and filtered prior to the addition of NaOH.

    - If the sulfide test and treatment is not performed in the field, the lab will test the samples for sulfide using lead acetate paper at the time of receipt and if sulfide is present in the sample, the client will be notified and given the option of retaking the sample and treating in the field per the method requirements or the laboratory can analyze the samples as delivered and qualify the results in the final report.

  - It is the responsibility of the client to notify the laboratory if thiosulfate, sulfite, or thiocyanate are known or suspected to be present in the sample. This notification may be on the chain of custody. The samples may need to be subcontracted to a laboratory that performs a UV digestion. If the lab does not perform the UV digestion on samples that contain these compounds, the results must be qualified in the final report.

  - The laboratory must test the sample for oxidizing agents (e.g. Chlorine) prior to analysis and treat according to the methods prior to distillation. (ascorbic acid or sodium arsenite are the preferred choice).

5) Sample Holding Times
   - TestAmerica will make every effort to analyze samples within the regulatory holding time. Samples must be received in the laboratory with enough time to perform the sample analysis. Except for short holding time samples (< 48hr HT) sample must be received with at least 48 hrs (2 working days) remaining on the holding time to ensure analysis.

   - Analyses that are designated as "field" analyses (Odor, pH, Dissolved Oxygen, Disinfectant Residual; a.k.a. Residual Chlorine, and Redox Potential) should be analyzed ASAP by the field sampler prior to delivering to the lab (within 15 minutes). However, if the analyses are to be performed in the laboratory, TestAmerica will make every effort to analyze the samples within 24 hours from receipt of the samples in the testing laboratory. Samples for "field" analyses received after 4:00 pm on Friday or on the weekend will be analyzed no later than the next business day after receipt (Monday unless a holiday). Samples will remain refrigerated and sealed until the time of analysis.

6) All samples submitted for Volatile Organic analyses must have a Trip Blank submitted at the same time. TestAmerica will supply this blank with the bottle order.

7) The project manager will be notified if any sample is received in damaged condition. TestAmerica will request that a sample be resubmitted for analysis.

8) Recommendations for packing samples for shipment.

   - Pack samples in Ice rather than "Blue" ice packs.
   - Soil samples should be placed in plastic zip-lock bags. The containers often have dirt around the top and do not seal very well and are prone to intrusion from the water from melted ice.
   - Water samples would be best if wrapped with bubble-wrap or paper (newspaper, or paper towels work) and then placed in plastic zip-lock bags.
   - Fill extra cooler space with bubble wrap.

Figure 23-3.

Example: Cooler Receipt Form

Doc. Login Front

TestAmerica Buffalo

Doc. LoginFront
Rev 13
09/21/2012

LOGIN **Copy from**

Company_____ Project #_____

Event _____ Analysis_____

TAT_____BD/_____CD # OF SAMPLES _____ TRIP BLANK Y/N #_____

SHIPPED BY	ATTACH SHIPPING TAGS(back)
RECEIVED DATE / TIME:	_____/_____/_____ _____:____

COOLER(s)_____ Temps_____ °C (<6 °C)

IR GUN 1 2 3

CUSTODY SEAL INTACT? YES/NO NONE RAD CHECK <0.02mR/hr: Y/N

RESIDUAL CHLORINE CHECK

☐ YES, OK ☐ YES, Qualified ☐ YES, Preserved ☐ NO, lab to check ☐ N/A

WORKSHARE/SUB Y/N LAB_____ ICOC #_____

RECEIVED OUTSIDE HOLD TIME Y/N_____

CHECKLIST ISSUES Y/N_____

PRESERVATION CHECKED YES___ NO___ NA___ Initials_____

ARE SAMPLE DATES AND TIMES CORRECT? Initials_____

WERE ALL THE APPROPRIATE TESTS ASSIGNED? Initials_____

NCM_____ COC SCANNED Y/N

ANALYSIS GROUP ISSUES_____

Temp Cert Loss:

Section 24.0

ASSURING THE QUALITY OF TEST RESULTS

24.1 OVERVIEW

In order to assure our clients of the validity of their data, the laboratory continuously evaluates the quality of the analytical process. The analytical process is controlled not only by instrument calibration as discussed in Section 20, but also by routine process quality control measurements (e.g. Blanks, Laboratory Control Samples (LCS), Matrix Spikes (MS), duplicates (DUP), surrogates, Internal Standards (IS)). These quality control checks are performed as required by the method or regulations to assess precision and accuracy. Quality control samples are to be treated in the exact same manner as the associated field samples being tested. In addition to the routine process quality control samples, Proficiency Testing (PT) Samples (concentrations unknown to laboratory) are analyzed to help ensure laboratory performance.

24.2 CONTROLS

Sample preparation or pre-treatment is commonly required before analysis. Typical preparation steps include homogenization, grinding, solvent extraction, sonication, acid digestion, distillation, reflux, evaporation, drying and ashing. During these pre-treatment steps, samples are arranged into discreet manageable groups referred to as preparation (prep) batches. Prep batches provide a means to control variability in sample treatment. Control samples are added to each prep batch to monitor method performance and are processed through the entire analytical procedure with investigative/field samples.

24.3 NEGATIVE CONTROLS

Table 24-1.

Control Type	Details
Method Blank (MB)	Are used to assess preparation and analysis for possible contamination during the preparation and processing steps.
	The specific frequency of use for method blanks during the analytical sequence is defined in the specific standard operating procedure for each analysis. Generally it is 1 for each batch of samples, not to exceed 20 environmental samples.
	The method blank is prepared from a clean matrix similar to that of the associated samples that is free from target analytes (e.g., Reagent water, Ottawa sand, glass beads, etc.) and is processed along with and under the same conditions as the associated samples. The method blank goes through all of the steps of the process (including as necessary: filtration, clean-ups, etc.).
	Reanalyze or qualify associated sample results when the concentration of a targeted analyte in the blank is at or above the reporting limit as established by the method or by regulation, AND is greater than 1/10 of the amount measured in the sample.
Calibration Blanks	Are prepared and analyzed along with calibration standards where applicable. They are prepared using the same reagents that are used to prepare the standards. In some analyses the calibration blank may be included in the calibration curve.

Table 24-1.

Control Type	Details
Instrument Blanks	Are blank reagents or reagent water that may be processed during an analytical sequence in order to assess contamination in the analytical system. In general, instrument blanks are used to differentiate between contamination caused by the analytical system and that caused by the sample handling or sample prep process. Instrument blanks may also be inserted throughout the analytical sequence to minimize the effect of carryover from samples with high analyte content.
Trip Blank [1]	Are required to be submitted by the client with each shipment of samples requiring aqueous and solid volatiles analyses (or as specified in the client's project plan) Additionally, trip blanks may be prepared and analyzed for volatile analysis of air samples, when required by the client. A trip blank may be purchased (certified clean) or is prepared by the laboratory by filling a clean container with pure deionized water that has been purged to remove any volatile compounds. Appropriate preservatives are also added to the container. The trip blank is sent with the bottle order and is intended to reflect the environment that the containers are subjected to throughout shipping and handling and help identify possible sources if contamination is found. The field sampler returns the trip blank in the cooler with the field samples.
Field Blanks [1]	Are sometimes used for specific projects by the field samplers. A field blank prepared in the field by filling a clean container with pure reagent water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)
Equipment Blanks [1]	Are also sometimes created in the field for specific projects. An equipment blank is a sample of analyte-free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures. (NELAC)
Holding Blanks	also referred to as refrigerator or freezer blanks, are used to monitor the sample storage units for volatile organic compounds during the storage of VOA samples in the laboratory

[1] When known, these field QC samples should not be selected for matrix QC as it does not provide information on the behavior of the target compounds in the field samples. Usually, the client sample ID will provide information to identify the field blanks with labels such as "FB", "EB", or "TB."

Evaluation criteria and corrective action for these controls are defined in the specific standard operating procedure for each analysis.

24.4 POSITIVE CONTROLS

Control samples (e.g., QC indicators) are analyzed with each batch of samples to evaluate data based upon (1) Method Performance (Laboratory Control Sample (LCS) or Blank Spike (BS)), which entails both the preparation and measurement steps; and (2) Matrix Effects (Matrix Spike (MS) (Matrix spikes are not applicable to air) or Sample Duplicate (MD, DUP), which evaluates field sampling accuracy, precision, representativeness, interferences, and the effect of the matrix on the method performed. Each regulatory program and each method within those programs specify the control samples that are prepared and/or analyzed with a specific batch

Note that frequency of control samples vary with specific regulatory, methodology and project specific criteria. Complete details on method control samples are as listed in each analytical SOP.

24.4.1 Method Performance Control - Laboratory Control Sample (LCS)

24.4.1.1 The LCS measures the accuracy of the method in a blank matrix and assesses method performance independent of potential field sample matrix affects in a laboratory batch.

24.4.1.2 The LCS is prepared from a clean matrix similar to that of the associated samples that is free from target analytes (for example: Reagent water, Ottawa sand, glass beads, etc.) and is processed along with and under the same conditions as the associated samples. The LCS is spiked with verified known amounts of analytes or is made of a material containing known and verified amounts of analytes, taken through all preparation and analysis steps along with the field samples. Where there is no preparation taken for an analysis (such as in aqueous volatiles), or when all samples and standards undergo the same preparation and analysis process (such as Phosphorus), a calibration verification standard may be reported as the LCS. In some instances where there is no practical clean solid matrix available, aqueous LCS's may be processed for solid matrices; final results may be calculated as mg/kg or ug/kg, assuming 100% solids and a weight equivalent to the aliquot used for the corresponding field samples, to facilitate comparison with the field samples.

24.4.1.3 Certified pre-made reference material purchased from a NIST/A2LA accredited vendor may also be used for the LCS when the material represents the sample matrix or the analyte is not easily spiked (e.g. solid matrix LCS for metals, TDS, etc.).

24.4.1.4 The specific frequency of use for LCS during the analytical sequence is defined in the specific standard operating procedure for each analysis. It is generally 1 for each batch of samples; not to exceed 20 environmental samples.

24.4.1.5 If the mandated or requested test method, or project requirements, do not specify the spiking components, the laboratory shall spike all reportable components to be reported in the Laboratory Control Sample (and Matrix Spike) where applicable (e.g. no spike of pH). However, in cases where the components interfere with accurate assessment (such as simultaneously spiking chlordane, toxaphene and PCBs in Method 608), the test method has an extremely long list of components or components are incompatible, at a minimum, a representative number of the listed components (see below) shall be used to control the test method. The selected components of each spiking mix shall represent all chemistries, elution patterns and masses, permit specified analytes and other client requested components. However, the laboratory shall ensure that all reported components are used in the spike mixture within a two-year time period.

24.4.1.5.1 For methods that have 1-10 target analytes, spike all components.

24.4.1.5.2 For methods that include 11-20 target analytes, spike at least 10 or 80%, whichever is greater.

24.4.1.5.3 For methods with more than 20 target analytes, spike at least 16 components.

24.4.1.5.4 Exception: Due to analyte incompatibility in pesticides, Toxaphene and Chlordane are only spiked at client request based on specific project needs.

24.4.1.5.5 Exception: Due to analyte incompatibility between the various PCB aroclors, aroclors 1016 and 1260 are used for spiking as they cover the range of all of the aroclors. Specific aroclors may be used by request on a project specific basis.

24.5 SAMPLE MATRIX CONTROLS

Table 24-5. Sample Matrix Control

Control Type	Details	
Matrix Spikes (MS)	Use	Used to assess the effect sample matrix of the spiked sample has on the precision and accuracy of the results generated by the method used;
	Typical Frequency [1]	At a minimum, with each matrix-specific batch of samples processed, an MS is carried through the complete analytical procedure. Unless specified by the client, samples used for spiking are randomly selected and rotated between different client projects. If the mandated or requested test method does not specify the spiking components, the laboratory shall spike all reportable components to be reported in the Laboratory Control Sample and Matrix Spike. Refer to the method SOP for complete details
	Description	Essentially a sample fortified with a known amount of the test analyte(s).
Surrogate	Use	Measures method performance to sample matrix (organics only).
	Typical Frequency [1]	Are added to all samples, standards, and blanks, for all organic chromatography methods except when the matrix precludes its use or when a surrogate is not available. The recovery of the surrogates is compared to the acceptance limits for the specific method. Poor surrogate recovery may indicate a problem with sample composition and shall be reported, with data qualifiers, to the client whose sample produced poor recovery.
	Description	Are similar to matrix spikes except the analytes are compounds with properties that mimic the analyte of interest and are unlikely to be found in environment samples.
Duplicates[2]	Use	For a measure of analytical precision, with each matrix-specific batch of samples processed, a matrix duplicate (MD or DUP) sample, matrix spike duplicate (MSD), or LCS duplicate (LCSD) is carried through the complete analytical procedure.
	Typical Frequency [1]	Duplicate samples are usually analyzed with methods that do not require matrix spike analysis.
	Description	Performed by analyzing two aliquots of the same field sample independently or an additional LCS.
Internal Standards	Use	Are spiked into all environmental and quality control samples (including the initial calibration standards) to monitor the qualitative aspect of organic and some inorganic analytical measurements.
	Typical Frequency [1]	All organic and ICP methods as required by the analytical method.
	Description	Used to correct for matrix effects and to help troubleshoot variability in analytical response and are assessed after data acquisition. Possible sources of poor internal standard response are sample matrix, poor analytical technique or instrument performance.

[1] See the specific analytical SOP for type and frequency of sample matrix control samples.

[2] LCSD's are normally not performed except when regulatory agencies or client specifications require them. The recoveries for the spiked duplicate samples must meet the same laboratory established recovery limits as the accuracy QC samples. If an LCSD is analyzed both the LCS and LCSD must meet the same recovery criteria and be included in the final report. The precision measurement is reported as "Relative Percent Difference" (RPD). Poor precision between duplicates (except LCS/LCSD) may indicate non-homogeneous matrix or sampling.

24.6 ACCEPTANCE CRITERIA (CONTROL LIMITS)

24.6.1 As mandated by the test method and regulation, each individual analyte in the LCS, MS, or Surrogate Spike is evaluated against the control limits published in the test method. Where

there are no established acceptance criteria, the laboratory calculates in-house control limits with the use of control charts or, in some cases, utilizes client project specific control limits. When this occurs, the regulatory or project limits will supersede the laboratory's in-house limits.

Note: For methods, analytes and matrices with very limited data (e.g., unusual matrices not analyzed often), interim limits are established using available data or by analogy to similar methods or matrices.

24.6.2 Once control limits have been established, they are verified, reviewed, and updated if necessary on an annual basis unless the method requires more frequent updating. Control limits are established per method (as opposed to per instrument) regardless of the number of instruments utilized.

24.6.3 Laboratory generated % Recovery acceptance (control) limits are generally established by taking $\pm$ 3 Standard Deviations (99% confidence level) from the average recovery of a minimum of 20-30 data points (more points are preferred).

24.6.3.1 Regardless of the calculated limit, the limit should be no tighter than the Calibration Verification (ICV/CCV). (Unless the analytical method specifies a tighter limit).

24.6.3.2 In-house limits cannot be any wider than those mandated in a regulated analytical method. Client or contract required control limits are evaluated against the laboratory's statistically derived control limits to determine if the data quality objectives (DQOs) can be achieved. If laboratory control limits are not consistent with DQOs, then alternatives must be considered, such as method improvements or use of an alternate analytical method.

24.6.3.3 The lowest acceptable recovery limit will be 10% (the analyte must be detectable). Exception: The lowest acceptable recovery limit for Benzidine will be 5% and the analyte must be detectable.

24.6.3.4 The maximum acceptable recovery limit will be 150%.

24.6.3.5 The maximum acceptable RPD limit will be 35% for waters and 40% for soils. The minimum RPD limit is 10%.

24.6.3.6 If either the high or low end of the control limit changes by $\leq$ 5% from previous, the data points are inspected and, using professional judgment, the limits may be left unchanged if there is no affect on laboratory ability to meet the existing limits.

24.6.4 The lab must be able to generate a current listing of their control limits and track when the updates are performed. In addition, the laboratory must be able to recreate historical control limits.

24.6.4.1 The control limits are maintained in the laboratory LIMs system. The limits for each analyte/method/matrix combination are assigned effective and expiration dates. The QA department is able to query the LIMs system and print an active list of control limits based on

this database. The most current laboratory limits (based on the effective/expiration dates) are reflected on the laboratory worksheets and final reports unless superseded by project specific limits.

24.6.5 A LCS that is within the acceptance criteria establishes that the analytical system is in control and is used to validate the process. Samples that are analyzed with an LCS with recoveries outside of the acceptance limits may be determined as out of control and should be reanalyzed if possible. If reanalysis is not possible, then the results for all affected analytes for samples within the same batch must be qualified when reported. The internal corrective action process (see Section 13) is also initiated if an LCS exceeds the acceptance limits. Sample results may be qualified and reported without reanalysis if:

24.6.5.1 The analyte results are below the reporting limit and the LCS is above the upper control limit.

24.6.5.2 If the analytical results are above the relevant regulatory limit and the LCS is below the lower control limit.

24.6.6 If the MS/MSDs do not meet acceptance limits, the MS/MSD and the associated spiked sample is reported with a qualifier for those analytes that do not meet limits. If obvious preparation errors are suspected, or if requested by the client, unacceptable MS/MSDs are reprocessed and reanalyzed to prove matrix interference. A more detailed discussion of acceptance criteria and corrective action can be found in the lab's method SOPs and in Section 12.

24.6.7 If a surrogate standard falls outside the acceptance limits, if there is not obvious chromatographic matrix interference, reanalyze the sample to confirm a possible matrix effect. If the recoveries confirm or there was obvious chromatographic interference, results are reported from the original analysis and a qualifier is added. If the reanalysis meets surrogate recovery criteria, the second run is reported (or both are reported if requested by the client). Under certain circumstances, where all of the samples are from the same location and share similar chromatography, the reanalysis may be performed on a single sample rather than all of the samples and if the surrogate meets the recovery criteria in the reanalysis, all of the affected samples would require reanalysis.

24.7 ADDITIONAL PROCEDURES TO ASSURE QUALITY CONTROL

24.7.1 The laboratory has written and approved method SOPs to assure the accuracy of the test method including calibration (see Section 20), use of certified reference materials (see Section 21) and use of PT samples.

24.7.2 A discussion regarding MDLs, Limit of Detection (LOD) and Limit of Quantitation (LOQ) can be found in Section 19.

24.7.3 Use of formulae to reduce data is discussed in the method SOPs and in Section 20.

24.7.4 Selection of appropriate reagents and standards is included in Section 9 and 22.

24.7.5 A discussion on selectivity of the test is included in Section 5.

24.7.6 Constant and consistent test conditions are discussed in Section 19.

24.7.7 The laboratories sample acceptance policy is included in Section 23.

SECTION 25.0

REPORTING RESULTS

25.1 OVERVIEW

The results of each test are reported accurately, clearly, unambiguously, and objectively in accordance with State and Federal regulations as well as client requirements. A variety of report formats are available to meet specific needs. Analytical results are issued in a format that is intended to satisfy customer and laboratory accreditation requirements as well as provide the end user with the information needed to properly evaluate the results. Where there is conflict between client requests and laboratory ethics or regulatory requirements, the laboratory's ethical and legal requirements are paramount, and the laboratory will work with the client during project set up to develop an acceptable solution. Refer to Section 7.

In cases where a client asks for simplified reports, there must be a written request from the client. There still must be enough information that would show any analyses that were out of conformance (QC out of limits) and there should be a reference to a full report that is made available to the client.

Review of reported data is included in Section 19.

25.2 TEST REPORTS

Analytical results are reported in a format that is satisfactory to the client and meets all requirements of applicable accrediting authorities and agencies. A variety of report formats are available to meet specific needs. The report is printed on laboratory letterhead, reviewed, and signed by the appropriate project manager. At a minimum, the standard laboratory report shall contain the following information:

25.2.1 A report title (e.g. Analytical Report) with a "sample results" column header.

25.2.2 Each report cover page is printed on company letterhead which includes the laboratory name, address and telephone number.

25.2.3 A unique identification of the report (e.g. job number) and on each page an identification in order to ensure the page is recognized as part of the report and a clear identification of the end.

Note: Page numbers of report are represented as # / ##. Where the first number is the page number and the second is the total number of pages.

25.2.4 A copy of the chain of custody (COC).

- Any COCs involved with Subcontracting are included.
- In most cases, the applicable COC is paginated and is an integral part of the report.

- Any additional addenda to the report must be treated in a similar fashion so it is a recognizable part of the report and cannot accidentally get separated from the report (e.g. Sampling information).

25.2.5 The name and address of client and a project name/number, if applicable.

25.2.6 Client project manager or other contact

25.2.7 Description and unambiguous identification of the tested sample(s) including the client identification code.

25.2.8 Date of receipt of sample, date and time of collection, and date(s) of test preparation and performance, and time of preparation or analysis if the required holding time for either activity is less than or equal to 72 hours.

25.2.9 Date reported or date of revision, if applicable.

25.2.10 Method of analysis including method code (EPA, Standard Methods, etc).

25.2.11 Practical quantitation limits or client reporting limit.

25.2.12 Method detection limits (if requested)

25.2.13 Definition of Data qualifiers and reporting acronyms (e.g. ND).

25.2.14 Sample results.

25.2.15 QC data consisting of method blank, surrogate, LCS, and MS/MSD recoveries and control limits (if requested).

25.2.16 Condition of samples at receipt including temperature. This may be accomplished in a narrative or by attaching sample login sheets (Refer to Sec. 25.2.4 – Item 3 regarding additional addenda). Sample temperatures are recorded in the report case narrative and on the COC. Deviations from normal conditions (e.g., preservation, breakage) are recorded in the report case narrative.

25.2.17 A statement to the effect that the results relate only to the items tested and the sample as received by the laboratory.

25.2.18 A statement that the report shall not be reproduced except in full, without prior express written approval by the laboratory coordinator.

25.2.19 A signature and title of the person(s) accepting responsibility for the content of the report and date of issue. Signatories are appointed by the Lab Director.

25.2.20 When NELAC accreditation is required, the lab shall certify that the test results meet all requirements of NELAC or provide reasons and/or justification if they do not.

25.2.21 The laboratory includes a cover letter.

25.2.22 Where applicable, a narrative to the report that explains the issue(s) and corrective action(s) taken in the event that a specific accreditation or certification requirement was not met.

25.2.23 When Soil samples are analyzed, a specific identification as to whether soils are reported on a "wet weight" or "dry weight" basis.

25.2.24 Appropriate laboratory certification number for the state of origin of the sample if applicable.

25.2.25 If only part of the report is provided to the client (client requests some results before all of it is complete), it must be clearly indicated on the report (e.g, partial report). A complete report must be sent once all of the work has been completed.

25.2.26 Any non-TestAmerica subcontracted analysis results are provided as an addendum to the report on the official letterhead of the subcontractor. All TestAmerica subcontracting is clearly identified on the report as to which laboratory performed a specific analysis.

25.3 REPORTING LEVEL OR REPORT TYPE

TestAmerica Buffalo offers four levels of quality control reporting. Each level, in addition to its own specific requirements, contains all the information provided in the preceding level. The packages provide the following information in addition to the information described above:

- Level I is a report with the features described in Section 25.2 above.
- Level II is a Level I report plus summary information, including results for the method blank, percent recovery for laboratory control samples and matrix spike samples, and the RPD values for all MSD and sample duplicate analyses.
- Level III contains all the information supplied in Level II, but presented on CLP-like summary forms, and relevant calibration information. A Level II report is not included, unless specifically requested. No raw data is provided.
- Level IV is the same as Level III with the addition of all raw supporting data.

In addition to the various levels of QC packaging, the laboratory also provides reports in diskette deliverable form. Initial reports may be provided to clients by facsimile. All faxed reports are followed by hardcopy. Procedures used to ensure client confidentiality are outlined in Section 26.7.

25.3.1 Electronic Data Deliverables (EDDs)

EDDs are routinely offered as part of TestAmerica's services. ***TestAmerica Buffalo*** offers a variety of EDD formats including Environmental Restoration Information Management System (ERPIMS), Excel, Dbase, GISKEY, and Text Files.

EDD specifications are submitted to the IT department by the PM for review and undergo the contract review process. Once the facility has committed to providing data in a specific electronic format, the coding of the format may need to be performed. This coding is documented and validated. The validation of the code is retained by the IT staff coding the EDD.

EDDs shall be subject to a review to ensure their accuracy and completeness. If EDD generation is automated, review may be reduced to periodic screening if the laboratory can demonstrate that it can routinely generate that EDD without errors. Any revisions to the EDD format must be reviewed until it is demonstrated that it can routinely be generated without errors. If the EDD can be reproduced accurately and if all subsequent EDDs can be produced error-free, each EDD does not necessarily require a review.

25.4 SUPPLEMENTAL INFORMATION FOR TEST

The lab identifies any unacceptable QC analyses or any other unusual circumstances or observations such as environmental conditions and any non-standard conditions that may have affected the quality of a result. This is typically in the form of a footnote or a qualifier and/or a narrative explaining the discrepancy in the front of the report

25.4.1 Numeric results with values outside of the calibration range, either high or low are qualified as 'estimated'.

25.4.2 Where quality system requirements are not met, a statement of compliance/non-compliance with requirements and/or specifications is required, including identification of test results derived from any sample that did not meet TNI sample acceptance requirements such as improper container, holding time, or temperature.

25.4.3 Where applicable, a statement on the estimated uncertainty of measurements; information on uncertainty is needed when a client's instructions so require.

25.4.4 Opinions and Interpretations - The test report contains objective information, and generally does not contain subjective information such as opinions and interpretations. If such information is required by the client, the Laboratory Director will determine if a response can be prepared. If so, the Laboratory Director will designate the appropriate member of the management team to prepare a response. The response will be fully documented, and reviewed by the Laboratory Director, before release to the client. There may be additional fees charged to the client at this time, as this is a non-routine function of the laboratory.

Note: Review of data deliverable packages for submittal to regulatory authorities requires responses to non-conforming data concerning potential impact on data quality. This

necessitates a limited scope of interpretation, and this work is performed by the QA Department. This is the only form of "interpretation" of data that is routinely performed by the laboratory.

When opinions or interpretations are included in the report, the laboratory provides an explanation as to the basis upon which the opinions and interpretations have been made. Opinions and interpretations are clearly noted as such and where applicable, a comment should be added suggesting that the client verify the opinion or interpretation with their regulator.

25.5 ENVIRONMENTAL TESTING OBTAINED FROM SUBCONTRACTORS

If the laboratory is not able to provide the client the requested analysis, the samples would be subcontracted following the procedures outlined in Section 8.

Data reported from analyses performed by a subcontractor laboratory are clearly identified as such on the analytical report provided to the client. Results from a subcontract laboratory outside of TestAmerica are reported to the client on the subcontract laboratory's original report stationary and the report includes any accompanying documentation.

25.6 CLIENT CONFIDENTIALITY

In situations involving the transmission of environmental test results by telephone, facsimile or other electronic means, client confidentiality must be maintained.

TestAmerica will not intentionally divulge to any person (other than the Client or any other person designated by the Client in writing) any information regarding the services provided by TestAmerica or any information disclosed to TestAmerica by the Client. Furthermore, information known to be potentially endangering to national security or an entity's proprietary rights will not be released.

Note: This shall not apply to the extent that the information is required to be disclosed by TestAmerica under the compulsion of legal process. TestAmerica will, to the extent feasible, provide reasonable notice to the client before disclosing the information.

Note: Authorized representatives of an accrediting authority are permitted to make copies of any analyses or records relevant to the accreditation process, and copies may be removed from the laboratory for purposes of assessment.

25.6.1 Report deliverable formats are discussed with each new client. If a client requests that reports be faxed or e-mailed, the reports are faxed with a cover sheet or e-mailed with the following note that includes a confidentiality statement similar to the following:

This material is intended only for the use of the individual(s) or entity to whom it is addressed, and may contain information that is privileged and confidential. It is our policy that facsimiles are intended for and should be used for business purposes only. If you are not the intended recipient, or the employee or agent responsible for delivering this material to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify the sender.

25.7 FORMAT OF REPORTS

The format of reports is designed to accommodate each type of environmental test carried out and to minimize the possibility of misunderstanding or misuse.

25.8 AMENDMENTS TO TEST REPORTS

Corrections, additions, or deletions to reports are only made when justification arises through supplemental documentation. Justification is documented using the laboratory's corrective action system (refer to Section 12).

The revised report is retained on the Archive data server, as is the original report. The revised report is stored in the Archive data server under the sample number followed by "R". The revised report will have the word "revised" appended to the cover letter.

When the report is re-issued, a notation of "revised" is placed on the cover/signature page of the report. A brief explanation of reason for the re-issue is included in the report case narrative.

25.9 POLICIES ON CLIENT REQUESTS FOR AMENDMENTS

25.9.1 Policy on Data Omissions or Reporting Limit Increases

Fundamentally, our policy is simply to not omit previously reported results (including data qualifiers) or to not raise reporting limits and report sample results as ND. This policy has few exceptions. Exceptions are:

- Laboratory error.
- Sample identification is indeterminate (confusion between COC and sample labels).
- An incorrect analysis (not analyte) was requested (e.g., COC lists 8315 but client wanted 8310). A written request for the change is required.
- Incorrect limits reported based on regulatory requirements.
- The requested change has absolutely *no possible* impact on the interpretation of the analytical results and there is *no possibility* of the change being interpreted as misrepresentation by anyone inside or outside of our company.

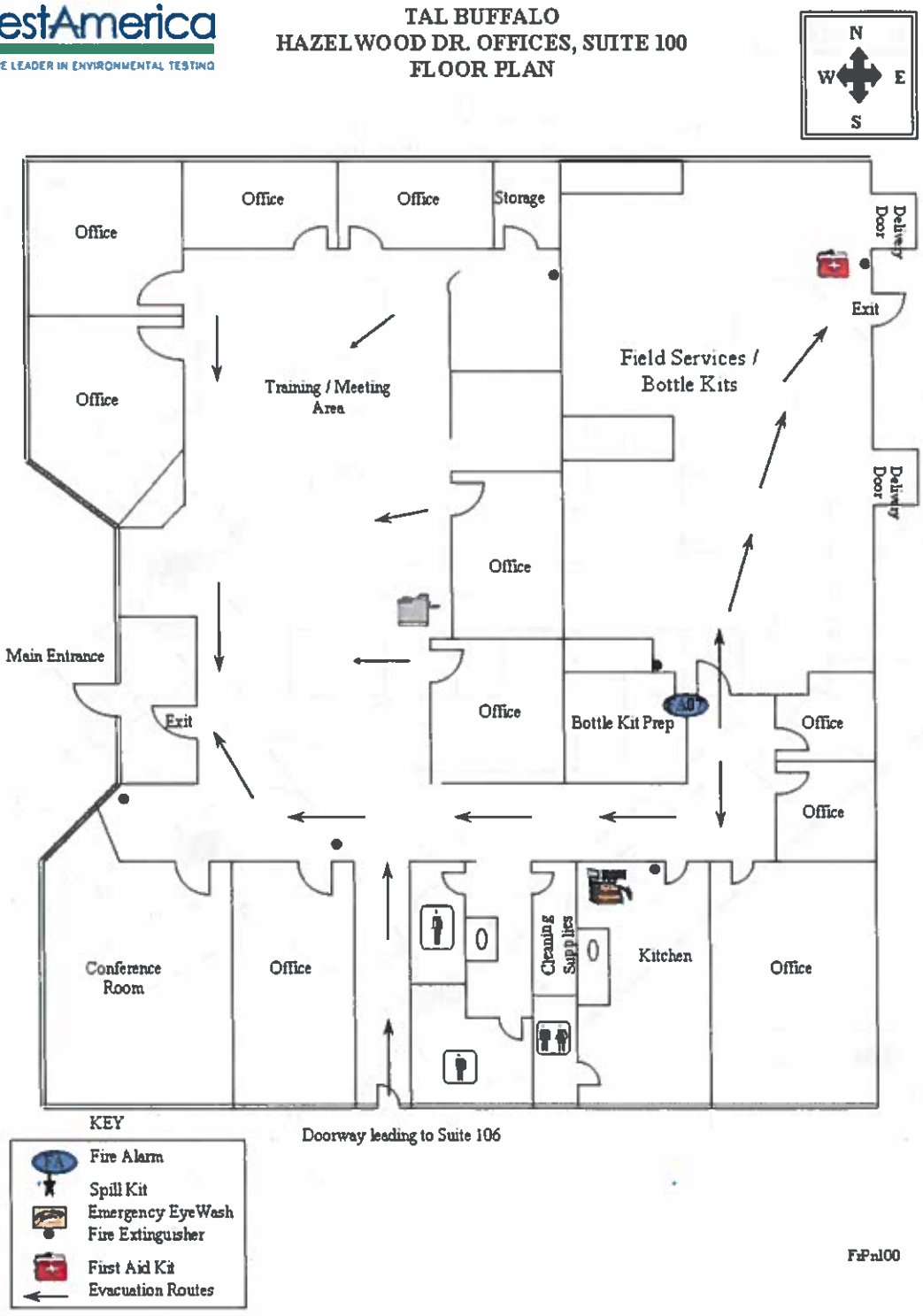
25.9.2 Multiple Reports

TestAmerica does not issue multiple reports for the same workorder where there is different information on each report (this does not refer to copies of the same report) unless required to meet regulatory needs and approved by QA.

Appendix 1.

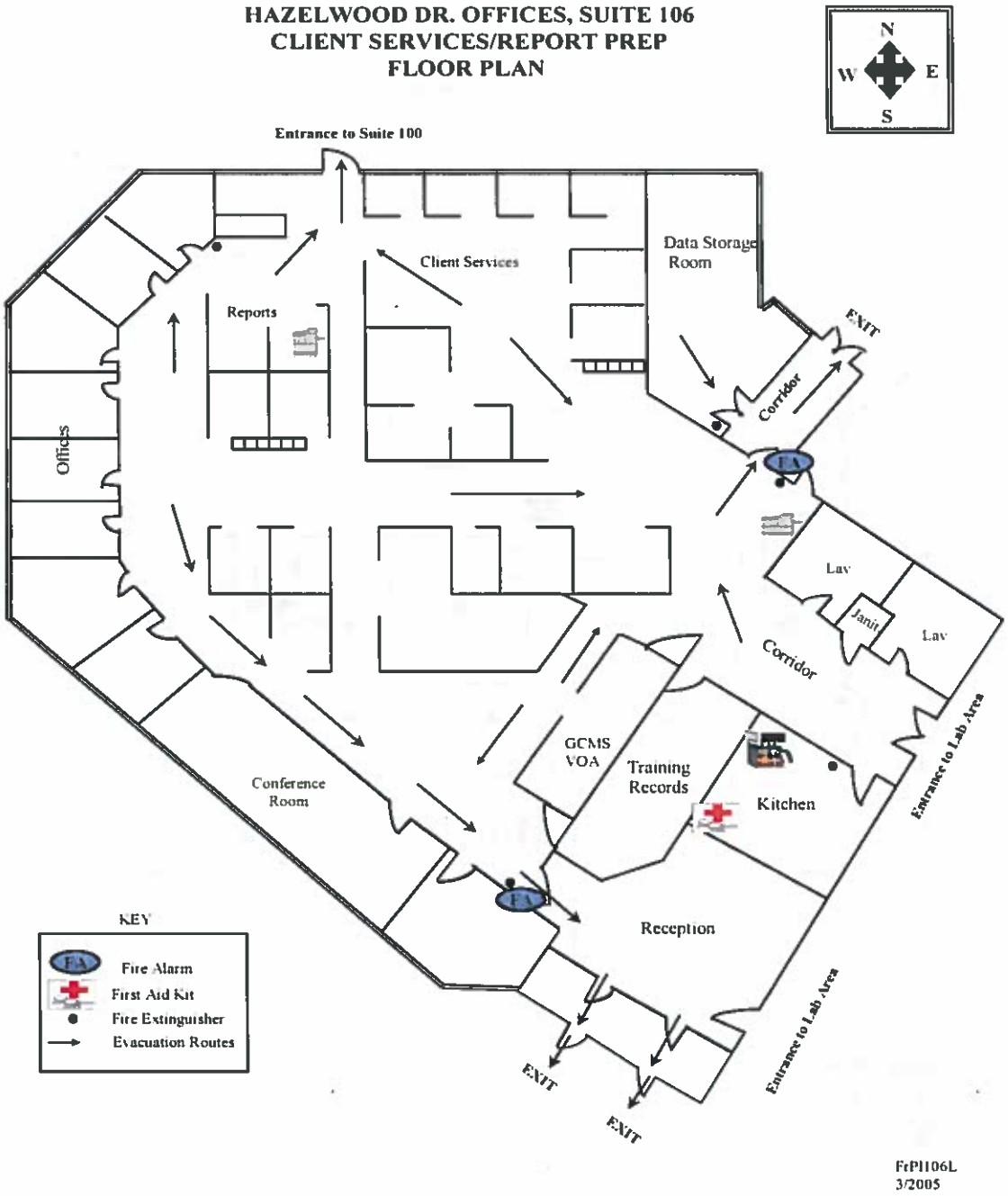
TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TAL BUFFALO
HAZELWOOD DR. OFFICES, SUITE 100
FLOOR PLAN



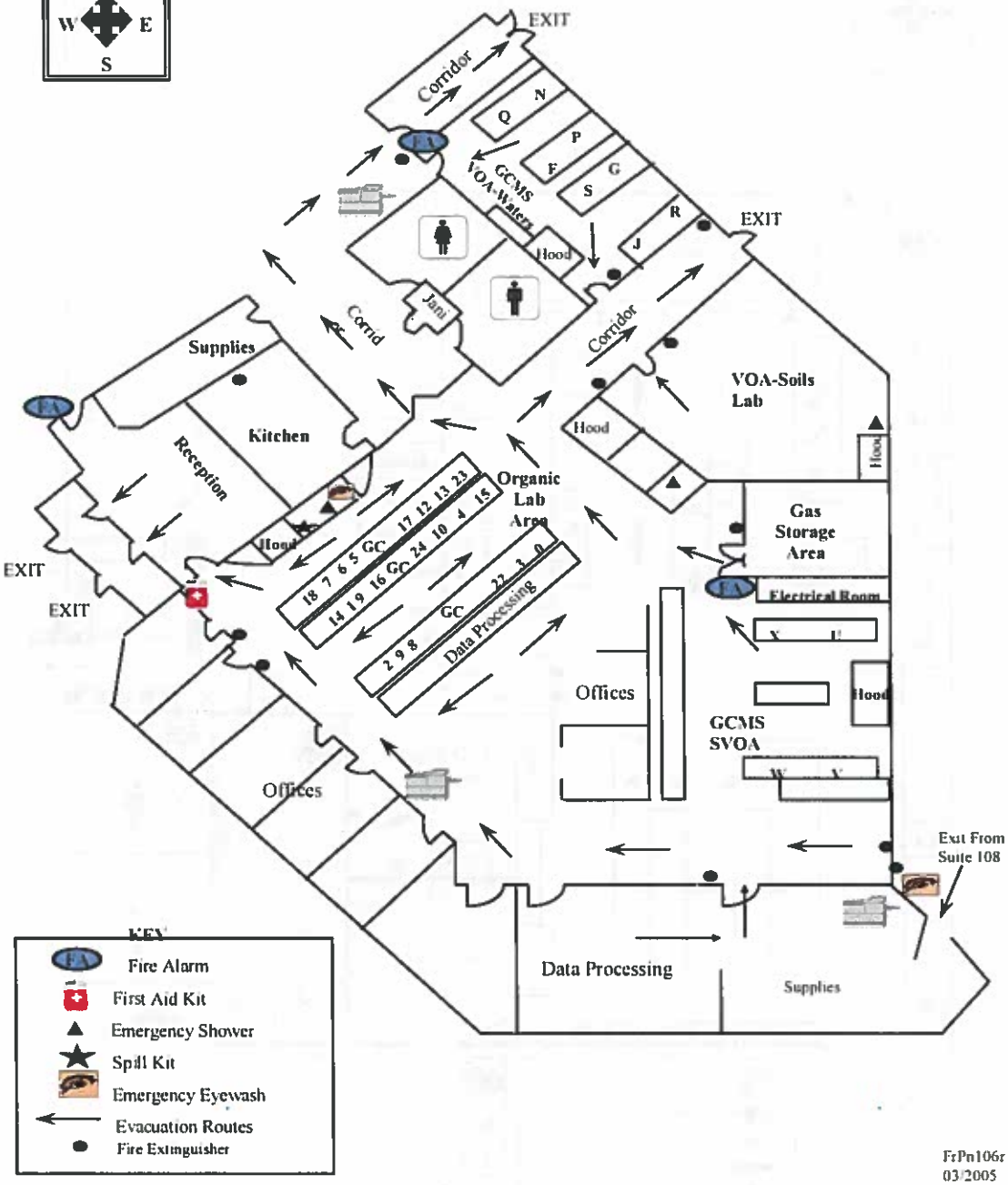
TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TAL BUFFALO
HAZELWOOD DR. OFFICES, SUITE 106
CLIENT SERVICES/REPORT PREP
FLOOR PLAN



TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

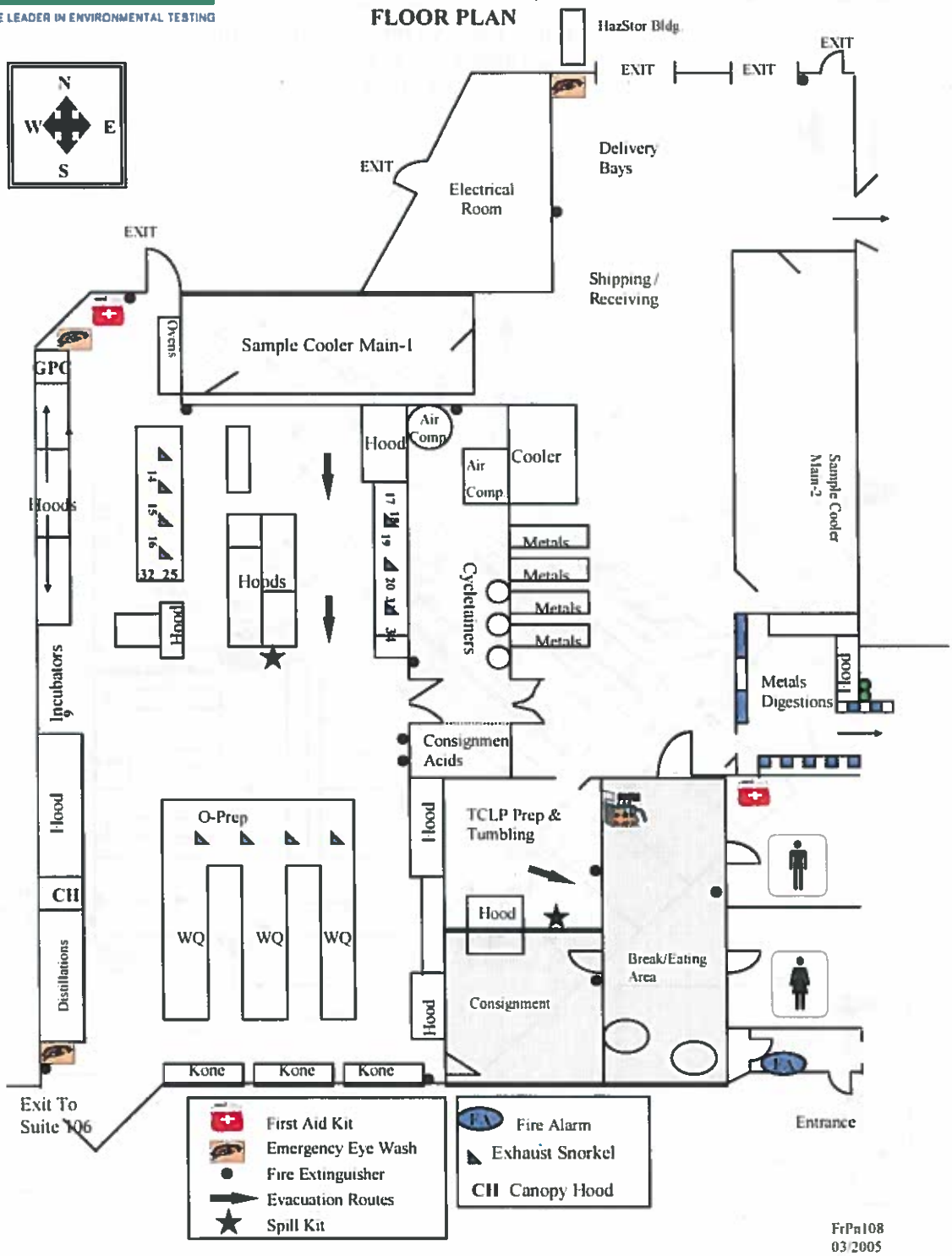
TAL BUFFALO
HAZELWOOD DR. NY OFFICES, SUITE 106
LABORATORY AREA
FLOOR PLAN

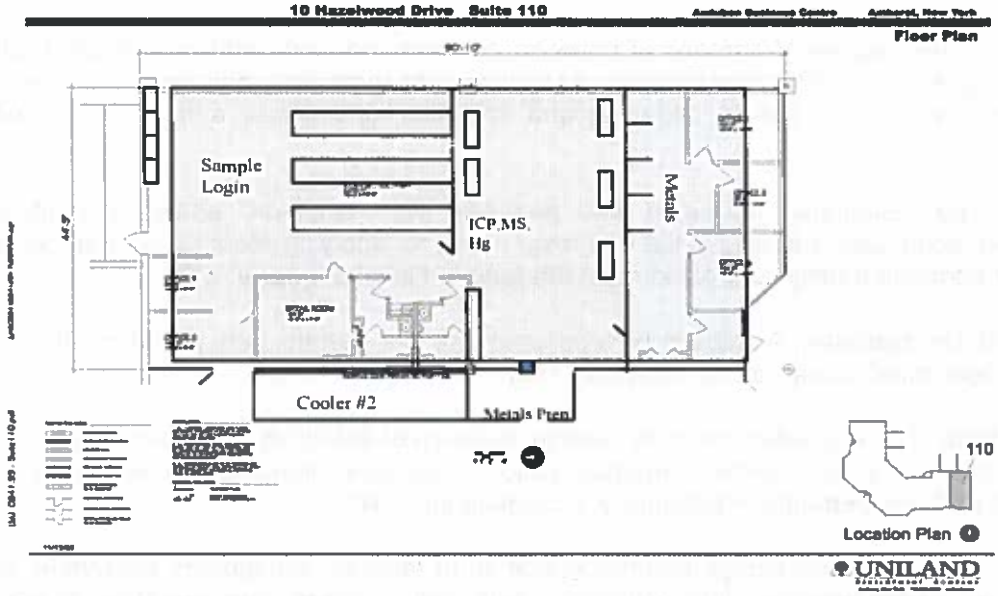


FrPn106r
03/2005

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TAL BUFFALO
HAZELWOOD DR. OFFICES, SUITE 108
FLOOR PLAN




10 Hazelwood Drive Suite 110
Floor Plan
Sample Login
ICP,MS, Hg
Metals
Cooler #2
Metals Prep
110
Location Plan
UNILAND

Appendix 2. Glossary/Acronyms

Glossary:

Acceptance Criteria: Specified limits placed on characteristics of an item, process, or service defined in requirement documents. (ASQC)

Accreditation: The process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. In the context of the National Environmental Laboratory Accreditation Program (NELAP), this process is a voluntary one. (TNI)

Accrediting Authority: The Territorial, State, or Federal Agency having responsibility and accountability for environmental laboratory accreditation and which grants accreditation (TNI)

Accuracy: The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator. (QAMS)

Analyst: The designated individual who performs the "hands-on" analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality. (TNI)

Analytical Uncertainty: A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis. (TNI)

Assessment: The evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its systems to defined criteria (to the standards and requirements of laboratory accreditation). (TNI)

Audit: A systematic and independent examination of facilities, equipment, personnel, training, procedures, record-keeping, data validation, data management, and reporting aspects of a system to determine whether QA/QC and technical activities are being conducted as planned and whether these activities will effectively achieve quality objectives. (TNI)

Batch: Environmental samples which are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) and /or those samples not requiring preparation, which are analyzed together as a group using the same calibration curve or factor. An analytical batch can include samples originating from various environmental matrices and can exceed 20 samples. (TNI)

Blank: A sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the

usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. (ASQC)

Calibration: A set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards. (TNI)

1) In calibration of support equipment the values realized by standards are established through the use of reference standards that are traceable to the International System of Units (SI).

2) In calibration according to methods, the values realized by standards are typically established through the use of Reference Materials that are either purchased by the laboratory with a certificate of analysis or purity, or prepared by the laboratory using support equipment that has been calibrated or verified to meet specifications.

Calibration Curve: The mathematical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response. (TNI)

Calibration Standard: A substance or reference material used to calibrate an instrument (QAMS)

Certified Reference Material (CRM): A reference material, accompanied by a certificate, having a value, measurement uncertainty, and stated metrological traceability chain to a national metrology institute. (TNI).

Chain of Custody (COC) Form: Record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; the collector; time of collection; preservation; and requested analyses. (TNI)

Compromised Samples: Those samples which are improperly sampled, insufficiently documented (chain of custody and other sample records and/or labels), improperly preserved, collected in improper containers, or exceeding holding times when delivered to a laboratory. Under normal conditions, compromised samples are not analyzed. If emergency situation require analysis, the results must be appropriately qualified. (TNI)

Confidential Business Information (CBI): Information that an organization designates as having the potential of providing a competitor with inappropriate insight into its management, operation or products. NELAC and its representatives agree to safeguarding identified CBI and to maintain all information identified as such in full confidentiality.

Confirmation: Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to:

Second column confirmation
Alternate wavelength

Derivitization
Mass spectral interpretation
Alternative detectors or
Additional Cleanup procedures
(TNI)

Conformance: An affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements. (ANSI/ASQC E4-1994)

Corrective Action: The action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence. (ISO 8402)

Data Audit: A qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data re of acceptable quality (i.e., that they meet specified acceptance criteria). (TNI)

Data Reduction: The process of transforming the number of data items by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useable form. (TNI)

Deficiency: An unauthorized deviation from acceptable procedures or practices, or a defect in an item. (ASQC)

Demonstration of Capability: A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. (TNI)

Document Control: The act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly, and controlled to ensure use of the correct version at the location where the prescribed activity if performed. (ASQC)

Duplicate Analyses: The analyses or measurements of the variable of interest performed identically on two subsamples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory. (EPA-QAD)

Equipment Blank: Sample of analyte-free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures. (TNI)

External Standard Calibration: Calibrations for methods that do not utilize internal standards to compensate for changes in instrument conditions.

Field Blank: Blank prepared in the field by filing a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken (EPA OSWER)

Field of Accreditation: Those matrix, technology/method, and analyte combinations for which the accreditation body offers accreditation.

Holding Times: The maximum time that samples may be held prior to analyses and still be considered valid or not compromised. (40 CFR Part 136)

Internal Standard: A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical test method. (TNI)

Internal Standard Calibration: Calibrations for methods that utilize internal standards to compensate for changes in instrument conditions.

Instrument Blank: A clean sample (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (EPA-QAD)

Instrument Detection Limit (IDL): The minimum amount of a substance that can be measured with a specified degree of confidence that the amount is greater than zero using a specific instrument. The IDL is associated with the instrumental portion of a specific method only, and sample preparation steps are not considered in its derivation. The IDL is a statistical estimation at a specified confidence interval of the concentration at which the relative uncertainty is ± 100%. The IDL represents a range where qualitative detection occurs on a specific instrument. Quantitative results are not produced in this range.

Laboratory Control Sample (however named, such as laboratory fortified blank, spiked blank, or QC check sample): A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes, taken through all preparation and analysis steps of the procedure unless otherwise noted in a reference method. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.

An LCS shall be prepared at a minimum of 1 per batch of 20 or less samples per matrix type per sample extraction or preparation method except for analytes for which spiking solutions are not available such as total suspended solids, total dissolved solids, total volatile solids, total solids, pH, color, odor, temperature, dissolved oxygen or turbidity. The results of these samples shall be used to determine batch acceptance.

Least Squares Regression (1st Order Curve): The least squares regression is a mathematical calculation of a straight line over two axes. The y axis represents the instrument response (or Response ratio) of a standard or sample and the x axis represents the concentration. The regression calculation will generate a correlation coefficient (r) that is a measure of the "goodness of fit" of the regression line to the data. A value of 1.00 indicates a perfect fit. In order to be used for quantitative purposes, r must be greater than or equal to 0.99 for organics and 0.995 for Inorganics.

Limit(s) of Detection (LOD) [a.k.a., Method Detection Limit (MDL)]: A laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in their facility. (TNI)

LOD Verification [a.k.a., MDL Verification]: A processed QC sample in the matrix of interest, spiked with the analyte at no more than 3X the LOD for single analyte tests and 4X the LOD for multiple analyte tests and processed through the entire analytical procedure.

Limit(s) of Quantitation (LOQ) [a.k.a., Reporting Limit]: The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. (TNI)

(QS) Matrix: The component or substrate that contains the analyte of interest. For purposes of batch and QC requirement determinations, the following matrix distinctions shall be used:

Aqueous: Any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.

Drinking Water: any aqueous sample that has been designated as a potable or potential potable water source.

Saline/Estuarine: any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.

Non-aqueous Liquid: any organic liquid with <15% Settleable solids.

Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Solids: includes soils, sediments, sludges, and other matrices with >15% Settleable solids.

Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

Air & Emissions: Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbant tube, impinger solution, filter, or other device. (NELAC)

Matrix Spike (spiked sample or fortified sample): A sample prepared, taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a referenced method, by adding a known amount of target analyte to a specified amount of sample for which an independent test result of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Matrix Spike Duplicate (spiked sample or fortified sample duplicate): A replicate matrix spike prepared and analyzed to obtain a measure of the precision of the recovery for each analyte.

Method Blank: A sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses. (TNI)

Method Detection Limit: The minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. (40 CFR Part 136, Appendix B)

Negative Control: Measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results. (TNI)

Non-conformance: An indication, judgment, or state of not having met the requirements of the relevant specifications, contract, or regulation.

Performance Audit: The routine comparison of independently obtained qualitative and quantitative measurement system data with routinely obtained data in order to evaluate the proficiency of an analyst or laboratory. (TNI)

Positive Control: Measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects. (TNI)

Precision: The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. (TNI)

Preservation: Any conditions under which a sample must be kept in order to maintain chemical and/or biological integrity prior to analysis. (NELAC)

Proficiency Testing: A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (TNI) [2.1]

Proficiency Testing Program: The aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories. (TNI)

Proficiency Test Sample (PT): A sample, the composition of which is unknown to the laboratory and is provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria. (TNI)

Quality Assurance: An integrated system of management activities involving planning, implementation, assessment, reporting and quality improvement to ensure that a process, item, or service is of the type of quality needed and expected by the client. (TNI)

Quality Assurance [Project] Plan (QAPP): A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (EAP-QAD)

Quality Control: The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are

used to fulfill requirements for quality; also the system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring that the results are of acceptable quality. (TNI)

Quality Control Sample: A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking, intended to demonstrate that a measurement system or activity is in control. (TNI)

Quality Manual: A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users. (NELAC)

Quality System: A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC activities. (TNI)

Raw Data: The documentation generated during sampling and analysis. This documentation includes, but is not limited to, field notes, electronic data, magnetic tapes, untabulated sample results, QC sample results, print outs of chromatograms, instrument outputs, and handwritten records. (TNI)

Record Retention: The systematic collection, indexing and storing of documented information under secure conditions.

Reference Material: Material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (TNI)

Reference Standard: Standard used for the calibration of working measurement standards in a given organization or a given location. (TNI)

Sampling: Activity related to obtaining a representative sample of the object of conformity assessment, according to a procedure.

Second Order Polynomial Curve (Quadratic): The 2nd order curves are a mathematical calculation of a slightly curved line over two axis. The y axis represents the instrument response (or Response ratio) of a standard or sample and the x axis represents the concentration. The 2nd order regression will generate a coefficient of determination (COD or r^2) that is a measure of the "goodness of fit" of the quadratic curvature the data. A value of 1.00 indicates a perfect fit. In order to be used for quantitative purposes, r^2 must be greater than or equal to 0.99.

Selectivity: The ability to analyze, distinguish, and determine a specific analyte or parameter from another component that may be a potential interferent or that may behave similarly to the target analyte or parameter within the measurement system. (TNI)

Sensitivity: The capability of a method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. (TNI)

Spike: A known mass of target analyte added to a blank, sample or sub-sample; used to determine recovery efficiency or for other quality control purposes.

Standard: The document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of standard setting and meets the approval requirements of NELAC standard adoption organizations procedures and policies. (TNI)

Standard Operating Procedures (SOPs): A written document which details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps. SOPs are officially approved as the methods for performing certain routine or and which is accepted as the method for performing certain routine or repetitive tasks. (TNI)

Storage Blank: A blank matrix stored with field samples of a similar matrix (volatiles only) that measures storage contribution to any source of contamination.

Surrogate: A substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes.

Surrogate compounds must be added to all samples, standards, and blanks, for all organic chromatography methods except when the matrix precludes its use or when a surrogate is not available. Poor surrogate recovery may indicate a problem with sample composition and shall be reported to the client whose sample produced poor recovery. (QAMS)

Systems Audit (also Technical Systems Audit): A thorough, systematic, qualitative on-site assessment of the facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a total measurement system. (EPA-QAD)

Technical Manager: A member of the staff of an environmental laboratory who exercises actual day-to-day supervision of laboratory operations for the appropriate fields of accreditation and reporting of results

Technology: A specific arrangement of analytical instruments, detection systems, and/or preparation techniques.

Traceability: The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project. (TNI)

Uncertainty: A parameter associated with the result of a measurement that characterizes the dispersion of the value that could reasonably be attributed to the measured value.

Acronyms:

CAR – Corrective Action Report
CCV – Continuing Calibration Verification
CF – Calibration Factor
CFR – Code of Federal Regulations
COC – Chain of Custody
DOC – Demonstration of Capability
DQO – Data Quality Objectives
DUP - Duplicate
EHS – Environment, Health and Safety
EPA – Environmental Protection Agency
GC - Gas Chromatography
GC/MS - Gas Chromatography/Mass Spectrometry
HPLC - High Performance Liquid Chromatography
ICP - Inductively Coupled Plasma Atomic Emission Spectroscopy
ICP/MS-ICP/Mass Spectrometry
ICV – Initial Calibration Verification
IDL – Instrument Detection Limit
IH – Industrial Hygiene
IS – Internal Standard
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
LIMS – Laboratory Information Management System
LOD – Limit of Detection
LOQ – Limit of Quantitation
MDL – Method Detection Limit
MDLCK – MDL Check Standard
MDLV – MDL Verification Check Standard
MRL – Method Reporting Limit Check Standard
MS – Matrix Spike
MSD – Matrix Spike Duplicate
MSDS - Material Safety Data Sheet
NELAP - National Environmental Laboratory Accreditation Program
PT – Performance Testing
NELAC – The NELAC Institute
QAM – Quality Assurance Manual
QA/QC – Quality Assurance / Quality Control
QAPP – Quality Assurance Project Plan
RF – Response Factor
RPD – Relative Percent Difference
RSD – Relative Standard Deviation
SD – Standard Deviation
SOP: Standard Operating Procedure
TAT – Turn-Around-Time
VOA – Volatiles
VOC – Volatile Organic Compound

Appendix 3.

Laboratory Certifications, Accreditations, Validations

TestAmerica Buffalo maintains certifications, accreditations, certifications, and validations with numerous state and national entities. Programs vary but may include on-site audits, reciprocal agreements with another entity, performance testing evaluations, review of the QA Manual, Standard Operating Procedures, Method Detection Limits, training records, etc. At the time of this QA Manual revision, the laboratory has accreditation/certification/licensing with the following organizations:

State	Program	Cert # / Lab ID
Arkansas	CWA, RCRA, SOIL	88-0686
California*	NELAP CWA, RCRA	01169CA
Connecticut	SDWA, CWA, RCRA, SOIL	PH-0568
Florida*	NELAP CWA, RCRA	E87672
Georgia*	SDWA,NELAP CWA, RCRA	956
Illinois*	NELAP SDWA, CWA, RCRA	200003
Iowa	SW/CS	374
Kansas*	NELAP SDWA, CWA, RCRA	E-10187
Kentucky	SDWA	90029
Kentucky UST	UST	30
Louisiana*	NELAP CWA, RCRA	2031
Maine	SDWA, CWA	NY0044
Maryland	SDWA	294
Massachusetts	SDWA, CWA	M-NY044
Michigan	SDWA	9937
Minnesota	SDWA,CWA, RCRA	036-999-337
New Hampshire Primary*	NELAP SDWA, CWA, RECRA	2973
New Hampshire Secondary*	NELAP SDWA, CWA, RECRA	2337
New Jersey*	NELAP,SDWA, CWA, RCRA,	NY455
New York*	NELAP, AIR, SDWA, CWA, RCRA	10026
North Dakota	CWA, RCRA	R-176
Oklahoma	CWA, RCRA	9421
Oregon*	CWA,RCRA	NY200003
Pennsylvania*	NELAP CWA,RCRA	68-00281
Rhode Island	SDWA, CWA	LAO00328
Tennessee	SDWA	02970
Texas*	NELAP CWA, RCRA	T104704412-08-TX
USDA	FOREIGN SOIL PERMIT	S-41579
Virginia	SDWA	278
Washington*	NELAP CWA,RCRA	C1677
Wisconsin	CWA, RCRA	998310390
West Virginia	CWA,RCRA	252

The certificates and parameter lists (which may differ) for each organization may be found on the corporate web site, the laboratory's public server, and in the QA Department.

STORM WATER POLLUTION PREVENTION PLAN

(FOR REFERENCE)

STORMWATER POLLUTION PREVENTION PLAN
REMEDIAL ACTION IMPLEMENTATION

NORTH AND SOUTH LANDFILLS
COOPER CROUSE-HINDS FACILITY
SYRACUSE, NEW YORK

Prepared for:

Cooper Crouse-Hinds, LLC
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Prepared by:

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February 3, 2014

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1.0 INTRODUCTION

Prior to excavation and relocation of soils, sediments, and landfill solid waste at part of the selected remedy for the North and South Landfills at the Cooper Crouse-Hinds Facility, submission of a Notice of Intent is being completed to comply with New York State Department of Environmental Conservation (NYSDEC) requirements.

Excavation of soils, sediments, and landfill waste with relocation and capping involving soil disturbances of one (1) or more acres require coverage under SPDES General Permit GP-0-10-001 with an effective date of January 29, 2010 issued by the New York State Department of Environmental Conservation (NYSDEC – Appendix A). The listed activities at the North (21.48 acres) and South (19.4 acres) Landfills thus requires this coverage.

To gain coverage under General Permit GP-0-10-001, a Notice of Intent (NOI – Appendix B) must be filed with the NYSDEC. A Storm Water Pollution Prevention Plan (SWPPP) must be included with the NOI submittal. Coverage under General Permit GP-0-01-001 may not be required as this project is a NYSDEC-approved remediation, however a SWPPP will detail the best practices for project completion.

2.0 PROJECT BACKGROUND INFORMATION

The Cooper Crouse-Hinds, LLC (CC-H) Site consists of two inactive landfills, referred to as the North and South landfills, which are located immediately west of the CSX railroad tracks and the adjacent operating CC-H manufacturing facility. The Site is located in the Town of Salina (North landfill) and City of Syracuse (South landfill), Onondaga County, New York (Latitude 043º 05' 7" N, Longitude 076º 09' 40" W). The North landfill consists of three contiguous parcels (Tax ID Nos. 073.-01-08.1, 073.-01-08.3, and 073.-01-08.4) totaling 21.48 acres in size. The South landfill consists of one parcel (Tax ID No. 01.01-03) totaling 19.4 acres in size. The Site is located in an area of mixed usage including light industrial/manufacturing, commercial, retail and residential usage. Seventh North Street is oriented southeast-northwest and separates the two landfills that comprise the Site. A Site Location Map is presented as Figure 1 and a Site Plan is presented as Figure 2.

2.1 Landfills

The North landfill is bordered along its northern border by vacant land (approximately 37 acres) owned by Plaza East, LLC (Plaza), which consists of areas of fill (municipal waste and miscellaneous debris) with woodland cover and wetlands. The North landfill is bordered to the east and southeast by CSX railroad tracks followed by the CC-H facility, mixed commercial and retail development, Wolf Street and residential development. Seventh North Street followed by the South landfill border the North landfill to the south to southwest. West of the North landfill are wetlands (Plaza property) followed by Ley Creek, mixed commercial and retail development, the Ley Creek waste transfer station, the Onondaga County sewage treatment plant, and Interstate Highway 81.

The South landfill is bordered to the north by Seventh North Street followed by the North landfill. To the east and southeast the South landfill is bordered by CSX railroad tracks followed by mixed commercial and retail development and Hiawatha Boulevard. Further east to southeast is residential development. Undeveloped woods, wetlands and mixed commercial and retail development border the South landfill further to the south. Ley Creek abuts the entire west and northwest boundary of the South landfill. Further west and northwest is a mixture of commercial and retail development.

Review of available historical documentation indicate that prior to the mid-to-late 1950's the North and South landfills had been occupied by low lying fields, salt marshes and woodlands. From the mid-1950's to 1989 fill material had been placed across various areas of the North and South landfills. Current topographic conditions are shown on the topographic survey map included in Figure 2.

2.2 Topography

Topography of the North landfill is generally flat across the southern half of the landfill with an average elevation range of approximately 370 feet to 372 feet above mean sea level (AMSL). However, moving to the north from the central area of the site, the

elevation rises moderately and increases to near an average of 381 feet AMSL across a notably mounded area of the landfill. Topography slopes moderately to steeply downward from the fill mound along the northern, eastern and western areas of the north landfill. Drainage across the North landfill is generally radially outward from the fill mound area in all directions. Drainage to the north-northeast is to lower lying adjacent property owned by Plaza East. Drainage to the east-southeast is towards the east wetland (Wetland A) and the eastern stream segment (Stream A). Drainage to the south tends to go southeast or southwest towards wetland (Wetland A and B) and stream areas (Stream A). Drainage to the west is toward the west wetland (Wetland B) and lower lying areas.

Topography of the South landfill is generally flat across the landfill area with an average elevation range of 373 feet to 377 feet AMSL. Topography along the edges of the fill mound slopes moderately to steeply away from the fill mound to the north, east, south and west. Drainage across the south landfill is generally radially outward from the fill mound in all directions. Drainage to the north-northeast is to the drainage ditch that parallels Seventh North Street and drains into Ley Creek. Drainage to the east-southeast is to the stream (Stream B) and wetland areas (Wetland C) located on the east-southeast side of the landfill. Drainage to the south is to the wetland area (Wetland C) located to the south of the fill mound. Drainage to the west is to Ley Creek, which is located along the landfill's western border.

2.3 Surface Water Features

Ley Creek is located between 80 feet and 120 feet west of the western property boundary of the North landfill and adjacent to the western boundary of the South landfill (Figure 2). Ley Creek is part of the Onondaga Lake drainage basin and flows to the southwest towards Onondaga Lake. Between the mouth of Ley Creek and the Onondaga County Ley Creek Transfer Station and former sewage treatment plant POTW outfall, Ley Creek is classified as a Class C water body. From the POTW outfall to a point located 3.1 miles north of the creek mouth, Ley Creek is classified as a Class B water body. The section of Ley Creek adjacent to the CC-H Site is classified as a Class C water body. Flood insurance maps indicate that the CC-H Site is located within the 100 year flood plain of Ley Creek as defined by the Federal Emergency Management Agency (FEMA). The base flood water surface elevation for the site is 374 AMSL at the southern half of the South Landfill and is 375 AMSL at the northwest corner of the South Landfill and mid-way through the North Landfill.

Bear Trap Creek drains into Ley Creek at its terminus that is located approximately 260 feet west of the southwest corner of the North landfill, which is to the immediate north of the Seventh North Street Bridge that crosses Ley Creek (Figure 2). Bear Trap Creek extends northward from its terminus and receives drainage from areas that range from undeveloped usage to commercial usage and potentially light industrial usage.

Two stream segments and one drainage ditch are located on the CC-H site and are described in the next section.

2.4 Wetlands

In November 2005, wetland delineation was conducted across the Site to define the extent of wetlands onsite. All work was conducted according to the criteria set forth in the *1987 United States Army Corps of Engineers Wetlands Delineation Manual*, *Classification of Wetlands and Deepwater Habitats of the United States*, and the *1995 NYSDEC Freshwater Wetlands Delineation Manual*. Wetland areas identified onsite are described further below.

Two wetland areas and one stream section were identified on the North landfill (Figure 2). The first wetland, Wetland A (a.k.a. the "east wetland") extends from the east corner of the North landfill and along the majority of the eastern side of the landfill and is approximately 2.63 acres in size. The east wetland receives flow from an offsite drainage ditch/stream that enters the wetland at the east corner of the landfill. Surface water in this ditch/stream appears to originate as surface water runoff and drainage from and across the adjacent properties owned by Plaza and the CSX Railroad. Surface water discharge from the east wetland is to a stream (Stream A) that is 675 feet in length and flows south out of the southern portion of the east wetland and parallel to the eastern property boundary of the North landfill to the southeast corner of the North landfill where it then turns to the northwest and parallels Seventh North Street. At its terminus, the stream discharges into two twenty-four-inch diameter culverts, which carry flow beneath Seventh North Street and into a drainage ditch that is located along the north boundary of the South landfill. Drainage in the ditch flows west and ultimately discharges to Ley Creek. The second wetland, Wetland B (a.k.a. the "west wetland") is located along the western side of the North landfill; the onsite portion of this wetland feature is approximately 2.61 acres in size. The west wetland occurs adjacent to and within the flood plain of Ley Creek and extends off-site from the western property boundary, and across the adjacent property owned by Plaza, to Ley Creek. The west wetland is identified on National Wetland Inventory (NWI) maps (ID No. PFO1/SS1E).

One wetland area, stream section, and drainage ditch were identified on the South landfill (Figure 2). The wetland, Wetland C (a.k.a. the "south wetland") is located in the southern area of the South landfill and is approximately 1.29 acres in size. The stream section (Stream B) is approximately 1,825 feet in length and extends along the eastern side of the South landfill from the eastern corner to the southeastern corner. The stream channel begins near the east corner of the landfill and runs parallel with the CSX railroad and eastern-southeastern edge of the landfill until it enters the south wetland. Upon entering the south wetland, the stream flows west and follows the northern edge of the south wetland area to its terminus point near Ley Creek.

Prior to 2009, surface water from the stream and south wetland discharged into Ley Creek at the terminus of the stream via a 36-inch diameter culvert pipe. On January 6, 2009, the culvert pipe was removed and the area backfilled with imported gravel material and fill (Figure 2) to prevent the flow of surface water and entrained sediments from Ley Creek to the South landfill and to Ley Creek from the South landfill; therefore, there is no longer a discharge point to Ley Creek. Surface water can still flow along Stream B and

into Wetland C. If the water level in Ley Creek is lower than the water level in Wetland C, water from Wetland C will seep and/or discharge into Ley Creek.

Surface water flow in the stream appears to be primarily from surface water runoff from the South landfill and the adjacent CSX railroad property. Observations indicate that flow in the stream is generally limited to times of heavy runoff due to either rainfall events or snow melt. Generally, the upper one third of the stream area is dry for the majority of the year. Prior to the removal of the culvert pipe, observations indicated that surface water from Ley Creek flowed into the stream and south wetland during high water events in Ley Creek.

The drainage ditch is located along the northern boundary of the South landfill and Seventh North Street. The ditch is 1,075 feet in length and begins at the east corner of the South landfill. Flow in the ditch is to the west to its terminus where it discharges into Ley Creek. The ditch accepts discharge from a culvert pipe located at the head of the ditch and from the two 24-inch culvert pipes leading beneath the roadway from the North landfill area. The source of flow from the culvert pipe at the head of the ditch is unknown. The head of the ditch is located at an elevation of approximately two feet below the head of the South landfill stream reach (Stream B) and does not provide flow to the stream reach.

Based on the NYSDEC wetlands maps, the wetlands located on the North and South landfills are not under the jurisdiction of New York State; however, they may fall under United States Army Corps of Engineers (USACOE) jurisdiction.

3.0 ENFORCEMENT STATUS

In 1984, the CC-H Site was listed as a "Class 3" New York State Inactive Hazardous Waste Disposal Site (IHWDS) (Site No. 7-34-004) pursuant to Environmental Conservation Law 27-1301(2).

In May 2004, Cooper Industries, Inc. (Respondent) entered into a Consent Order (Index No.D-7-0002-01-07) for the CC-H Site, which became effective on May 14, 2004. Under the terms of the Consent Order the Respondent agreed to: 1) develop and implement a Preliminary Site Assessment (PSA) to characterize that nature and extent of impacts at the Site (completed on May 25, 2006); 2) depending on the findings of the PSA and the corresponding determination made by NYSDEC, to develop and implement an RI/FS for the Site (RI/FS Work Plan approved by NYSDEC on March 26, 2008; RI Report approved by NYSDEC on October 6, 2009); and 3) to perform any mutually agreed upon Interim Remedial Measures (IRMs).

Declaration of Covenants and Restrictions (DCR) were filed with the Onondaga County Clerk on September 15, 2004, in Book 4850 of Deeds at page 833 (Attachment 1). The DCR stipulates that the property (North and South Landfills) is subject to an Order on Consent between the NYSDEC and Cooper Industries, Inc. and that the restrictive covenant shall run with the land and be binding upon Cooper Industries, Inc., its successors and assigns.

In March of 2007, CC-H indicated that the NYSDEC had verbally indicated to CC-H that USEPA will not make the Site part of the Onondaga Lake Superfund site, and that NYSDEC would retain authority for the Site.

4.0 PROJECT DESCRIPTION

4.1 2012 Clearing and Hot Spot Removal Operations

Under the NYSDEC approved remedy for the site, removal of contaminated soils and transportation to an off-site licensed disposal facility was completed at three selected area within the North Landfill during October through November 2012 (Figure 3). At the same time, to allow an aerial photographic survey to be flown over both the North and South Landfills, all trees were cut to leave six-inch stumps, brush was cleared, and grass was mowed to a six-inch height.

Upon examination at the site by the NYSDEC, mowing up to the water's edge along Ley Creek and along all wetlands was completed to allow increased accuracy for the aerial survey.

4.2 Project Disturbance Area

Total Disturbed Area:	+/- 41 acres
Existing Total Impervious Area:	0 acres
Proposed Total Impervious Area:	0 acres

The landfills will be reconstructed in consecutive years. The South Landfill is scheduled for reconstruction in 2013. The North Landfill is scheduled for reconstruction in 2014. Waste relocation to the landfill centers from buffer zones, contaminated wetland sediment relocation to the landfill centers, wetland reconstruction/mitigation, and landfill capping are the project elements.

4.3 Description and Limitations of On-Site Soils

The soil disturbance for the proposed work is approximately 41 acres for all excavation and grading operations.

A summary of the soil composition in the project area is shown in Table 1. Descriptions of each soil type, according to the USDA Soil Survey of Onondaga, New York, are located in Appendix C.

Table 1 – Soil Analyses Summary

Soil Name	Hydrologic Soil Group
Ce – Carlisle muck	A/D
ChB – Collamer silt loam	C
ML – Made Land	No Classified Group (Assumed D)
Ub – Urban Land	No Classified Group (Assumed D)

The Natural Resource Conservation Service (NRCS, formerly known as the SCS), as part of their soil classification system, assigns each soil series to a Hydrologic Soil Group (HSG). The HSG is a four-letter index intended to indicate the minimum rate of infiltration obtained after prolonged wetting, and to indicate the relative potential for a soil type to generate runoff. The infiltration rate is the rate at which water enters the soil at the soil surface. The HSG also indicates the transmission rate – the rate at which water moves within the soil. Soil scientists define the four groups as follows:

- HSG 'A' (sand, loamy sand, or sandy loam): Soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission (> than 0.30 inches/hour).
- HSG 'B' (silt loam or loam): Soils have moderate infiltration rates when thoroughly wetted, and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to fine texture. These soils have a moderate rate of water transmission (0.15 to 0.30 inches/hour).
- HSG 'C' (sandy clay loam): Soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water, and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05 to 0.15 inches/hour).
- HSG 'D' (clay loam, silty clay loam, sandy clay, silty clay, or clay): Soils have high runoff potential. They have very low infiltration rates when thoroughly wetted, and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (< 0.05 inches/hour).

4.4 Historic Places

The proposed project is not shown on the National Register of Historic Places. A Phase IA Cultural Resources Report is included as Appendix D.

4.5 Sequence of Major Activities

This SWPPP presents temporary erosion and sediment controls to assist the operator in compliance with the project's SPDES General Permit for construction activity. To the degree practicable, all temporary erosion and sediment control mitigation measures shall be installed immediately before associated project areas are disturbed in anticipation of all soil disturbing activities to follow. Based upon NYS DEC regulations, the owner or operator of a construction activity shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a regulated, traditional land use control MS4, the MS4 (provided the MS4 is not the owner or operator of the construction activity). At a minimum, the owner or operator must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

1. The owner or operator shall have a qualified inspector conduct at least two (2) site inspections in accordance with Part IV.C.2 every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. When performing just two (2) inspections every seven (7) calendar days, the inspections shall be separated by a minimum of two (2) full calendar days.

2. In areas where soil disturbance activity has been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the most current version of the technical standard, New York Standards and Specifications for Erosion and Sediment Control.

3. The owner or operator shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

4. The owner or operator shall install any additional site specific practices needed to protect water quality.

5. The owner or operator shall include the requirements above in their SWPPP.

Due to the nature of this project, it is intended to disturb more than 5 acres of land at one time. A waiver will be requested before grading operations commence.

It is the responsibility of the Contractor to ensure that all soils removed from the project site are spoiled in a manner consistent with all local, state, and federal regulations (particularly those governing hazardous waste sites). Appropriate erosion and sediment controls shall be installed at all spoil sites. Additionally, the Contractor is responsible for coordinating the application for a GP-0-10-001 permit (and development of an associated SWPPP) if disturbance associated with any soil spoils area is greater than 1 acre. GP-0-10-001 applications must be signed by the owner of the lands on which soils are spoiled.

This project will be carried out in multiple phases. See approved construction documents for actual construction sequencing. The South Landfill work will be conducted in the first calendar year (2013) and the North Landfill work will be conducted in the second calendar year (2014).

4.6 Name of Receiving Waters

Stormwater runoff moving off-site will eventually drain into Ley Creek (Class B), which is a 303(d) listed water body.

5.0 EROSION AND SEDIMENT CONTROL PRACTICES

This section presents erosion and control practices that will be used at the North and South Landfills.

5.1 Construction Road Stabilization

One gated access road into each (North and South) landfill currently exists. Extending from Seventh North Street inwards, the initial 50 feet of driveway access has been improved by adding six inches of gravel road base and being sloped away from Seventh North Street. This improvement has stabilized the driveways for heavy equipment use, provides a tracking road and clean-off station for vehicles leaving the site, and directs any water from vehicles away from the street.

Existing access roads on the landfill property are visible on historical landfill air photographs and will be used for access during operations to the extent possible. These access roads will be inspected and wood chips or imported gravel placed as needed to stabilize road surfaces to minimize rutting and reduce soil tracking off-site by clearing and grubbing vehicles.

Dump trucks hauling materials to and from the project site shall be covered with a tarpaulin to reduce dust. An existing decon pad is present at the entrance of each landfill with a rinse off station and an attendant or the driver will inspect any vehicle leaving the site. Any sediment and debris tracked from work area along project adjacent roadways shall be immediately removed with a street sweeper or equivalent sweeping method. Further, sweeping of streets adjacent to disturbed areas shall be performed prior to the end of each work day (at a minimum) when tracking of sediment is occurring.

5.2 Dust Control

Should dust control become an issue, a portable or truck mounted water pump will be used to draw water from an on-site wetland or stream for use in wetting down access roads. If construction operations cause excessive dust, work areas will be wetted down as necessary using on-site water.

5.3 Timing of Controls/Measures

The erosion and sediment control measures shall be constructed prior to clearing or grading of any portion of the project. Where land disturbance is necessary, temporary seeding or mulching must be used on areas which will be exposed for more than 7 days. Permanent stabilization should be performed as soon as possible after completion of grading. After the entire project area is stabilized, the accumulated sediment shall be removed from the project area. Erosion control devices shall remain in place until disturbed areas are permanently stabilized. For projects where soil disturbance is greater than five (5) acres, and construction activity has temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The

soil stabilization measures selected shall be in conformance with the most current version of the technical standard, New York Standards and Specifications for Erosion and Sediment Control.

Excavations will occur in the order shown on each design drawing sheet to move from areas of higher elevation to areas of lower elevation. This will allow drainage from each higher elevation area sampled as "clean" to be collected at any temporary swale without re-contaminating the contacted soils.

Excavated soils will be transported to the landfill interior to a pre-determined area as indicated on the contractor's written work plan. The only exception to this will be PCB sediment cells in the North Landfill that will be transported off-site to a TSCA landfill. The contractor's written work plan will be updated on a weekly basis, approved by the on-site engineer, and available on-site for review by any interested party.

Each pre-determined area will have a silt fence perimeter and an interior temporary swale (Figure 6) sized to contain the water quality volume as defined in Section 4.2 of the New York State Stormwater Management Design Manual. The objective is for all interior water to either seep into the ground or evaporate and not leave the pre-determined area silt fence perimeter. Localized areas within the landfill interior may allow excavated soil piling within a pre-determined are without perimeter silt fence if sufficient WQ_v capacity makes a silt fence perimeter unnecessary. This will occur if the swale can be shown to contain 300% of the calculated water quality volume. A silt fence perimeter will always be present on the landfill cap area perimeter (Figure 3).

5.4 Erosion and Sediment Controls / Stabilization Practice

5.4.1 Temporary Stabilization

Topsoil stockpiles, staging areas and disturbed pervious portions of the project area where construction activity temporarily ceases for at least 7 days shall be stabilized with temporary seed and mulch no later than 7 days from the last construction activity in that area.

Temporary seed shall be ryegrass applied at the rates specified below:

- If seeding in spring, summer or early fall then seed with annual or perennial rye at a rate of 30 lbs per acre. If area is to remain stabilized over the winter into the following spring use perennial rye only.
- If seeding in late fall or early winter, use certified Aroostook winter rye (cereal rye) at a rate of 90 lbs per acre.

Any seeding method may be used that will provide uniform application of seed to the area and result in relatively good soil to seed contact. The area must be free of large rocks and debris and seeded within 24 hours of disturbance or scarification of the soil surface will be necessary prior to seeding. Fertilizer or lime is not typically used for temporary plantings.

Mulch shall be applied in conjunction with seeding and applied at the rate of 90 lbs per 1000 square feet. Mulch shall be reapplied as necessary.

Proposed grades which will have slopes steeper than 3:1 shall be stabilized with erosion control fabric. (These specific areas have been highlighted on the Grading Sheets.)

Temporary diversion swales shall be installed on site where necessary. A diversion swale is designed to divert runoff around active construction areas to a point of discharge.

Rip-rap outlet protection shall be installed at all stormwater end sections, including that from the temporary sediment basin(s). Rip-rap material shall be hard, durable field or quarry stone which is angular and resists breaking down when exposed to water or weathering.

Sediment control fencing shall be installed around the site where depicted on the attached plan (Figures 3 and 4). Prior to commencing any earthwork, the existing stabilized construction entrances shall be inspected and improved to comply with the attached plans. These entrances shall be utilized as the exclusive construction entrances and exits to the construction areas. Construction traffic shall be limited to the construction entrances.

5.4.2 Permanent Stabilization

Disturbed portions of the project area where construction activities permanently cease shall be stabilized with permanent seed no later than 7 days after the last construction activity. The permanent seed mix shall be in accordance with the project specifications and plans. Construction and maintenance of erosion and siltation control measures are in accordance with the New York Standards and Specifications for Erosion and Sediment Control.

Where construction activity is complete over areas to be permanently vegetated, stabilize with permanent seeding. Verify seeding dates with engineer. If engineer determines that seed cannot be applied due to climate, topsoil shall not be spread and mulching shall be applied to the exposed surface to stabilize soils until the next recommended seeding period.

5.4.3 Winter Operation

If construction activities proceed through the winter season, access points should be enlarged and stabilized to provide for snow stockpiling. Drainage structures should be kept open and free of potential snow and ice dams. Inspection and maintenance are necessary to ensure the function of these practices during runoff events. For sites where construction activities temporarily cease, temporary and/or permanent soil stabilization measures shall be installed within seven (7) days from the date the soil disturbing activity

ceased. Disturbed areas should be stabilized with seed and mulch, or other approved methods, even if the ground is covered by significant amounts of snow.

5.4.4 Winter Shutdown

Site inspections (by the qualified inspector) may be decreased to a minimum of one (1) time every thirty (30) days for sites where soil disturbing activities have ceased and at least 80% of the site has been stabilized with an approved method. Inlet protection should be installed and/or repaired before shutdown of the site. The owner or operator shall provide written notification to the respective DEC regional office prior to reducing the frequency of any site inspections.

5.4.5 Waste Disposal

Waste materials and foreign waste materials shall be collected and stored in a secured area until removal and disposal by a licensed solid waste management company. All trash and construction debris from the project area shall be disposed of in a portable container unit. No foreign waste materials shall be buried within the project area. All personnel shall be instructed regarding the correct procedure for waste disposal. Notices stating these practices shall be posted in the project trailer and the individual who manages day-to-day project operations will be responsible for seeing that these procedures are followed.

Petroleum-Impacted/Hazardous Waste – During the excavation activities, there is the potential that petroleum impacted soils and/or hazardous waste may be encountered. Except for the defined TSCA sediment areas in the North Landfill, all excavated wastes will be relocated to the area to be capped. Drums and tires discovered during project activities will be segregated and disposed of off-site per current NYSDEC regulations.

Sanitary Waste - Any sanitary waste from portable units shall be collected from the portable units by a licensed sanitary waste management contractor, as required by NYS DEC regulations.

5.4.6 Non-Stormwater Discharges

Non-stormwater discharges are not expected to exit the project sites during construction.

5.4.7 Certification of Compliance with Federal, State, & Local Regulations

The stormwater pollution prevention plan reflects the New York State requirements for stormwater management and erosion and sediment control. To ensure compliance, this plan was prepared in accordance with New York State Standards. There are no other applicable State or Federal requirements for sediment and erosion plans (or permits), or stormwater management plans (or permits).

6.0 POST-CONSTRUCTION STORMWATER MANAGEMENT

6.1 Methodology

In order to evaluate the potential impacts associated with the proposed project, existing and proposed conditions were examined. At each landfill, only land grading activities which do not change overall drainage patterns will take place. No impervious surfaces are proposed throughout either site. Any slight increase in peak flows after construction will be mitigated by detention swales surrounding the landfill cap areas.

Local drainage patterns within the landfill areas will be altered with the sediment and waste consolidation activities locating mounds at the center of each landfill. Construction of the landfill caps in compliance with 6 NYCRR Part 360 and re-vegetation of the buffer zone areas will ensure that the proposed conditions will similarly cause no increase in peak flow leaving the site after construction.

The Enhanced Phosphorus Removal Standards are required in on-site stormwater management practices due to the project location within the Onondaga Lake Watershed. All on-site flow is directed to on-site streams and wetlands where extended retention takes place. The drains to the ditch along 7th North Street that empties into Ley Creek are located at the ends of Streams A and B so that any stormwater entering the ditch has traveled the maximum distance from the center of the site over vegetated cover.

6.2 Existing Conditions

South Landfill – 19.4 acres in size covered with tree stumps, brush, and grasses. Essentially flat across the area, with radial drainage to a stream, wetlands, Ley Creek, and a ditch along 7th North Street.

North Landfill – 21.48 acres in size covered with tree stumps, brush, and grasses. Slightly higher elevations along the north edge draining to the south, east, and west, into a stream, wetlands, and to a ditch along 7th North Street.

6.3 Proposed Conditions

South Landfill – 19.4 acres in size, with a mounded landfill cap in the center bordered by a vegetated buffer zone to the east, south and west. Drainage will occur through the buffer zones to a stream, wetlands, Ley Creek, and a ditch along 7th North Street.

North Landfill – 21.48 acres in size, with a mounded landfill cap in the center bordered by a vegetated buffer zone to the east and west. Drainage will occur through the buffer zones to a stream, wetlands, and a ditch along 7th North Street.

Proposed conditions are indicated on Figure 5.

6.4 Floodplains

Flood insurance maps indicate that the CC-H Site is located within the 100 year flood plain of Ley Creek as defined by the Federal Emergency Management Agency (FEMA). The base flood water surface elevation for the site is 374-375 AMSL. No negative impact will be present due this location.

In November of 2013, upon receipt of comments from the City of Syracuse, calculations were performed to verify that the construction of the North and South Landfill caps, adjacent buffer zones, and wetland sediment relocations would result in no net loss of flood storage at either landfill for the 100-year flood at elevation 374 feet. Appendix E contains the calculations and modifications to the 95% design. The modifications to the design are included in the Final Design documents.

7.0 MAINTENANCE / INSPECTION PROCEDURES

7.1 Erosion and Sediment Control Inspection and Maintenance Practices

These are the minimum required inspection and maintenance practices that shall be used to maintain erosion and sediment controls:

Owner/Operator Inspection Requirements

- Prior to construction activity the owner/operator shall have contractors and sub-contractors identify a trained individual responsible for the implementation of the SWPPP. The trained individual must be on-site on a daily basis when soil disturbing activities are occurring.
- The owner/operator shall inspect the erosion and sediment control measures as identified in the SWPPP to ensure that they are being maintained in effective operating conditions at all times. Where soil disturbing activities temporarily cease and temporary stabilization measures have been applied to all disturbed areas, the owner/operator can stop conducting inspections. The owner/operator shall resume inspections when soil disturbing activities begin again.
- Where soil disturbing activities have ceased with partial project completion, the owner/operator can stop conducting inspections when disturbed areas have reached final stabilization. All post construction stormwater management practices required for the completed areas shall have been constructed in conformance with the SWPPP and be fully operational. Final stabilization means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.
- The owner/operator shall notify the DEC Regional Office's stormwater contact person or, in areas under the jurisdiction of a regulated, traditional land use MS4, the MS4 prior to any reduction in the frequency of site inspections.
- The owner/operator shall retain copies of the NOI, SWPPP, MS4 SWPPP acceptance form and any inspection reports submitted in conjunction with this permit and records or all data used to complete the NOI to be covered by this permit for a period of at least five (5) years from the date that the site is finally stabilized.

Qualified Inspector Inspection Requirements

- The qualified inspector is defined as a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed Landscape Architect, or other Department endorsed individual(s). It may also mean someone working under the direct supervision of the licensed Professional Engineer or licensed Landscape Architect, provided that

person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means the person has received four (4) hours of training endorsed by the Department and shall receive four (4) hours of training every three (3) years after the initial training.

- A site inspection in accordance with Part IV.C shall be conducted at least once every seven (7) days by the qualified inspector when soil disturbing activities are occurring. Inspections must be conducted at least twice every seven (7) calendar days when soil disturbance is 5 acres or more with no less than 2 calendar days between inspections. A copy of the "Construction Duration Inspection Form" is included in the "inspection forms" section of this plan.
- All measures shall be maintained in good working order; if any repairs or corrective actions are necessary, it is the responsibility of the qualified inspector to notify the owner/operator and appropriate contractor within one business day. The contactor shall begin implementing the corrective action within one business day of being notified.
- All inspection forms must be signed by a qualified inspector.
- For construction sites where soil disturbing activities are temporarily suspended, temporary stabilization measures shall be applied and the qualified inspector shall conduct a site inspection at least once every thirty (30) calendar days.
- Where soil disturbing activities have ceased with partial project completion the qualified inspector can stop conducting inspections when disturbed areas have reached final stabilization and all post construction stormwater management practices required for the completed areas have been constructed in conformance with the SWPPP and are fully operational.
- Where soil disturbing activities are not resumed within two (2) years, from the date of shut down of partial project completion, the qualified inspector shall perform a final inspection and certify that all disturbed areas have achieved final stabilization, all temporary and permanent erosion control measures have been removed, and post-construction stormwater management practices have been constructed in conformance with the SWPPP. Qualified inspector shall sign the "Final Stabilization" and "Post-Construction Stormwater Management Practice" certification statements on the Notice of Termination (NOT).

General Requirements

- A copy of the SPDES General Permit (GP-0-10-001), SWPPP and inspection reports shall be maintained onsite until the site has achieved final stabilization.
- Built up sediment shall be removed from any silt fence when it has reached one-third the height of the fence / dike.
- Sediment fencing shall be inspected for depth of sediment, and tears, to see if fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- The construction entrance shall be cleaned of sediment and redressed when voids in the crushed stone become filled and vehicular tracking of sediment is occurring.

- Dust shall be controlled on access points and other disturbed areas subject to surface dust movement and blowing.
- Stabilization fabric and check dams shall be inspected to ensure that slopes and swales are not being eroded. Fabric shall be replaced / reinstalled and rock dams added as necessary to prevent any such erosion.
- Inspection of swales shall be conducted to check condition of swale.
- Inspection must verify that all practices are adequately operational, maintained properly and that sediment is removed from all control structures.
- Inspection must look for evidence of soil erosion on the site, potential of pollutants entering drainage systems, problems at the discharge points, and signs of soil and mud transport from the site to the public road.

7.2 Post-Construction Stormwater Inspection and Maintenance Practices

CCH will maintain ownership of the site and will be responsible for maintaining the drainage system. Long-term inspection forms for the stormwater management practices (included in Appendix F of this plan) are referenced from Appendix G of the New York State Stormwater Management Design Manual.

8.0 INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be within the project area during construction:

- Fertilizers / seeding materials
- Stone
- Petroleum based products
- Straw bales (Hay will not be used per City of Syracuse requirement)
- Silt fence fabric
- Lumber
- Pavement marking paint
- Iron pipe and corrugated metal pipe (CMP)
- Bonded fiber matrix material
- HDPE Geomembrane material

9.0 SPILL PREVENTION

The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

9.1 Good Housekeeping

The following good housekeeping practices shall be followed within project areas during construction:

- An effort shall be made to store only enough products required to do the job.
- All materials stored within project areas shall be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products shall be kept in their original containers with the original manufacturer's label.
- Substances shall not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product shall be used up before disposing of the container.
- Manufacturers' recommendations for proper use and disposal shall be followed.
- The project superintendent shall inspect daily to ensure proper use and disposal of materials.

9.2 Hazardous Products

These practices are used to reduce the risks associated with hazardous materials:

- Products shall be kept in original containers unless they are not resealable.
- Original labels and material safety data shall be retained.
- If surplus product must be disposed of, manufacturers' or local and state recommended methods of proper disposal shall be followed.
- Material Safety Data Sheets for all hazardous products shall be within the project area for the duration of construction.

9.3 Product Specific Practices

The following product-specific practices shall be followed within the project areas:

9.3.1 Petroleum Products

All project related vehicles shall be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products shall be stored in tightly sealed containers which are clearly labeled.

Any asphalt substances used during construction shall be applied according to the manufacturer's recommendations**.**

9.3.2 Fertilizers

Fertilizers used shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked into the soil to limit exposure to stormwater. Fertilizers shall be stored in a covered or other contained area.

9.3.3 Paints

All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged to the storm sewer system but shall be properly disposed of according to manufacturer's instructions or State regulations.

9.3.4 Watercourse Protection

Construction operations shall be conducted in such a manner as to prevent damage to watercourses from pollution of debris, sediment, or other foreign material, or from manipulation, from equipment and/or materials in or near the watercourse. The contractor shall not return directly to the watercourse any water used for wash purposes or other similar operations which may cause the water to become polluted with sand, silt, cement, oil or other impurities. If the contractor uses water from the water course, the contractor shall construct an intake or temporary dam to protect and maintain watercourse water quality.

9.3.5 Spill Control Practices

The contractor will be responsible for preparing a project area specific spill control plan in accordance with local and NYS DEC regulations. At a minimum this plan should:

- Reduce stormwater contact if there is a spill.
- Contain the spill.
- Stop the source of the spill.
- Dispose of contaminated material in accordance with manufactures procedures, and NYSDEC regulations.
- Identify responsible and trained personnel.
- Ensure spill area is well ventilated.

10.0 UPDATING THE SWPPP

The SWPPP shall be updated/revised as conditions merit or as directed by the regulating authority. The attached inspection forms included with this document allows for the certification of any updates/revisions.

11.0 SWPPP CERTIFICATION

Contracting Firm Information:

Contracting Firm

Address

City/Town **State** **Zip**

Site Location:

CCH Landfills
Wolf and 7th North Streets
City of Syracuse (South Landfill) and Town of Salina (North Landfill)
Onondaga County, NY

Contractor's Certification

I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System (SPDES) general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

_____

Signature (Contractor/Subcontractor) **Date**

_____

For

_____

Responsible For

_____

Signature (Trained Individual) **Date**

_____

For

_____

Responsible For

_____

Signature (Contractor/Subcontractor) **Date**

For

_____

Responsible For

_____

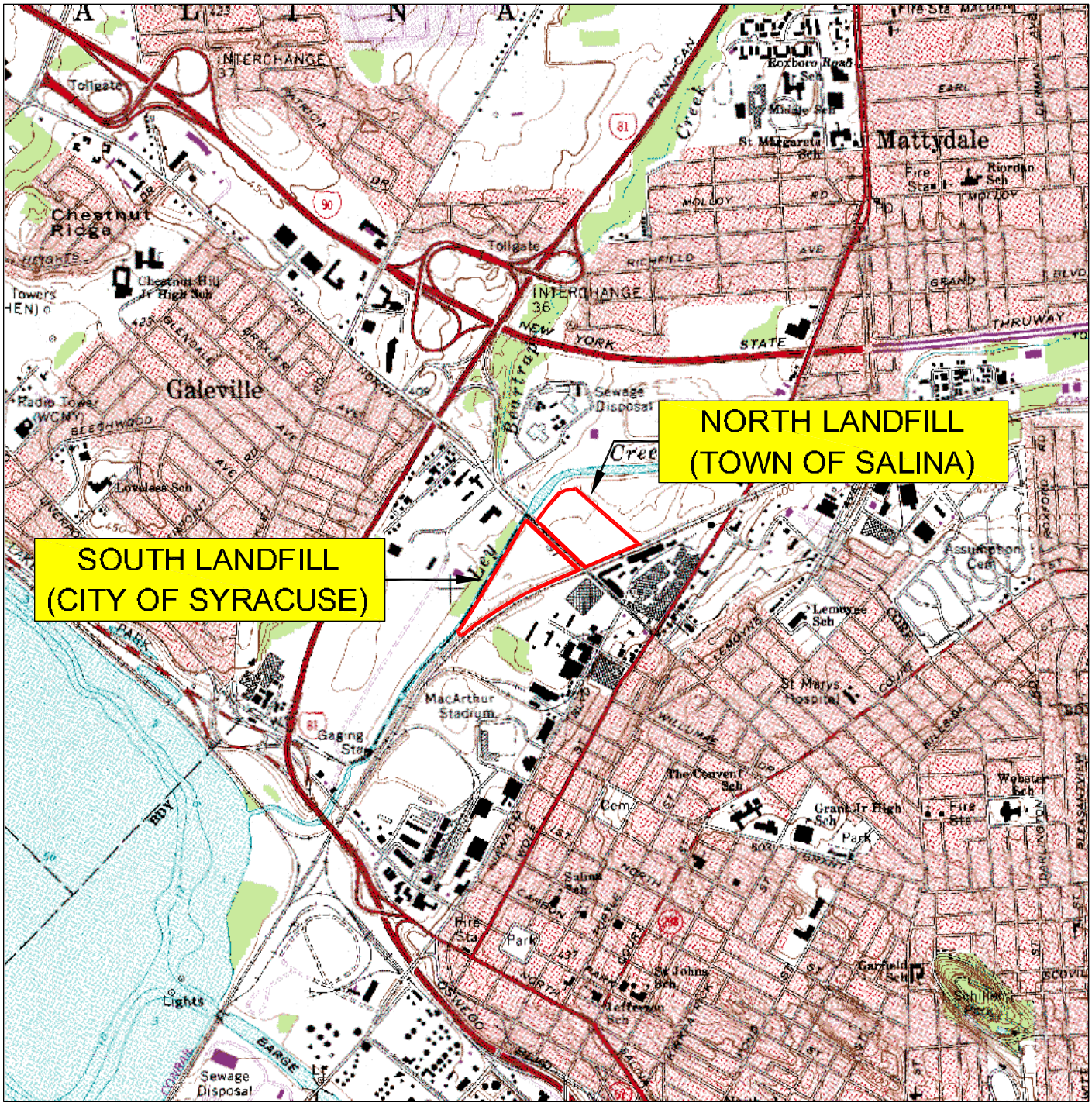
Signature (Trained Individual) **Date**

_____

For

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Responsible For

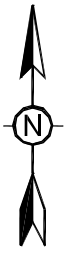


National Geodetic Vertical Datum of 1929
Contour Interval 10 Feet

SCALE
0 5000
FEET



QUADRANGLE LOCATION



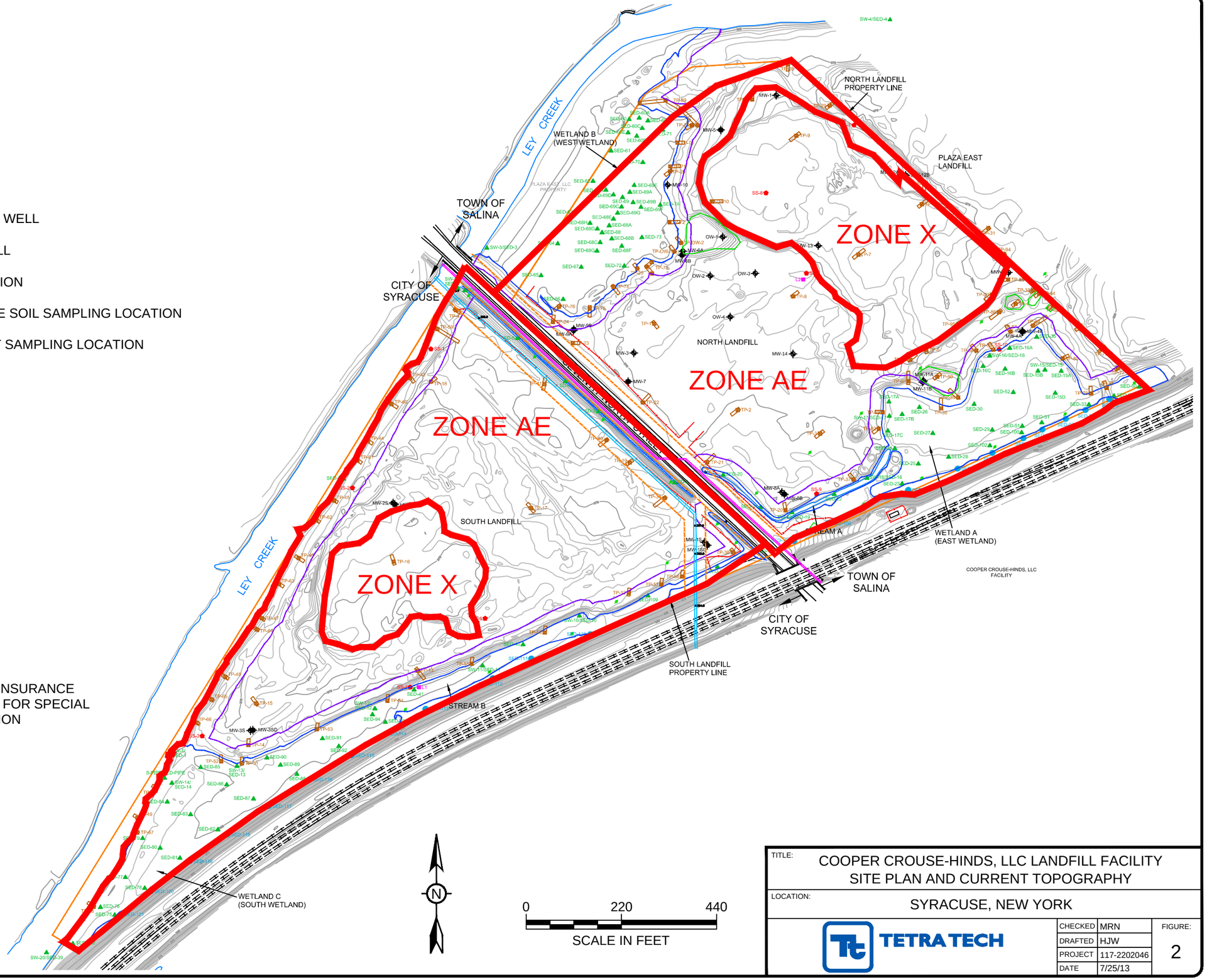
Base map from U.S.G.S. 7.5' SYRACUSE WEST, NEW YORK topographic quadrangle map.

COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SYRACUSE, NEW YORK	DATE: 8/1/12 DESIGNED: HJW CHECKED: MRN APPROVED: MRN DRAWN: HJW PROJ.: 117-2202046
SITE LOCATION MAP	
TETRA TECH	Figure 1

S:\CAD\COOPER\SYRACUSE\12-11-09\2202036FIG1.DWG

EXPLANATION

- MW-3S — SHALLOW AQUIFER MONITORING WELL
- MW-3SD — DEEP AQUIFER MONITORING WELL
- SS-1 — SURFACE SOIL SAMPLING LOCATION
- SED-95 — SURFACE SOIL AND SUBSURFACE SOIL SAMPLING LOCATION
- SW-1/SED-1 — SURFACE WATER AND SEDIMENT SAMPLING LOCATION
- SED-27 — SEDIMENT SAMPLING LOCATION
- TP-48 — TEST PIT LOCATION
- L1 — LEACHATE SAMPLING LOCATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- GAS MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- ZONE X AND ZONE AE: SEE FIRE INSURANCE RATE MAP NUMBER 36067C0208F FOR SPECIAL FLOOD HAZARD AREA DESIGNATION



TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
SITE PLAN AND CURRENT TOPOGRAPHY

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	7/25/13

FIGURE: 2

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\SITE PLAN.DWG

EXPLANATION

MW-3S — EXISTING SHALLOW AQUIFER MONITORING WELL. INSTALL STRAW BALES TO SURROUND WELL WITH ORANGE TRAFFIC CONES ON TOP - 2 CONES PER WELL. ABANDON / RECONSTRUCT AS DIRECTED BY ENGINEER

MW-3SD — EXISTING DEEP AQUIFER MONITORING WELL. INSTALL STRAW BALES TO SURROUND WELL WITH ORANGE TRAFFIC CONES ON TOP - 2 CONES PER WELL. ABANDON / RECONSTRUCT AS DIRECTED BY ENGINEER

SOIL REMOVAL AREA ADJACENT TO WETLAND

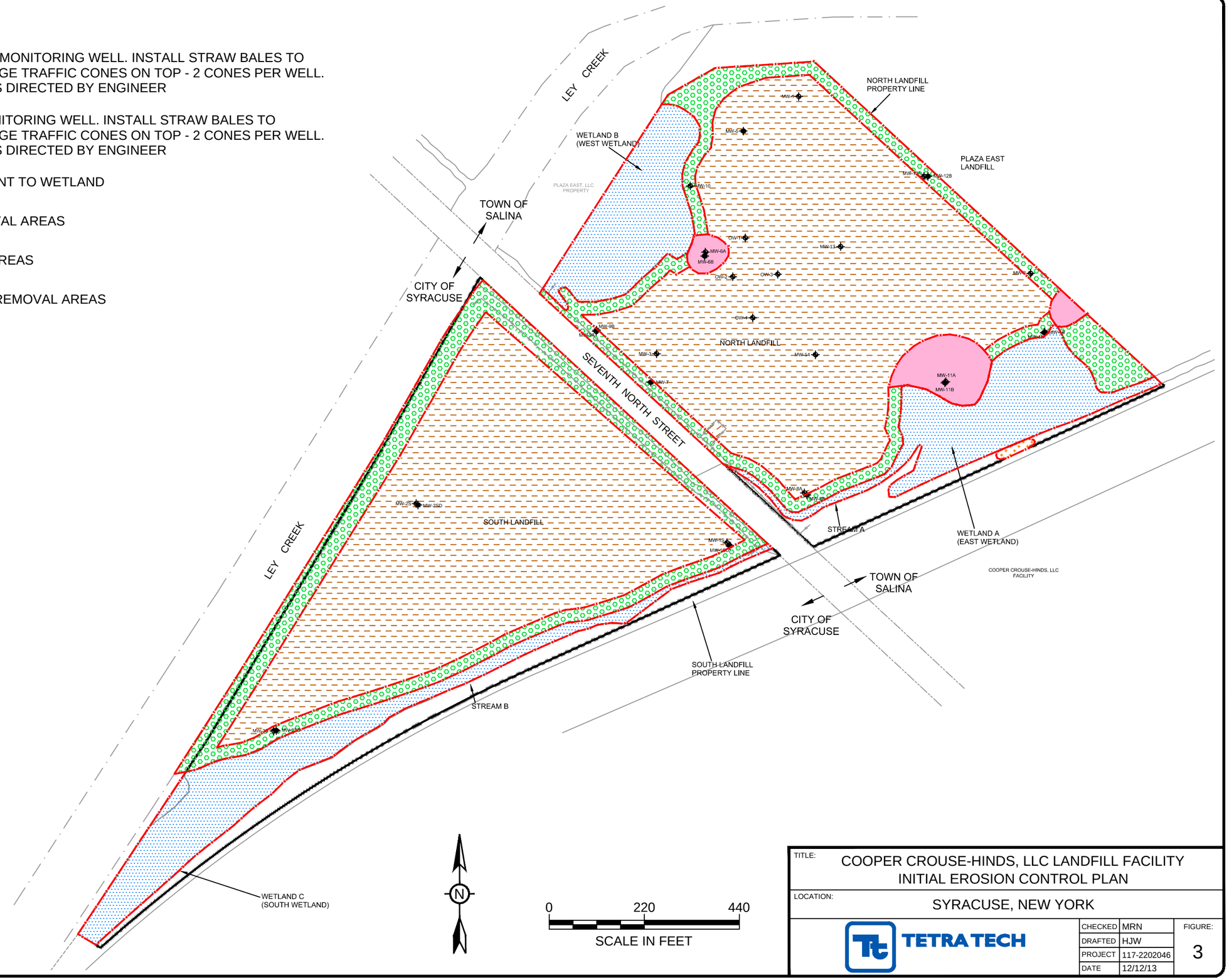
WETLANDS SEDIMENT REMOVAL AREAS

BUFFER ZONE EXCAVATION AREAS

2012 COMPLETED HOT SPOT REMOVAL AREAS

LANDFILL CAP AREA

SILT FENCE PERIMETER



TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
INITIAL EROSION CONTROL PLAN

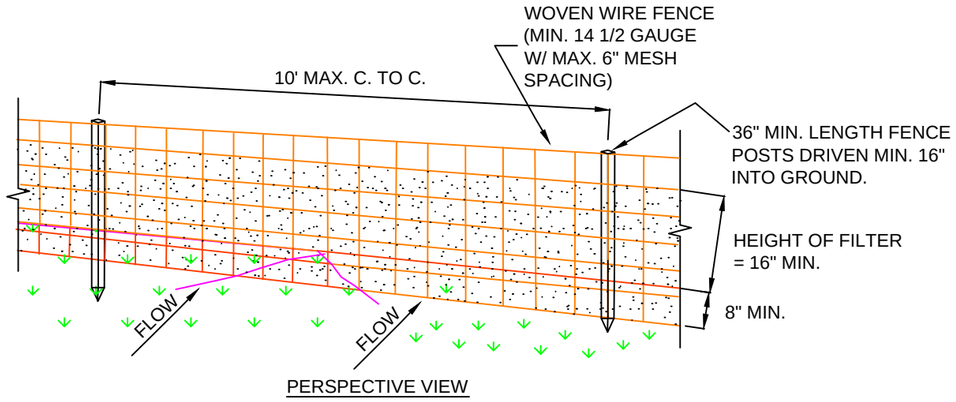
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

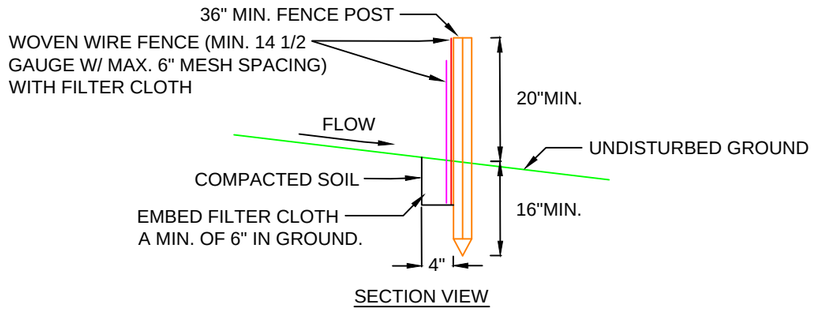
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PROJECT	117-2202046
DATE	12/12/13

FIGURE: 3

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PERSPECTIVE VIEW

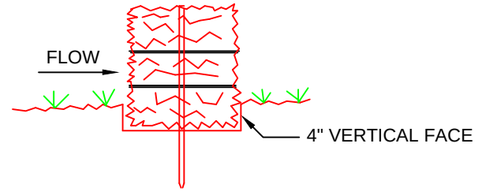


SECTION VIEW

CONSTRUCTION SPECIFICATIONS

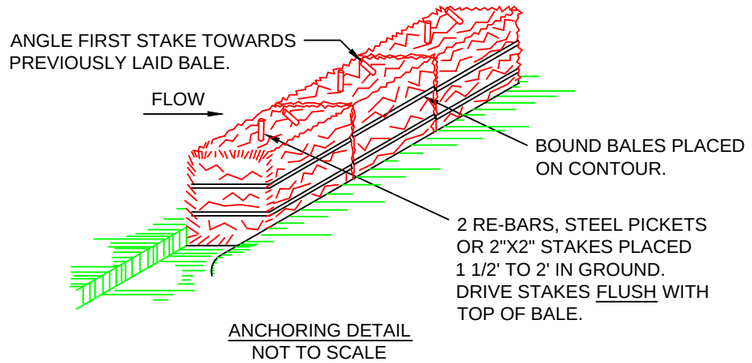
1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE DETAIL



BEDDING DETAIL
NOT TO SCALE

DRAINAGE AREA NO MORE THAN 1/4 ACRE PER 100 FEET OF STRAW BALE DIKE FOR SLOPES LESS THAN 25%.



ANCHORING DETAIL
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULLNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

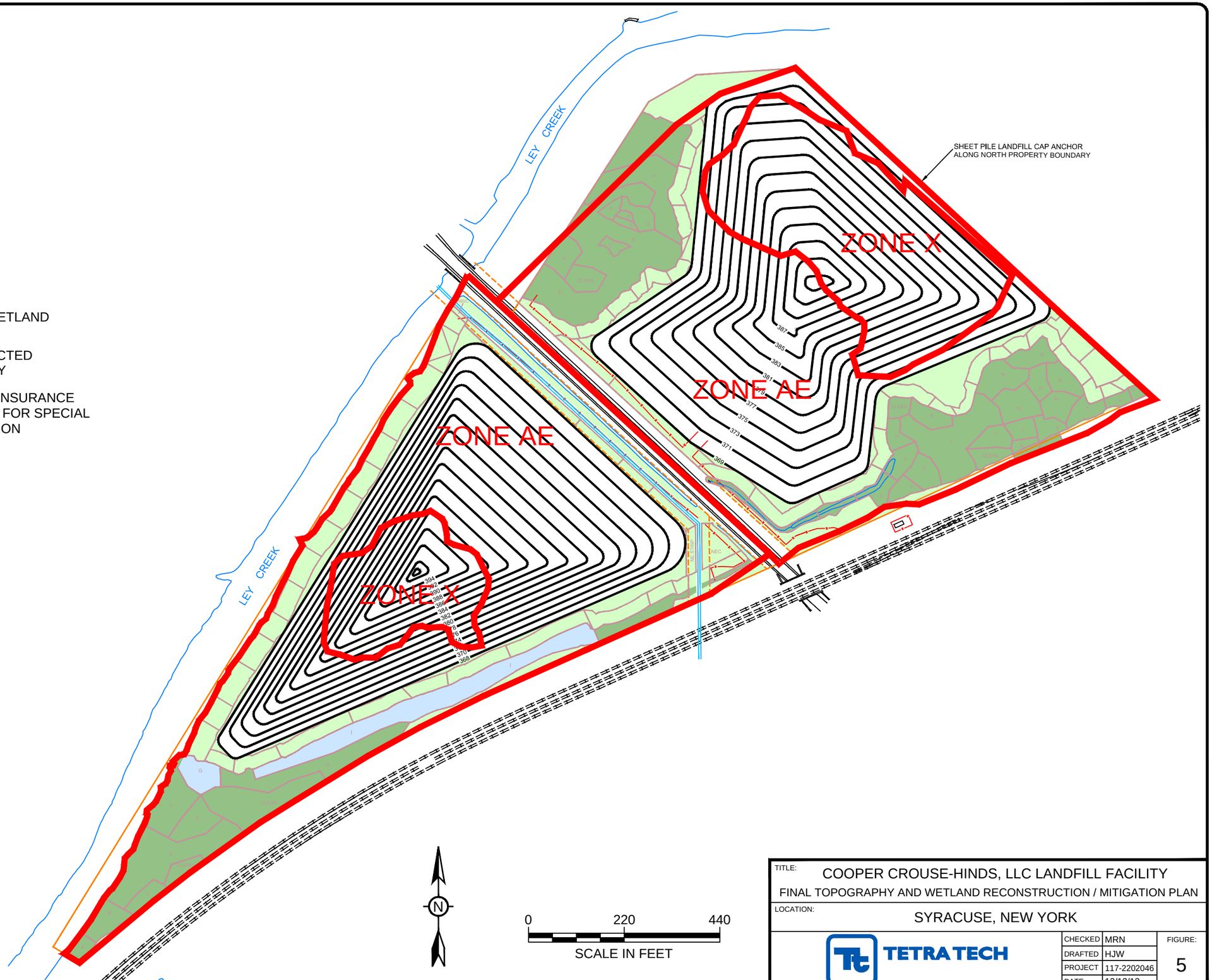
STRAW BALE DIKE DETAIL

TITLE:	COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SILT FENCE AND STRAW BALE DIKE DETAILS		
LOCATION:	SYRACUSE, NEW YORK		
TETRA TECH	CHECKED	MRN	FIGURE:
	DRAFTED	HJW	4
	PROJECT	117-2202046	
	DATE	2/25/13	

S:\CAD\COOPER\SYRACUSE\8-5-10\2202036FIG5.DWG

EXPLANATION

- PROPOSED FINAL TOPOGRAPHY
- EXCAVATION LIMITS
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- BUFFER ZONE
- RECONSTRUCTED EMERGENT WETLAND
- OPEN WATER WITH RECONSTRUCTED EMERGENT WETLAND PERIPHERY
- ZONE X AND ZONE AE: SEE FIRE INSURANCE RATE MAP NUMBER 36067C0208F FOR SPECIAL FLOOD HAZARD AREA DESIGNATION



TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION / MITIGATION PLAN

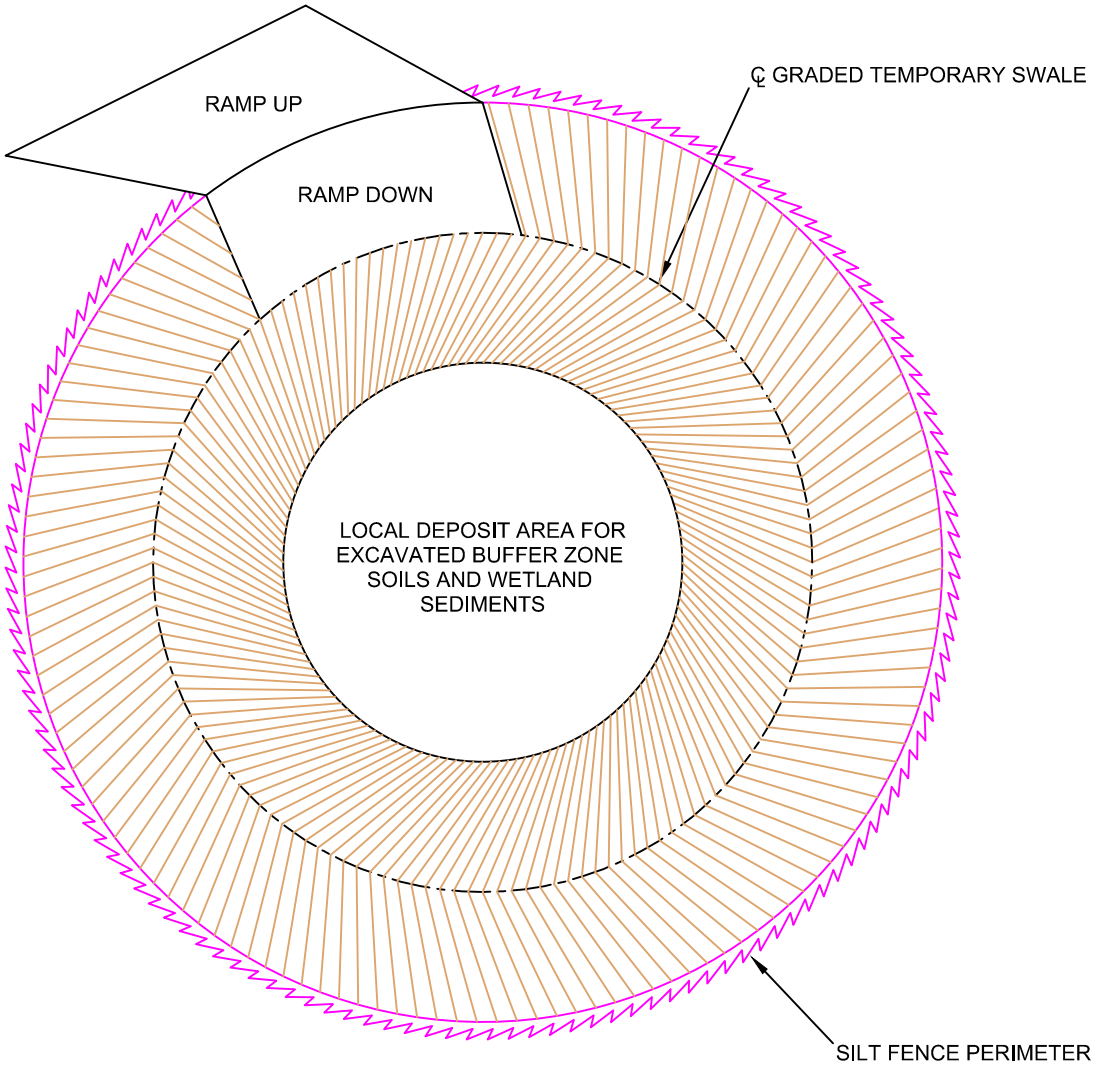
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

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PROJECT	117-2202046
DATE	12/12/13

FIGURE: 5

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NOTES:

1. DETERMINE TARGET AREA WITHIN LANDFILL CAP AREA TO DEPOSIT EXCAVATED SOILS / SEDIMENTS.
2. GRADE TEMPORARY SWALE SURROUNDING TARGET AREA TO CONTAIN WATER QUALITY VOLUME PER SECTION 4.2 OF NEW YORK STATE STORMWATER DESIGN MANUAL (WQV).
3. PLACE SILT FENCE AT SWALE PERIMETER UNLESS TEMPORARY SWALE VOLUME ≥3WQV.
4. SWALE SHAPE MAY VARY.
5. EXISTING TOPOGRAPHY MAY BE USED FOR SWALE.

LANDFILL CAP SEGMENT AREA PLAN

COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SYRACUSE, NEW YORK	DATE: 8/28/13
	DESIGNED: HJW
LANDFILL CAP SEGMENT AREA TEMPORARY STORMWATER SWALE	CHECKED: MRN
	APPROVED: MRN
	DRAWN: HJW
	PROJ.: 117-2202046
TETRA TECH	Figure 6

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\8-22-13\FIG 6 SEGMENT AREA.DWG

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole- foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 18. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC- 3, #9202
1315 East- West Highway
Silver Spring, MD 20910- 3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from digital orthophotography provided by the New York Office of Cyber Security & Critical Infrastructure from photography dated April 2006.

This map reflects more detailed and up- to- date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de- annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1- 800- 358- 9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a *Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1- 800- 358- 9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1- 877- 336- 2627) or visit the FEMA website at http://www.fema.gov/.

This digital FIRM was produced through a unique cooperative partnership between the New York State Department of Environmental Conservation (NYSDEC) and FEMA. As part of the effort, NYSDEC has joined in a Cooperative Technical Partnership agreement to produce and maintain FEMA's digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275 000m N — 1000-meter Universal Transverse Mercator grid values, zone 18
- 6000000 FT — 5000-foot grid ticks: New York State Plane coordinate system, central zone (FIPSZONE 3102), Transverse Mercator
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1- 800- 638- 6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0208F

FIRM
FLOOD INSURANCE RATE MAP
ONONDAGA COUNTY, NEW YORK
(ALL JURISDICTIONS)

PANEL 208 OF 520
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GEDDES, TOWN OF	360579	0208	F
SALINA, TOWN OF	360591	0208	F
SYRACUSE, CITY OF	360595	0208	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36067C0208F

EFFECTIVE DATE

Federal Emergency Management Agency

APPENDIX A

SPDES GENERAL PERMIT # GP-0-10-001

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

from

CONSTRUCTION ACTIVITY

Permit No. GP-0-10-001

Issued Pursuant to Article 17, Titles 7, 8 and Article 70
of the Environmental Conservation Law

Effective Date: January 29, 2010 Expiration Date: January 28, 2015

William R. Adriance
Chief Permit Administrator

William R. Adriance — January 28, 2010
Authorized Signature — Date

Address: NYS DEC
Div. Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

PREFACE

Pursuant to Section 402 of the Clean Water Act ("CWA"), stormwater *discharges* from certain *construction activities* are unlawful unless they are authorized by a *National Pollutant Discharge Elimination System ("NPDES")* permit or by a state permit program. New York's *State Pollutant Discharge Elimination System ("SPDES")* is a NPDES-approved program with permits issued in accordance with the *Environmental Conservation Law ("ECL").*

This general permit ("permit") is issued pursuant to Article 17, Titles 7, 8 and Article 70 of the ECL. An *owner or operator* may obtain coverage under this permit by submitting a Notice of Intent ("NOI") to the Department. Copies of this permit and the NOI for New York are available by calling (518) 402-8109 or at any New York State Department of Environmental Conservation ("the Department") regional office (see Appendix G).They are also available on the Department's website at:

http://www.dec.ny.gov/

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of "*construction activity*", as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a point source and therefore, pursuant to Article 17-0505 of the ECL, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. They cannot wait until there is an actual *discharge* from the construction site to obtain permit coverage.

***Note: The italicized words/phrases within this permit are defined in Appendix A.**

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES

FROM CONSTRUCTION ACTIVITIES

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Part I. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application - This permit authorizes stormwater *discharges* to *surface waters of the State* from the following *construction activities* identified within 40 CFR Parts 122.26(b)(14)(x), 122.26(b)(15)(i) and 122.26(b)(15)(ii), provided all of the eligibility provisions of this permit are met:

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;

2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department has determined that a *SPDES* permit is required for stormwater *discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of *pollutants* to *surface waters of the State.*

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

B. Maintaining Water Quality - It shall be a violation of this permit and the *ECL* for any *discharge* to either cause or contribute to a violation of *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, such as:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

C. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity* to *surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph D. of this Part.

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater discharges from *construction activities*.

(Part I. C)

3. Notwithstanding paragraphs C.1 and C.2 above, the following non-stormwater *discharges* may be authorized by this permit: discharges from fire fighting activities; fire hydrant flushings; waters to which cleansers or other components have not been added that are used to wash vehicles or control dust in accordance with the SWPPP, routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; uncontaminated groundwater or spring water; uncontaminated discharges from construction site de-watering operations; and foundation or footing drains where flows are not contaminated with process materials such as solvents. For those entities required to obtain coverage under this permit, and who discharge as noted in this paragraph, and with the exception of flows from fire fighting activities, these discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with water quality standards in Part I.B.

D. <u>Activities Which Are Ineligible for Coverage Under This General Permit</u> - All of the following are **<u>not</u>** authorized by this permit:

1. *Discharges* after *construction activities* have been completed and the site has undergone *final stabilization*;

2. *Discharges* that are mixed with sources of non-stormwater other than those expressly authorized under subsection C.3. of this Part and identified in the SWPPP required by this permit;

3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII, subparagraph K of this permit;

4. *Discharges* from *construction activities* that adversely affect a listed, or proposed to be listed, endangered or threatened species, or its critical habitat;

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects that:

    a. are tributary to waters of the state classified as AA or AA-s; and

(Part I. D. 6)

b. disturb one or more acres of land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey for the County in which the disturbance will occur.

7. *Construction activities* for linear transportation projects and linear utility projects that:
   a. are tributary to waters of the state classified as AA or AA-s; and

   b. disturb two or more acres of land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey for the County in which the disturbance will occur.

8. *Construction activities* that adversely affect a property that is listed or is eligible for listing on the State or National Register of Historic Places (Note: includes Archeological sites), unless there are written agreements in place with the NYS Office of Parks, Recreation and Historic Preservation (OPRHP) or other governmental agencies to mitigate the effects, or there are local land use approvals evidencing the same.

Part II. OBTAINING PERMIT COVERAGE

A. Notice of Intent (NOI) Submittal

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a *regulated, traditional land use control MS4* must first develop a SWPPP in accordance with all applicable requirements of this permit and then submit a completed NOI form to the address below in order to be authorized to *discharge* under this permit. The NOI form shall be one which is associated with this permit, signed in accordance with Part VII.H. of this permit.

   NOTICE OF INTENT
   NYS DEC, Bureau of Water Permits
   625 Broadway, 4th Floor
   Albany, New York 12233-3505

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first develop a SWPPP in accordance with all applicable requirements of this permit and then have its SWPPP reviewed and accepted by the *MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the "MS4 SWPPP Acceptance" form signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4*, or by a duly authorized representative of that person, and then submit that form along with the NOI to the address referenced under "Notice of Intent (NOI) Submittal".

(Part II. A.2)

This requirement does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.E. (Change of Owner or Operator).

3. The *owner or operator* shall have the SWPPP preparer sign the "SWPPP Preparer Certification" statement on the NOI prior to submitting the form to the Department.

4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

B. <u>Permit Authorization</u>

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.

2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied <u>all</u> of the following criteria:

    a. project review pursuant to the State Environmental Quality Review Act (SEQRA) have been satisfied, when SEQRA is applicable,

    b. where required, all necessary Department permits subject to the *Uniform Procedures Act (UPA)* (see 6 NYCRR Part 621) have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits must submit a preliminary SWPPP to the appropriate DEC Regional Office in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

    c. the final SWPPP has been prepared, and

    d. an NOI has been submitted to the Department in accordance with the requirements of this permit.

3. An *owner or operator* that has satisfied the requirements of Part II.B.2 above will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

(Part II. B. 3)

a. For *construction activities* that are <u>not</u> subject to the requirements of a *regulated, traditional land use control MS4*:

i. Five (5) business days from the date the Department receives a complete NOI for *construction activities* with a SWPPP that has been prepared in conformance with the technical standards referenced in Parts III.B.1, 2 and/or 3, or

ii. Sixty (60) business days from the date the Department receives a complete NOI for *construction activities* with a SWPPP that has <u>not</u> been prepared in conformance with the technical standards referenced in Parts III.B.1, 2 or 3.

b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:

i. Five (5) business days from the date the Department receives a complete NOI and signed "MS4 SWPPP Acceptance" form,

4. The Department may suspend or deny an *owner's or operator's* coverage under this permit if the Department determines that the SWPPP does not meet the permit requirements.

5. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department.

C. <u>General Requirements For Owners or Operators With Permit Coverage</u>

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination (NOT) has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4.

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-10-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form and inspection reports at the construction site until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department.

(Part II. C. 2)

The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land use control MS4*, the MS4 (provided the MS4 is not the *owner or operator* of the construction activity). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

    a. The *owner or operator* shall have a *qualified inspector* conduct **at least** two (2) site inspections in accordance with Part IV.C. every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

    b. In areas where soil disturbance activity has been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control.

    c. The *owner or operator* shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

    d. The *owner or operator* shall install any additional site specific practices needed to protect water quality.

    e. The *owner or operator* shall include the requirements above in their SWPPP.

4. The Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements.

(Part II. C)

5. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4,* the *owner or operator* shall notify the *MS4* in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *MS4*, the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *MS4* prior to commencing construction of the post-construction stormwater management practice.

D. Permit Coverage for Discharges Authorized Under GP-0-08-001

1. Upon renewal of SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-08-001), a*n owner or operator* of *construction activity* with coverage under GP-0-08-001, as of the effective date of GP-0-10-001, shall be authorized to *discharge* in accordance with GP-0-10-001 unless otherwise notified by the Department.

E. Change of Owner or Operator

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.A.1.. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

   Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or operator* was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

1. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*.

(Part III. A)

2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the pollutants in stormwater discharges and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.

3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.

4. The *owner or operator* must keep the SWPPP current so that it at all times accurately documents the erosion and sediment controls practices that are being used or will be used during construction, and all post-construction stormwater management practices that will be constructed on the site. At a minimum, the *owner or operator* shall amend the SWPPP:

    a. whenever the current provisions prove to be ineffective in minimizing pollutants in stormwater *discharges* from the site;

    b. whenever there is a change in design, construction, or operation at the construction site that has or could have an effect on the discharge of pollutants; and

    c. to address issues or deficiencies identified during an inspection by the *qualified inspector*, the Department or other regulatory authority.

5. The Department may notify the *owner or operator* at any time that the SWPPP does not meet one or more of the minimum requirements of this permit. The notification shall be in writing and identify the provisions of the SWPPP that require modification. Within fourteen (14) calendar days of such notification, or as otherwise indicated by the Department, the *owner or operator* shall make the required changes to the SWPPP and submit written notification to the Department that the changes have been made. If the *owner or operator* does not respond to the Department's comments in the specified time frame, the Department may suspend the *owner's or operator's* coverage under this permit.

6. Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP.

(Part III. A. 6)

The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor.* The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.

The *owner or operator* shall have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

> "I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings. "

In addition to providing the certification statement above, the certification page must also identify the specific elements of the SWPPP that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the *trained contractor* responsible for SWPPP implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The *owner or operator* shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the construction site. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above.

7. For projects where the Department requests a copy of the SWPPP or inspection reports, the *owner or operator* shall submit the documents in both electronic (PDF only) and paper format within five (5) business days, unless otherwise notified by the Department.

8. The SWPPP must include documentation supporting the determination of permit eligibility with regard to Part I.D.8. (Historic Places or Archeological Resource). At a minimum, the supporting documentation shall include the following:

(Part III. A. 8)

a. Information on whether the stormwater discharge or *construction activities* would have an effect on a property (historic or archeological resource) that is listed or eligible for listing on the State or National Register of Historic Places;

b. Results of historic resources screening determinations conducted. Information regarding the location of historic places listed, or eligible for listing, on the State or National Registers of Historic Places and areas of archeological sensitivity that may indicate the need for a survey can be obtained online by viewing the New York State Office of Parks, Recreation and Historic Places (OPRHP) online resources located on their web site at: http://nysparks.state.ny.us/shpo/online-tools/ (using The Geographic Information System for Archeology and National Register). OPRHP can also be contacted at: NYS OPRHP, State Historic Preservation Office, Peebles Island Resources Center, P.O. Box 189, Waterford, NY 12188-0189, phone: 518-237-8643;

c. A description of measures necessary to avoid or minimize adverse impacts on places listed, or eligible for listing, on the State or National Register of Historic Places. If the *owner or operator* fails to describe and implement such measures, the stormwater *discharge* is ineligible for coverage under this permit; and

d. Where adverse effects may occur, any written agreements in place with OPRHP or other governmental agency to mitigate those effects, or local land use approvals evidencing the same.

B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control. Where erosion and sediment control practices are not designed in conformance with this technical standard, the *owner or operator* must demonstrate equivalence to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

    a. Background information about the scope of the project, including the location, type and size of project;

(Part III. B. 1)

b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s), wetlands and drainage patterns that could be affected by the construction activity; existing and final slopes; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the stormwater discharge(s);

c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);

d. A construction phasing plan and sequence of operations describing the intended order of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

e. A description of the minimum erosion and sediment control practices to be installed or implemented for each construction activity that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;

f. A temporary and permanent soil stabilization plan that meets the requirements of the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of final stabilization;

g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

h. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;

(Part III. B. 1)

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6., to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control;

j. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in the stormwater *discharges*;

k. A description and location of any stormwater *discharges* associated with industrial activity other than construction at the site, including, but not limited to, stormwater *discharges* from asphalt plants and concrete plants located on the construction site; and

l. Identification of any elements of the design that are not in conformance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is equivalent to the technical standards.

2. Post-construction stormwater management practice component - All construction projects identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the most current version of the technical standard, New York State Stormwater Management Design Manual ("Design Manual"). If the Design Manual is revised during the term of this permit, an *owner or operator* must begin using the revised version of the Design Manual to prepare their SWPPP six (6) months from the final revision date of the Design Manual.

   Where post-construction stormwater management practices are not designed in conformance with this technical standard, the *owner or operator* must demonstrate equivalence to the technical standard.

   At a minimum, the post-construction stormwater management practice component of the SWPPP shall include the following:

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project;

(Part III. B. 2)

b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;

c. The dimensions, material specifications and installation details for each post-construction stormwater management practice;

d. Identification of any elements of the design that are not in conformance with the Design Manual. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is equivalent to the technical standards;

e. A hydrologic and hydraulic analysis for all structural components of the stormwater management control system;

f. A detailed summary (including calculations) of the sizing criteria that was used to design all post-construction stormwater management practices. At a minimum, the summary shall address the required design criteria from the applicable chapter of the Design Manual; including the identification of and justification for any deviations from the Design Manual, and identification of any design criteria that are not required based on the design criteria or waiver criteria included in the Design Manual; and

g. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.g. above.

(Part III. C)

C. Required SWPPP Components by Project Type - Unless otherwise notified by the Department, *owners or operators* of *construction activities* identified in Table 1 of Appendix B are required to prepare a SWPPP that only includes erosion and sediment control practices designed in conformance with Part III.B.1. *Owners or operators* of the *construction activities* identified in Table 2 of Appendix B shall prepare a SWPPP that also includes post-construction stormwater management practices designed in conformance with Part III.B.2 or 3.

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices and all post-construction stormwater management practices identified in the SWPPP are maintained in effective operating condition at all times.

2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York, or protect the public health and safety and/or the environment.

B. Owner or Operator Maintenance Inspection Requirements

1. The *owner or operator* shall inspect, in accordance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, the erosion and sediment controls identified in the SWPPP to ensure that they are being maintained in effective operating condition at all times.

2. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the *owner or operator* can stop conducting the maintenance inspections. The *owner or operator* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. as soon as soil disturbance activities resume.

3. For construction sites where soil disturbance activities have been shut down with partial project completion, the *owner or operator* can stop conducting the maintenance inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

(Part IV. C)

C. <u>Qualified Inspector Inspection Requirements</u> - The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

[Note: The *trained contractor* identified in Part III.A.6. **cannot** conduct the *qualified inspector* site inspections unless they meet the *qualified inspector* qualifications included in Appendix A. In order to perform these inspections, the *trained contractor* would have to be a:

- Licensed Professional Engineer,
- Certified Professional in Erosion and Sediment Control (CPESC),
- Registered Landscape Architect, or
- Someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, <u>with the exception of</u>:

    a. the construction of a single family residential subdivision with 25% or less impervious cover at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

    b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

    c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and

    d. construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:

    a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.

(Part IV. C. 2)

b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.C.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the Regional Office stormwater contact person (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the MS4 (provided the MS4 is not the *owner or operator* of the construction activity) in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the Regional Office stormwater contact person (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the MS4 (provided the MS4 is not the *owner or operator* of the construction activity). in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization*, and all temporary, structural erosion and sediment control measures have been removed*;* and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "Final Stabilization" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.A.1..

(Part IV. C. 3)

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization*, all points of discharge to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site, and all points of discharge from the construction site.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

    a. Date and time of inspection;

    b. Name and title of person(s) performing inspection;

    c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

    d. A description of the condition of the runoff at all points of discharge from the construction site. This shall include identification of any *discharges* of sediment from the construction site. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

    e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

    f. Identification of all erosion and sediment control practices that need repair or maintenance;

    g. Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;

    h. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection;

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s); and

k. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector.* Pursuant to Part II.C.2., the inspection reports shall be maintained on site with the SWPPP.

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.A.1. The NOT form shall be one which is associated with this general permit, signed in accordance with Part VII.H.

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

(Part V. A. 2)

a. Total project completion - All construction activity identified in the SWPPP has been completed; and all areas of disturbance have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.E.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "Final Stabilization" and "Post-Construction Stormwater Management Practice" certification statements on the NOT, certify that all disturbed areas have achieved *final stabilization;* and all temporary, structural erosion and sediment control measures have been removed; and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall also have the MS4 sign the "MS4 Acceptance" statement on the NOT. The *owner or operator* shall have the principal executive officer, ranking elected official, or duly authorized representative from the *regulated, traditional land use control MS4*, sign the "MS4 Acceptance" statement. The MS4 official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The MS4 can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector's* final site inspection certification(s) required in Part V.3.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

(Part V. A. 5)

a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has modified their deed of record to include a deed covenant that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan,

d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, college, university), or government agency or authority, the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION OF RECORDS

A. Record Retention - The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the site achieves *final stabilization*. This period may be extended by the Department, in its sole discretion, at any time upon written notification.

B. Addresses - With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.A.1), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate Department Regional Office listed in Appendix F.

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply - The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied.

(Part VII. A)

The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

B. <u>Continuation of the Expired General Permit</u> - This permit expires five (5) years from the effective date. However, coverage may be obtained under the expired general permit, which will continue in force and effect, until a new general permit is issued. Unless otherwise notified by the Department in writing, an *owner or operator* seeking authorization under the new general permit must submit a new NOI in accordance with the terms of such new general permit.

C. <u>Enforcement</u> - Failure of the *owner or operator,* its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to $37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

D. <u>Need to Halt or Reduce Activity Not a Defense</u> - It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

E. <u>Duty to Mitigate</u> - The *owner or operator* and its contractors and subcontractors shall take all reasonable steps to minimize or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

F. <u>Duty to Provide Information</u> - The *owner or operator* shall make available to the Department for review and copying or furnish to the Department within five (5) business days of receipt of a Department request for such information, any information requested for the purpose of determining compliance with this permit. This can include, but is not limited to, the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form, executed maintenance agreement, and inspection reports. Failure to provide information requested by the Department within the request timeframe shall be a violation of this permit.

The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review the NOI, SWPPP or inspection reports. Copying of documents will be done at the requester's expense.

G. <u>Other Information</u> - When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any other report, or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s)

changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or impervious area), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. <u>Signatory Requirements</u>

1. All NOIs and NOTs shall be signed as follows:

    a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

        i. a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

        ii. the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

    b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

    c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

        i. the chief executive officer of the agency, or

(Part VII. H. 1. c)

ii. a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. or by a duly authorized representative of that person. A person is a duly authorized representative only if:

    a. The authorization is made in writing by a person described in Part VII.H.1.;

    b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position) and,

    c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

    It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

I. <u>Property Rights</u> - The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity.*

J. <u>Severability</u> - The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

(Part VII. K)
K. <u>Denial of Coverage Under This Permit</u>

1. At its sole discretion, the Department may require any *owner or operator* authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the *owner or operator* to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from *owner or operator* receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Regional Water Engineer, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. Any *owner or operator* authorized by this permit may request to be excluded from the coverage under this permit by applying for an individual permit or another general permit. In such cases, the *owner or operator* shall submit an individual application or an alternative general permit application in accordance with the requirements of this general permit, 40 CFR 122.26(c)(1)(ii) and 6 NYCRR Part 621, with reasons supporting the request, to the Department at the address for the appropriate Department Office (see addresses in Appendix F).The request may be granted by issuance of an individual permit or another general permit at the discretion of the Department.

3. When an individual SPDES permit is issued to a discharger authorized to discharge under a general SPDES permit for the same discharge(s), the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

L. <u>Proper Operation and Maintenance</u> - The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

M. <u>Inspection and Entry</u> - The *owner or operator* shall allow the Department or an authorized representative of EPA, the State, or, in the case of a construction site which discharges through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

(Part VII. M)

1. Enter upon the *owner's or operator's* premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

N. Permit Actions - At the Department's sole discretion, this permit may, at any time, be modified, suspended, revoked, or renewed. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. Definitions - Definitions of key terms are included in Appendix A of this permit.

P. Re-Opener Clause

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with *construction activity* covered by this permit, the *owner or operator* of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. Penalties for Falsification of Forms and Reports – Article 17 of the ECL provides for a civil penalty of $37,500 per day per violation of this permit. Articles 175 and 210 of the New York State Penal Law provide for a criminal penalty of a fine and/or imprisonment for falsifying forms and reports required by this permit.

R. Other Permits – Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

APPENDIX A

Definitions

Alter Hydrology from Pre to Post-Development Conditions - means the post-development peak flow rate(s) has increased by more than 5% of the pre-developed condition for the design storm of interest (e.g. 10 yr and 100 yr).

Combined Sewer - means a sewer that is designed to collect and convey both "sewage" and "stormwater".

Commence (Commencement of) Construction Activities - means the initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices required in the SWPPP. See definition for "Construction Activity(ies)" also.

Construction Activity(ies) - means any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, logging equipment operation, the cutting and skidding of trees, stump removal and/or brush root removal. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Direct Discharge (to a specific surface waterbody) - means that runoff flows from a construction site by overland flow and the first point of discharge is the specific surface waterbody, or runoff flows from a construction site to a separate storm sewer system and the first point of discharge from the separate storm sewer system is the specific surface waterbody.

Discharge(s) - means any addition of any pollutant to waters of the State through an outlet or point source.

Environmental Conservation Law (ECL) - means chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law.

Final Stabilization - means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

General SPDES permit - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 authorizing a category of discharges.

Groundwater - means waters in the saturated zone. The saturated zone is a subsurface zone in

which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Impervious Area (Cover) - means all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Larger Common Plan of Development or Sale - means a contiguous area where multiple separate and distinct construction activities are occurring, or will occur, under one plan. The term "plan" in "larger common plan of development or sale" is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, marketing plan, advertisement, drawing, permit application, State Environmental Quality Review Act (SEQRA) application, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that construction activities may occur on a specific plot.

For discrete construction projects that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline or utility project that is part of the same "common plan" is not concurrently being disturbed.

Municipal Separate Storm Sewer (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

i. Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters of the State*;*
ii. Designed or used for collecting or conveying stormwater;
iii. Which is not a *combined sewer*; and
iv. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) - means the national system for the issuance of wastewater and stormwater permits under the Federal Water Pollution Control Act (Clean Water Act).

NOI Acknowledgment Letter - means the letter that the Department sends to an owner or operator to acknowledge the Department's receipt and acceptance of a complete Notice of Intent. This letter documents the owner's or operator's authorization to discharge in accordance with the general permit for stormwater discharges from construction activity.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the construction activity is occurring; and/or an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications.

Pollutant - means dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in Parts 700 et seq of this Title.

Qualified Inspector - means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or other Department endorsed individual(s).

It can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years.

It can also mean a person that meets the *Qualified Professional* qualifications in addition to the *Qualified Inspector* qualifications.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional - means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics in order to prepare a SWPPP that conforms to the Department's technical standard. All components of the SWPPP that involve the practice of engineering, as defined by the NYS Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is required to gain coverage under New York State DEC's SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s).

Routine Maintenance Activity - means construction activity that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:

- Re-grading of gravel roads or parking lots,
- Stream bank restoration projects (does not include the placement of spoil material),
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch,
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch),
- Placement of aggregate shoulder backing that makes the transition between the road shoulder and the ditch or embankment,
- Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material,
- Long-term use of equipment storage areas at or near highway maintenance facilities,
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or embankment,
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts.

State Pollutant Discharge Elimination System (SPDES) - means the system established pursuant to Article 17 of the ECL and 6 NYCRR Part 750 for issuance of permits authorizing discharges to the waters of the state.

Surface Waters of the State - shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction. Waters of the state are further defined in 6 NYCRR Parts 800 to 941.

Temporary Stabilization - means that exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats).

Total Maximum Daily Loads (TMDLs) - A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. It is a calculation of the maximum amount of a pollutant that a waterbody can receive on a daily basis and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL stipulates wasteload allocations (WLAs) for point source discharges, load allocations (LAs) for nonpoint sources, and a margin of safety (MOS).

Trained Contractor - means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

It can also mean an employee from the contracting (construction) company, identified in Part III.A.6., that meets the *qualified inspector* qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity).

The *trained contractor* will be responsible for the day to day implementation of the SWPPP.

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part 621 of the Environmental Conservation Law (ECL), Article 70.

Water Quality Standard - means such measures of purity or quality for any waters in relation to their reasonable and necessary use as promulgated in 6 NYCRR Part 700 et seq.

APPENDIX B

Required SWPPP Components by Project Type

Table 1
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres:

- Single family home not located in one of the watersheds listed in Appendix C and not *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E
- Construction of a barn or other agricultural building, silo, stock yard or pen.

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
- Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
- Bike paths and trails
- Sidewalk construction projects that are not part of a road/ highway construction or reconstruction project
- Slope stabilization projects
- Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics
- Spoil areas that will be covered with vegetation
- Land clearing and grading for the purposes of creating vegetated open space (i.e. recreational parks, lawns, meadows, fields), excluding projects that *alter hydrology from pre to post development* conditions
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State", excluding projects that involve soil disturbances of less than five acres and construction activities that include the construction or reconstruction of impervious area

The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land:

- All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

Table 2
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other agricultural building(e.g. silo) and structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional, includes hospitals, prisons, schools and colleges
- Industrial facilities, includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's and water treatment plants
- Office complexes
- Sports complexes
- Racetracks, includes racetracks with earthen (dirt) surface
- Road construction or reconstruction
- Parking lot construction or reconstruction
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover*, and constructed as part of an over-head electric transmission line project , wind-power project, cell tower project, oil or gas well drilling project or other linear utility project
- All other construction activities that include the construction or reconstruction of *impervious area* and *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

APPENDIX C

Watersheds Where Enhanced Phosphorus Removal Standards Are Required

Watersheds where *owners or operators* of construction activities identified in Table 2 of Appendix B must prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

- Entire New York City Watershed located east of the Hudson River - Figure 1
- Onondaga Lake Watershed - Figure 2
- Greenwood Lake Watershed -Figure 3
- Oscawana Lake Watershed – Figure 4

Figure 1 - New York City Watershed East of the Hudson

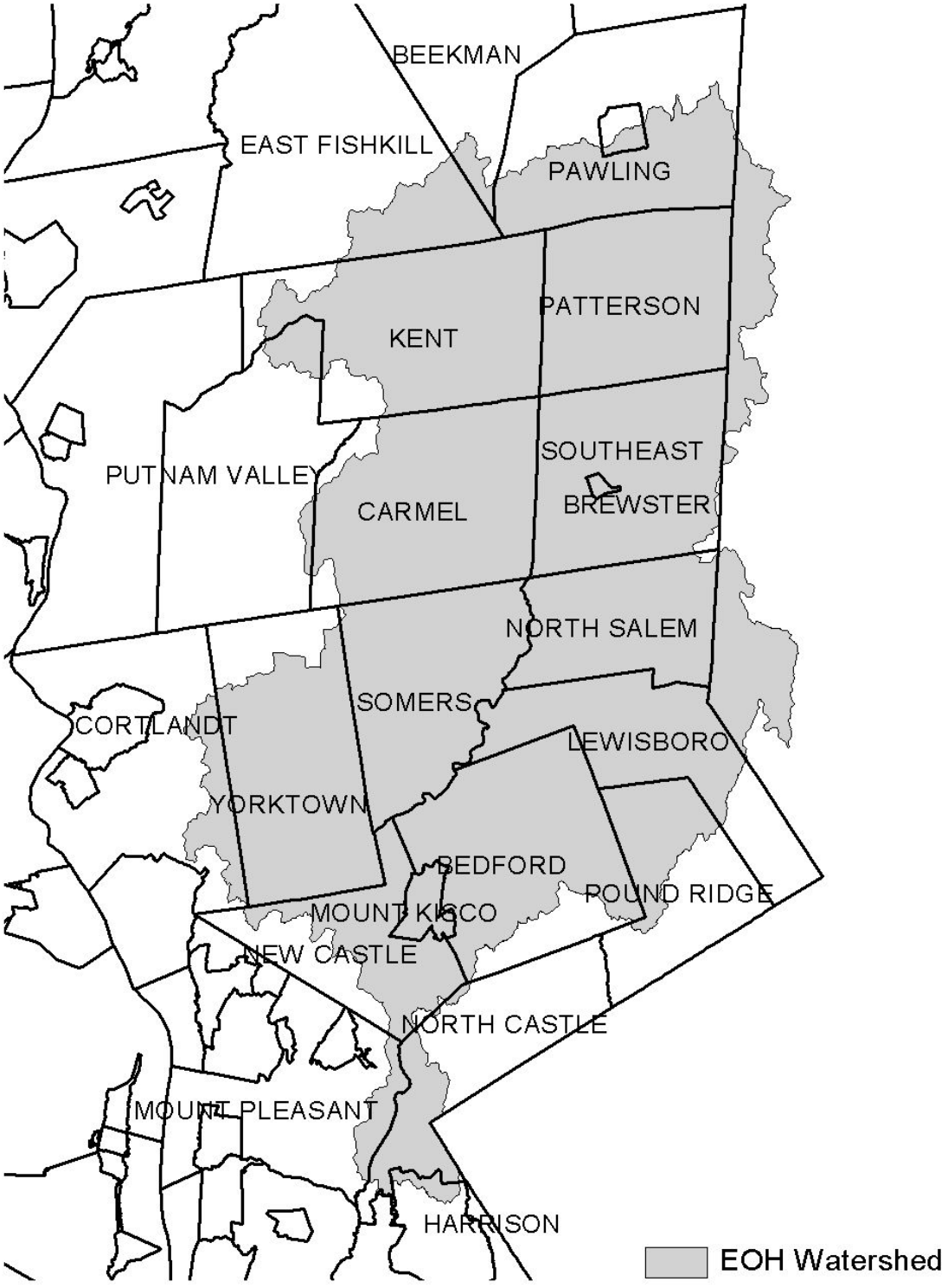


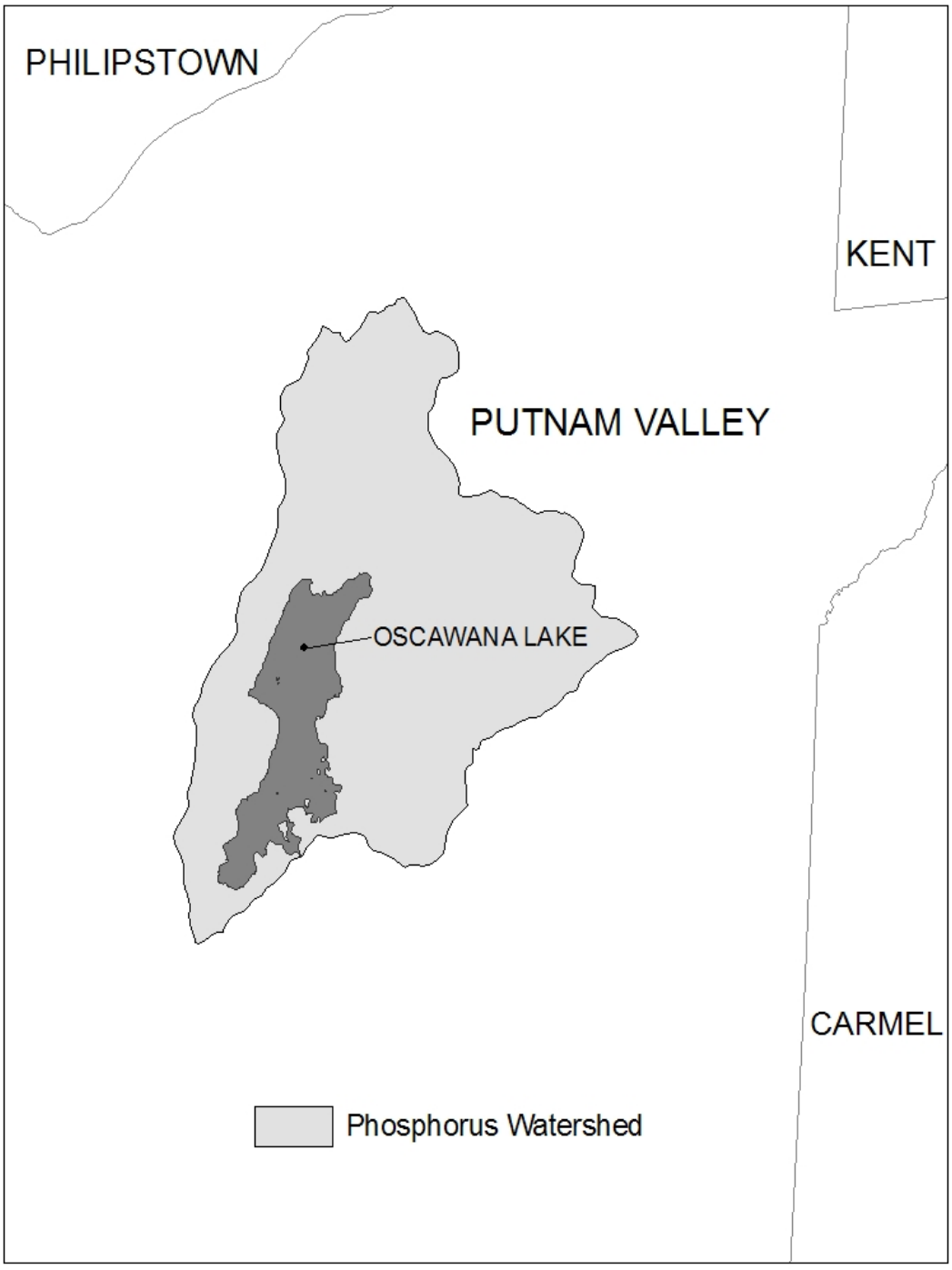
Figure 2 - Onondaga Lake Watershed



Figure 3 - Greenwood Lake Watershed



Figure 4 - Oscawana Lake Watershed



APPENDIX D

Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.

Entire New York City Watershed that is located east of the Hudson River - See Figure 1 in Appendix C

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity (e.g. silt, sediment or nutrients). *Owners or operators* of single family home and single family residential subdivision construction activities that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the most current version of the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

COUNTY	WATERBODY
Albany	Ann Lee (Shakers) Pond, Stump Pond
Albany	Basic Creek Reservoir
Bronx	Van Cortlandt Lake
Broome	Whitney Point Lake/Reservoir
Broome	Beaver Lake
Broome	White Birch Lake
Chautauqua	Chautauqua Lake, North
Chautauqua	Chautauqua Lake, South
Chautauqua	Bear Lake
Chautauqua	Chadakoin River and tribs
Chautauqua	Lower Cassadaga Lake
Chautauqua	Middle Cassadaga Lake
Chautauqua	Findley Lake
Clinton	Great Chazy River, Lower, Main Stem
Columbia	Kinderhook Lake
Columbia	Robinson Pond
Dutchess	Hillside Lake
Dutchess	Wappinger Lakes
Dutchess	Fall Kill and tribs
Dutchess	Rudd Pond
Erie	Rush Creek and tribs
Erie	Ellicott Creek, Lower, and tribs
Erie	Beeman Creek and tribs
Erie	Murder Creek, Lower, and tribs
Erie	South Branch Smoke Cr, Lower, and tribs
Erie	Little Sister Creek, Lower, and tribs
Essex	Lake George (primary county listed as Warren)
Genesee	Black Creek, Upper, and minor tribs
Genesee	Tonawanda Creek, Middle, Main Stem
Genesee	Tonawanda Creek, Upper, and minor tribs
Genesee	Little Tonawanda Creek, Lower, and tribs
Genesee	Oak Orchard Creek, Upper, and tribs
Genesee	Bowen Brook and tribs
Genesee	Bigelow Creek and tribs
Greene	Schoharie Reservoir
Greene	Sleepy Hollow Lake
Herkimer	Steele Creek tribs
Kings	Hendrix Creek
Lewis	Mill Creek/South Branch and tribs
Livingston	Conesus Lake
Livingston	Jaycox Creek and tribs
Livingston	Mill Creek and minor tribs
Monroe	Genesee River, Lower, Main Stem
Monroe	Genesee River, Middle, Main Stem
Monroe	Black Creek, Lower, and minor tribs
Monroe	Buck Pond
Monroe	Long Pond
Monroe	Cranberry Pond
Monroe	Mill Creek and tribs
Monroe	Shipbuilders Creek and tribs
Monroe	Minor tribs to Irondequoit Bay
Monroe	Thomas Creek/White Brook and tribs
Nassau	Glen Cove Creek, Lower, and tribs
Nassau	LI Tribs (fresh) to East Bay
Nassau	East Meadow Brook, Upper, and tribs
Nassau	Hempstead Bay
Nassau	Hempstead Lake
Nassau	Grant Park Pond
Niagara	Bergholtz Creek and tribs
Oneida	Ballou, Nail Creeks
Onondaga	Ley Creek and tribs
Onondaga	Onondaga Creek, Lower and tribs
Onondaga	Onondaga creek, Middle and tribs
Onondaga	Onondaga Creek, Upper, and minor tribs
Onondaga	Harbor Brook, Lower, and tribs
Onondaga	Ninemile Creek, Lower, and tribs
Onondaga	Minor tribs to Onondaga Lake
Ontario	Honeoye Lake
Ontario	Hemlock Lake Outlet and minor tribs
Ontario	Great Brook and minor tribs
Oswego	Lake Neatahwanta
Putnam	Oscawana Lake
Putnam	Lake Carmel
Queens	Jamaica Bay, Eastern, and tribs (Queens)
Queens	Bergen Basin
Queens	Shellbank Basin
Rensselaer	Snyders Lake
Richmond	Grasmere, Arbutus and Wolfes Lakes
Saratoga	Dwaas Kill and tribs
Saratoga	Tribs to Lake Lonely
Saratoga	Lake Lonely
Saratoga	Schuyler Creek and tribs
Schenectady	Collins Lake

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity, cont'd.

COUNTY	WATERBODY	COUNTY	WATERBODY
Schoharie	Engleville Pond		
Schoharie	Summit Lake		
St. Lawrence	Black Lake Outlet/Black Lake		
Steuben	Lake Salubria		
Steuben	Smith Pond		
Suffolk	Millers Pond		
Suffolk	Mattituck (Marratooka) Pond		
Suffolk	Tidal tribs to West Moriches Bay		
Suffolk	Canaan Lake		
Suffolk	Lake Ronkonkoma		
Tompkins	Cayuga Lake, Southern End		
Tompkins	Owasco Inlet, Upper, and tribs		
Ulster	Ashokan Reservoir		
Ulster	Esopus Creek, Upper, and minor tribs		
Warren	Lake George		
Warren	Tribs to L.George, Village of L George		
Warren	Huddle/Finkle Brooks and tribs		
Warren	Indian Brook and tribs		
Warren	Hague Brook and tribs		
Washington	Tribs to L.George, East Shore of Lake George		
Washington	Cossayuna Lake		
Wayne	Port Bay		
Wayne	Marbletown Creek and tribs		
Westchester	Peach Lake		
Westchester	Mamaroneck River, Lower		
Westchester	Mamaroneck River, Upper, and minor tribs		
Westchester	Sheldrake River and tribs		
Westchester	Blind Brook, Lower		
Westchester	Blind Brook, Upper, and tribs		
Westchester	Lake Lincolndale		
Westchester	Lake Meahaugh		
Wyoming	Java Lake		
Wyoming	Silver Lake		

Note: The list above identifies those waters from the final New York State "2008 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy", dated May 26, 2008, that are impaired by silt, sediment or nutrients.

APPENDIX F

LIST OF NYS DEC REGIONAL OFFICES

Region	COVERING THE FOLLOWING COUNTIES:	DIVISION OF ENVIRONMENTAL PERMITS (DEP) PERMIT ADMINISTRATORS	DIVISION OF WATER (DOW) WATER (SPDES) PROGRAM
1	NASSAU AND SUFFOLK	50 CIRCLE ROAD STONY BROOK, NY 11790 TEL. (631) 444-0365	50 CIRCLE ROAD STONY BROOK, NY 11790-3409 TEL. (631) 444-0405
2	BRONX, KINGS, NEW YORK, QUEENS AND RICHMOND	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4997	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4933
3	DUTCHESS, ORANGE, PUTNAM, ROCKLAND, SULLIVAN, ULSTER AND WESTCHESTER	21 SOUTH PUTT CORNERS ROAD NEW PALTZ, NY 12561-1696 TEL. (845) 256-3059	100 HILLSIDE AVENUE, SUITE 1W WHITE PLAINS, NY 10603 TEL. (914) 428 - 2505
4	ALBANY, COLUMBIA, DELAWARE, GREENE, MONTGOMERY, OTSEGO, RENSSELAER, SCHENECTADY AND SCHOHARIE	1150 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2069	1130 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2045
5	CLINTON, ESSEX, FRANKLIN, FULTON, HAMILTON, SARATOGA, WARREN AND WASHINGTON	1115 STATE ROUTE 86, PO BOX 296 RAY BROOK, NY 12977-0296 TEL. (518) 897-1234	232 GOLF COURSE ROAD, PO BOX 220 WARRENSBURG, NY 12885-0220 TEL. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROAD AVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVE. BUFFALO, NY 14203-2999 TEL. (716) 851-7070

APPENDIX B

NYSDEC NOTICE OF INTENT AND MS4s

1358331598

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR ☐☐☐☐☐☐
(for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-10-001

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-
RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
Cooper Crouse-Hinds

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Olavarria

Owner/Operator Contact Person First Name
Nelson

Owner/Operator Mailing Address
600 Travis, PO Box 4446

City
Houston

State
TX

Zip
77210-

Phone (Owner/Operator)
713-209-8850

Fax (Owner/Operator)
713-209-8990

Email (Owner/Operator)
Nelson.Olavarria@CooperIndustries.com

FED TAX ID
20-1288146 (not required for individuals)

Project Site Information

Project/Site Name
Cooper Crouse-Hinds Landfills

Street Address (NOT P.O. BOX)
Wolf and 7th North Streets

Side of Street
● North ● South ○ East ○ West

City/Town/Village (THAT ISSUES BUILDING PERMIT)
City of Syracuse and Town of Salina

State: NY
Zip: 13221 -
County: Onondaga
DEC Region: 7

Name of Nearest Cross Street
Wolf Street

Distance to Nearest Cross Street (Feet)
2000

Project In Relation to Cross Street
○ North ○ South ○ East ● West

Tax Map Numbers
Section-Block-Parcel
073.-01-08.1-34

Tax Map Numbers
01.01-03

1. Provide the Geographic Coordinates for the project site in NYTM Units. To do this you must go to the NYSDEC Stormwater Interactive Map on the DEC website at:

www.dec.ny.gov/imsmaps/stormwater/viewer.htm

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site, go to the tool boxes on the top and choose "i"(identify). Then click on the center of your site and a new window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting): 405513

Y Coordinates (Northing): 4770894

2. What is the nature of this construction project?

○ **New Construction**

○ **Redevelopment with increase in imperviousness**

● **Redevelopment with no increase in imperviousness**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use

- ○ FOREST
- ○ PASTURE/OPEN LAND
- ○ CULTIVATED LAND
- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY
- ○ PARKING LOT
- ● OTHER

Landfill

Post-Development Future Land Use

- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION — Number of Lots
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ MUNICIPAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY (water, sewer, gas, etc.)
- ○ PARKING LOT
- ○ CLEARING/GRADING ONLY
- ○ DEMOLITION, NO REDEVELOPMENT
- ○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
- ● OTHER

Landfill

***note: for gas well drilling, non-high volume hydraulic fractured wells only**

4. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law ? ○ **Yes** ○ **No**

5. Is this a project which does not require coverage under the General Permit (e.g. Project done under an Individual SPDES Permit, or department approved remediation)? ○ **Yes** ○ **No**

6. Is this property owned by a state authority, state agency, federal government or local government? ○ **Yes** ○ **No**

7. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area. Round to the nearest tenth of an acre.

Total Site Acreage	**Acreage To Be Disturbed**	**Existing Impervious Area Within Disturbed**	**Future Impervious Area Within Disturbed**
40.490.9	40.9	0.0	0.0.0.0

8. Do you plan to disturb more than 5 acres of soil at any one time? ○ **Yes** ○ **No**

9. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	**B**	**C**	**D**
%	%	%	100 %

10. Is this a phased project? ○ Yes ○ No

11. Enter the planned start and end dates of the disturbance activities.

Start Date 08/01/2013 - End Date 12/31/2014

12. Identify the nearest, natural, surface waterbody(ies) to which construction site runoff will discharge.

Name

Ley Creek

12a. Type of waterbody identified in Question 12?

- ○ Wetland / State Jurisdiction On Site (Answer 12b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 12b)
- ○ Wetland / Federal Jurisdiction Off Site
- ○ Stream / Creek On Site
- ● Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

12b. How was the wetland identified?

- ○ Regulatory Map
- ○ Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

13. Has the surface waterbody(ies) in question 12 been identified as a 303(d) segment in Appendix E of GP-0-10-001? ○ Yes ○ No

14. Is this project located in one of the Watersheds identified in Appendix C of GP-0-10-001? ○ Yes ○ No

15. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? **If no, skip question 16.** ○ Yes ○ No

16. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? **If Yes, what is the acreage to be disturbed?** ○ **Yes** ○ **No**

.

17. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ○ **Yes** ○ **No**

18. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ○ **Yes** ○ **No** ○ **Unknown**

19. What is the name of the municipality/entity that owns the separate storm sewer system?

20. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ **Yes** ○ **No** ○ **Unknown**

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book) ? ○ **Yes** ○ **No**

22. Does this construction activity require the development of a SWPPP that includes Water Quality and Quantity Control components (Post-Construction Stormwater Management Practices) **(If No, skip questions 23 and 27-35)** ○ **Yes** ○ **No**

23. Have the Water Quality and Quantity Control components of the SWPPP been developed in comformance with the current NYS Stormwater Management Design Manual ? ○ **Yes** ○ **No**

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ● **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer
Tetra Tech, Inc.

Contact Name (Last, Space, First)
Morgan, Daniel

Mailing Address
175 N Corporate Drive Suite 100

City
Brookfield

State
WI

Zip
53045-

Phone
262-792-1282

Fax
262-792-1310

Email
dan.morgan@tetratech.com

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-10-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name
Daniel

MI
L

Last Name
Morgan

Signature
Daniel L. Morgan

Date
05/03/2013

25. Has a construction sequence schedule for the planned management practices been prepared? ○ Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ○ Check Dams
- ● Construction Road Stabilization
- ● Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ○ Sediment Traps
- ● Silt Fence
- ○ Stabilized Construction Entrance
- ○ Storm Drain Inlet Protection
- ● Straw/~~Hay~~ Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ○ Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ● Mulching
- ○ Protecting Vegetation
- ○ Recreation Area Improvement
- ● Seeding
- ○ Sodding
- ● Straw/~~Hay~~ Bale Dike
- ● Streambank Protection
- ○ Temporary Swale
- ● Topsoiling
- ● Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ● Diversion
- ○ Grade Stabilization Structure
- ● Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ● Riprap Slope Protection
- ● Rock Outlet Protection
- ○ Streambank Protection

Other

Water Quality and Quantity Control

Important: Completion of Questions 27-35 is not required if response to Question 22 is No.

Post-Construction Stormwater Management Practices

27. Indicate **all** Stormwater Management Practice(s) that will be installed/constructed on this site:

Ponds
- ○ **Micropool Extended Detention (P-1)**
- ○ **Wet Pond (P-2)**
- ○ **Wet Extended Detention (P-3)**
- ○ **Multiple Pond System (P-4)**
- ○ **Pocket Pond (P-5)**

Filtering
- ○ **Surface Sand Filter (F-1)**
- ○ **Underground Sand Filter (F-2)**
- ○ **Perimeter Sand Filter (F-3)**
- ○ **Organic Filter (F-4)**
- ○ **Bioretention (F-5)**
- ○ **Other**

Alternative Practice
- ○ **Rain Garden**
- ○ **Cistern**
- ○ **Green Roof**
- ○ **Stormwater Planters**
- ○ **Permeable Paving (Modular Block)**

Wetlands
- ○ **Shallow Wetland (W-1)**
- ○ **Extended Detention Wetland (W-2)**
- ○ **Pond/Wetland System (W-3)**
- ○ **Pocket Wetland (W-4)**

Infiltration
- ○ **Infiltration Trench (I-1)**
- ○ **Infiltration Basin (I-2)**
- ○ **Dry Well (I-3)**
- ○ **Underground Infiltration System**

Open Channels
- ○ **Dry Swale (O-1)**
- ○ **Wet Swale (O-2)**

Verified Proprietary Practice
- ○ **Hydrodynamic**
- ○ **Wet Vault**
- ○ **Media Filter**

28. Describe other stormwater management practices not listed above or explain any deviations from the technical standards.

29. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ○ **Yes** ○ **No**

If Yes, Identify the entity responsible for the long term Operation and Maintenance

30. Provide the total water quality volume required and the total provided for the site.

WQv Required: 000.611 **acre-feet**

WQv Provided: 000.611 **acre-feet**

31. Provide the following Unified Stormwater Sizing Criteria for the site.

Total Channel Protection Storage Volume (CPv) - Extended detention of post-developed 1 year, 24 hour storm event

CPv Required: ___.___ **acre-feet**

CPv Provided: ___.___ **acre-feet**

31a. The need to provide for channel protection has been waived because:

○ **Site discharges directly to fourth order stream or larger**

Total Overbank Flood Control Criteria (Qp) - Peak discharge rate for the 10 year storm

Pre-Development: ___.___ **CFS**

Post-development: ___.___ **CFS**

Total Extreme Flood Control Criteria (Qf) - Peak discharge rate for the 100 year storm

Pre-Development: ___.___ **CFS**

Post-development: ___.___ **CFS**

31b. The need to provide for flood control has been waived because:

○ **Site discharges directly to fourth order stream or larger**

○ **Downstream analysis reveals that flood control is not required**

IMPORTANT: For questions 31 and 32, impervious area should be calculated considering the project site and all offsite areas that drain to the post-construction stormwater management practice(s). (Total Drainage Area = Project Site + Offsite areas)

32. Pre-Construction Impervious Area - As a percent of the Total Drainage Area enter the percentage of the existing impervious areas before construction begins. ___ %

33. Post-Construction Impervious Area - As a percent of the Total Drainage Area, enter the percentage of the future impervious areas that will be created/remain on the site after completion of construction. ___ %

34. Indicate the total number of post-construction stormwater management practices to be installed/constructed. ___

35. Provide the total number of stormwater discharge points from the site. (include discharges to either surface waters or to separate storm sewer systems) ___

36. Identify other DEC permits that are required for this project.

DEC Permits

○ Air Pollution Control	○ Navigable Waters Protection / Article 15
○ Coastal Erosion	○ Water Quality Certificate
○ Hazardous Waste	○ Dam Safety
○ Long Island Wells	○ Water Supply
○ Mined Land Reclamation	○ Freshwater Wetlands/Article 24
○ Other SPDES	○ Tidal Wetlands
○ Solid Waste	○ Wild, Scenic and Recreational Rivers
● None	○ Stream Bed or Bank Protection / Article 15
○ Other	

37. Does this project require a US Army Corps of Engineers Wetland Permit? ○ Yes ● No
If Yes, Indicate Size of Impact. [ ][ ][ ][ ][ ].[ ]

38. Is this project subject to the requirements of a regulated, traditional land use control MS4? ● Yes ○ No
(If No, skip question 39)

39. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ● Yes ○ No

40. If this NOI is being submitted for the purpose of continuing coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. NYR[ ][ ][ ][ ][ ][ ]

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name Jesse **MI**

Print Last Name Conklin

Owner/Operator Signature Jesse A Conklin

Date 05/08/2013

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information	
1. Owner/Operator Name:	Cooper Industries, LLC
2. Contact Person:	Nelson Olavarria
3. Street Address:	PO Box 4446, 600 Travis, Suite 5600
4. City/State/Zip:	Houston, TX 77210
II. Project Site Information	
5. Project/Site Name:	Cooper Crouse-Hinds South Landfill
6. Street Address:	Wolf and 7th North Streets
7. City/State/Zip:	Syracuse, NY 13208
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information	
8. SWPPP Reviewed by:	RUSSELL HOUCK, PE
9. Title/Position:	FACILITIES ENGINEER
10. Date Final SWPPP Reviewed and Accepted:	1/15/14
IV. Regulated MS4 Information	
11. Name of MS4:	City of Syracuse
12. MS4 SPDES Permit Identification Number: NYR20A	186
13. Contact Person:	RUSSELL HOUCK
14. Street Address:	233 E. WASHINGTON ST
15. City/State/Zip:	SYRACUSE, NY, 13202
16. Telephone Number:	315-448-8059

(NYS DEC - MS4 SWPPP Acceptance Form - January 2010)

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s).
Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name: MARY ROBISON, P.E.

Title/Position: CITY ENGINEER

Signature: Mary E Robison

Date: 1/31/14

VI. Additional Information

Approval is based on the following conditions:
1. City of Syracuse Site Preparation Permit needs to be obtained prior to any site disturbance within the City of Syracuse.
2. Stormwater Maintenance and Easement Access agreements need to be executed and Filed in the County Clerk's Office prior to the City of Syracuse issuing a Site Preparation Permit.
3. This SWPPP acceptance does NOT include authorization to disturb greater than 5 acres at any time. A justification for disturbance, additional erosion and sediment control measures to mitigate disturbance, phasing plan, cuts and fill plan, and total acreage to be disturbed in each phase must be submitted for review and approval by the City of Syracuse and NYSDEC.

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information	
1. Owner/Operator Name:	Cooper Industries, LLC
2. Contact Person:	Nelson Olavarria
3. Street Address:	PO Box 4446, 600 Travis, Suite 5600
4. City/State/Zip:	Houston, TX 77210
II. Project Site Information	
5. Project/Site Name:	Cooper Crouse-Hinds North Landfill
6. Street Address:	Wolf and 7th North Streets
7. City/State/Zip:	Syracuse, NY 13208
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information	
8. SWPPP Reviewed by:	Kristy Harris, CPESC, CPSWQ (CHA)
9. Title/Position:	Asst. Project Engineer
10. Date Final SWPPP Reviewed and Accepted:	10/11/13
IV. Regulated MS4 Information	
11. Name of MS4:	Town of Salina
12. MS4 SPDES Permit Identification Number: NYR20A	374
13. Contact Person:	Jason Perkins
14. Street Address:	201 School Rd.
15. City/State/Zip:	Liverpool, NY 13088
16. Telephone Number:	(315) 451-0492

(NYS DEC - MS4 SWPPP Acceptance Form - January 2010)

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s).
Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name: Mark Nicotra

Title/Position: Supervisor

Signature: Mark Nicotra

Date: 10/15/13

VI. Additional Information

APPENDIX C

SOIL DESCRIPTIONS

Map Unit Description (Brief, Generated)

Onondaga County, New York

[Minor map unit components are excluded from this report]

Map unit: Ce - Carlisle muck

Component: Carlisle (75%)

The Carlisle component makes up 75 percent of the map unit. Slopes are 0 to 2 percent. This component is on swamps, marshes. The parent material consists of deep organic material. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, September, October, November, December. Organic matter content in the surface horizon is about 84 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map unit: ChB - Collamer silt loam, 2 to 6 percent slopes

Component: Collamer (85%)

The Collamer component makes up 85 percent of the map unit. Slopes are 2 to 6 percent. This component is on lake plains. The parent material consists of silty and clayey glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during March, April, May. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: ML - Made land

Component: Udorthents (70%)

The Udorthents component makes up 70 percent of the map unit. Slopes are 0 to 5 percent. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 54 inches during January, February, March, April, May, June, November, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: Ub - Urban land

Component: Urban land (70%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

APPENDIX D

2013 PHASE 1A CULTURAL RESOURCES REPORT

PHASE IA CULTURAL RESOURCES REPORT

Cooper Crouse-Hinds, LLC.
North Landfill and South Landfill Remedial Action
Town of Salina and City of Syracuse
Onondaga County, New York

Prepared for:

Cooper Crouse-Hinds, LLC
600 Travis, Suite 5600
Houston, Texas 77002

Prepared by:
Tetra-Tech, Inc.
Cultural Resources Services Group
285 Ellicott St
Buffalo, New York 14203
716-849-9419

Report Author:

David Ingleman

Bonnie L. Locking, M.A.
Principal Investigator

February 2013



MANAGEMENT SUMMARY

SHPO Project Review Number:

Involved State and Federal Agencies (DEC, CORPS, FHWA, etc.): DEC

Phase of Survey: 1A

Location Information
- Location: Town of Salina and City of Syracuse
- Minor Civil Division: 64815 (Salina) and 73000 (Syracuse)
- County: Onondaga

Survey Area (Metric and English)
- Length: Not applicable
- Depth: Not applicable
- Number of Acres Surveyed: 16.54 hectares (40.88 acres)
- Number of Square Meters and Feet Excavated (Phase II, Phase III only): Not applicable
- Percentage of the Site Excavated (Phase II, Phase III only): Not applicable

USGS 7.5-Minute Quadrangle Map: Syracuse West (1973)

Archaeological Survey Overview
- Number and Interval of Shovel Tests: Not applicable
- Number and Size of Units: Not applicable
- Width of Plowed Strips: Not applicable
- Surface Survey Transect Interval: Not applicable

Results of Archaeological Survey
- Number and name of prehistoric sites identified: Not applicable
- Number and name of historic sites identified: Not applicable
- Number and name of sites recommended for Phase II/Avoidance: Not applicable

Results of Architectural Survey
- Number of buildings/structures/cemeteries within project area: 0
- Number of buildings/structures/cemeteries adjacent to project area: 0
- Number of previously determined NR listed or eligible building/structures/cemeteries/districts: 0
- Number of identified eligible buildings/structures/cemeteries/districts: 0

Report Author(s): David A. Ingleman

Date of Report: February 2013

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ATTACHMENT	DESCRIPTION
Attachment A	Photographic Record
Attachment B	Historic Photographs

1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) Cultural Resources Services Group performed a Phase IA cultural resources investigation for the proposed Cooper Crouse-Hinds, LLC, North Landfill and South Landfill Remedial Action (hereafter referred to as the Project), located in the Town of Salina and City of Syracuse, Onondaga County, New York in December 2012, on behalf of Cooper Crouse-Hinds, LLC (C-CH). This study was conducted in accordance with cultural resource management practices as required on the Federal and State level. Specifically, the Phase IA cultural resources investigation was conducted in accordance with the National Historic Preservation Act of 1966, as amended, Executive Order 11593, the regulations of the Advisory Council on Historic Preservation (36 Code of Federal Regulations [CFR] 800), Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law of 1980, the New York Archaeological Council's (NYAC) *Standards for Cultural Resource Investigations and Curation of Collections* (1994), and the New York State Historic Preservation Office (SHPO) *Phase I Archaeological Report Format Requirements* (2005).

The Phase IA cultural resources investigation of the Project included a reconnaissance survey (visual assessment, site walkover, and photographic documentation), and background research of the approximately 16.54 hectare (ha) (40.88 acre [ac]) Project area. The purpose of the Phase IA cultural resources investigation is to provide a sensitivity assessment and recommendations regarding Phase IB investigations.

The Phase IA cultural resources investigation was completed under the direction of Bonnie L. Locking. Ms. Locking meets 36 CFR 61 qualifications for conducting archaeological review and compliance projects in New York. David Ingleman served as project archaeologist. Jennifer Laslovich prepared the figures and conducted Geographic Information Systems (GIS) analysis. This report summarizes the background research, describes the environment of the Project Area, describes the results of the field reconnaissance survey, and provides recommendations for further investigations.

1.1 PROJECT DESCRIPTION

The Project area comprises two adjacent, former landfills situated in the Town of Salina and the City of Syracuse, Onondaga County, New York. The two former landfills, referred to as the North Landfill and the South Landfill, are located immediately west of CSX railroad tracks and the adjacent CC-H manufacturing facility, and are separated by Seventh North Street, which also forms the boundary between the Town of Salina (North Landfill) and the City of Syracuse (South Landfill). The Project area is located in an area of mixed usage including light industrial/manufacturing, commercial, and retail usage (Figure 1: Project Location Map).

The North Landfill occupies an irregular polygon shape totaling 8.69 ha (21.48 ac) in size. It is bordered to the north by a former municipal landfill owned by Plaza East, LLC (Plaza), to the east and southeast by CSX railroad tracks and the CC-H facility, to the south and southwest by Seventh North Street and the South Landfill, and to the west by wetlands and Ley Creek. Between the mid-1950s and 1989 CC-H reportedly used the North Landfill for disposal of wastes generated at their adjacent manufacturing facility (Tetra Tech 2012).

The South Landfill occupies a roughly triangular shape totaling 7.85 ha (19.4 ac) in size. The South Landfill is bordered to the north by Seventh North Street and the North Landfill, to the east and southeast by CSX railroad tracks, mixed commercial and retail development, and Hiawatha Boulevard, and to the west and northwest by Ley Creek. Undeveloped woods, wetlands, and mixed commercial and retail development are located further south of the South Landfill. Beginning in 1960, CC-H reportedly began using the South Landfill for disposal of wastes generated at their adjacent manufacturing facility. Between 1960 and early-1965 the South Landfill also accepted approximately 1,529 cubic meters (m^3) (2,000 cubic yards [yd^3]) of municipal solid waste per week from the City of Syracuse. By 1969 all landfilling at the South Landfill had stopped (Tetra Tech 2012).

Both landfills have been designated a Class 3 Inactive Hazardous Waste Disposal Site (Site No. 7-34-004) by the New York State Department of Environmental Conservation (NYSDEC). A Remedial Investigation (RI) completed in August 2009 included the excavation of test pits, boreholes and monitoring wells, as well as the collection of about 200 samples of groundwater, soil, sediments and surface water. On August 29, 2011 CC-H entered into a Consent Order (R7-0666-05-11) with NYSDEC to remediate the Project area. The minimum goals for the remedial program are to eliminate or mitigate all significant threats to public health and the environment presented by the

contamination identified within the Project area. Elements of the proposed remedial action include the following activities:

- Characterization, excavation, and off-site disposal of approximately 5,160 m^3 (6,750 yd^3) of fill material and sediments from three discrete "hot spots" within the North Landfill known to contain elevated contaminant levels.

- Consolidation of the North Landfill and South Landfill to reduce their current areas. The consolidated areas will be fenced and will have engineered cap systems designed and constructed. The areas to be consolidated will be determined during the design; however, areas to be excavated will include a 15-meter (m) (50-foot [ft]) buffer zone area between the South Landfill and Ley Creek and 9-m (30-ft) buffer zone areas between the landfills and on-site wetlands. If required for cap installation, buffer zones will be established between the landfills and Seventh North Street. This excavated material will be consolidated in the landfills above the water table.

- Excavation of wetland sediment with PCB concentrations greater than 1 part per million (ppm) and less than 50 ppm for consolidation and on-site capping with the material discussed above.

- Excavation of wetland sediment with PCB concentrations of 50 ppm or greater for off-site disposal.

- Restoration and maintenance of excavated wetlands and buffer zones per an approved restoration plan developed during the remedial design phase. Buffer zone soils will be a minimum of 0.6 m (2 ft) in deep, measured from the finished surface grade.

- Possible relocation of several existing utilities that traverse the Project area including overhead power lines (National Grid) and underground water and sanitary sewer pipelines (City of Syracuse).

The Area of Potential Effect (APE) for this cultural resources investigation consists of the entire Project Area. Also included in the APE is any area adjacent to the Project area that may indirectly be impacted through the proposed development.

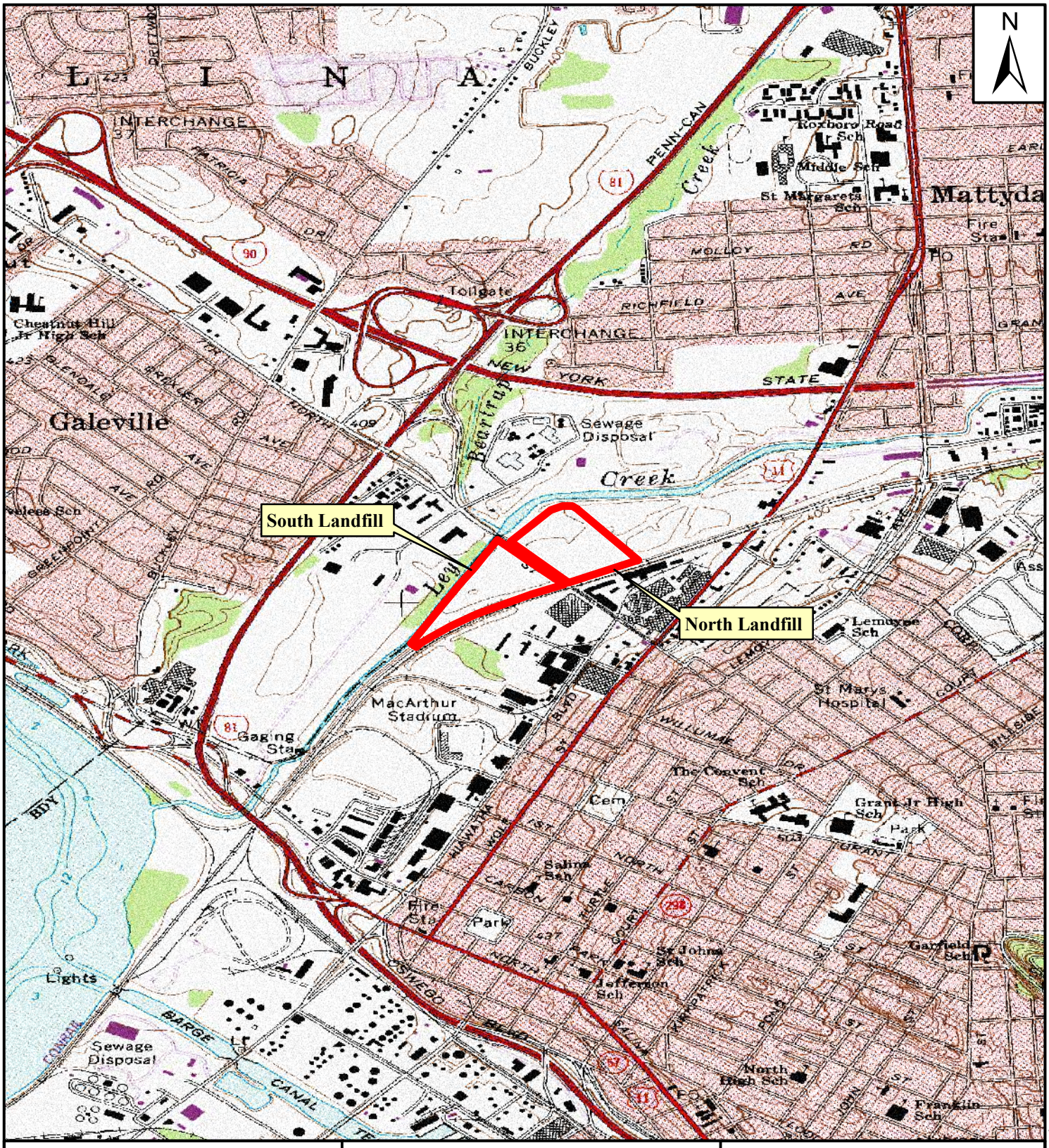


Figure 1. Project Location Map for the Cooper Crouse-Hinds North Landfill and South Landfill Project, Town of Salina, Onondaga County New York.

Prepared For: Cooper Crouse-Hinds, LLC

Prepared By: TETRA TECH

Date: 2/2013

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1.2 BACKGROUND RESEARCH

1.2.1 Environmental Setting

The Project area is located within the northern portion of the Allegheny Plateau Physiographic Province (Hutton and Rice 1977). The glaciated topography found within a 1.6 kilometers (km) (1 mile [mi]) of the Project area gently slopes up from about 121.9 m (400 ft) above mean sea level (AMSL) north of the Project area to about 131.1 m (430 ft) AMSL south of the Project area (Hutton and Rice 1977; United States Geological Survey [USGS) 1973).

Naturally occurring salt was abundant in the vicinity of the Project area (Thompson 1977:471). The Ley Creek floodplain, which includes the entire Project area, was historically a salt marsh. The confluence of Ley Creek and Bear Trap Creek is about 79 m (260 ft) west of the southwest corner of the North Landfill. From this confluence Ley Creek follows an artificially channelized course generally southwest before emptying into Onondaga Lake. The National Wetland Inventory (NWI) map identified the location of one wetland (ID No. PFO1/SS1E), including Ley Creek, within or adjacent to the Project area. Two additional wetlands, two stream segments and a drainage ditch were also delineated during the RI (Tetra Tech 2012).

Elevations in the North Landfill generally range between 112.8 – 113.4 m (370 – 372 ft) AMSL except for a large fill-mound situated in the northern half of the North Landfill, where the elevation rises to about 116.1 m (381 ft) AMSL. The topography slopes moderately to steeply downward from the fill-mound towards the North Landfill's northern boundary. Drainage across the North Landfill generally follows topography and radiates outward from the fill-mound. Drainage to the north and west is to a wetland, referred to as Wetland B, and then to the adjacent wetland property. Drainage to the south and east is towards the east wetland, referred to as Wetland A and the eastern stream segment, referred to as Stream A (Tetra Tech 2012).

Topography of the South Landfill is generally flat with an average elevation range of 113.7 – 114.9 m (373 – 377 ft) AMSL. Topographic relief is due largely to mounded fill. The topography slopes moderately to steeply away from the fill-mound in all directions. Drainage across the South Landfill generally follows topography and radiates outward from the fill-mound. Drainage to the south and east-southeast is to a small stream, referred to as Stream B, and a wetland, referred to as Wetland C. Drainage to the west is into Wetland C and eventually to Ley Creek.

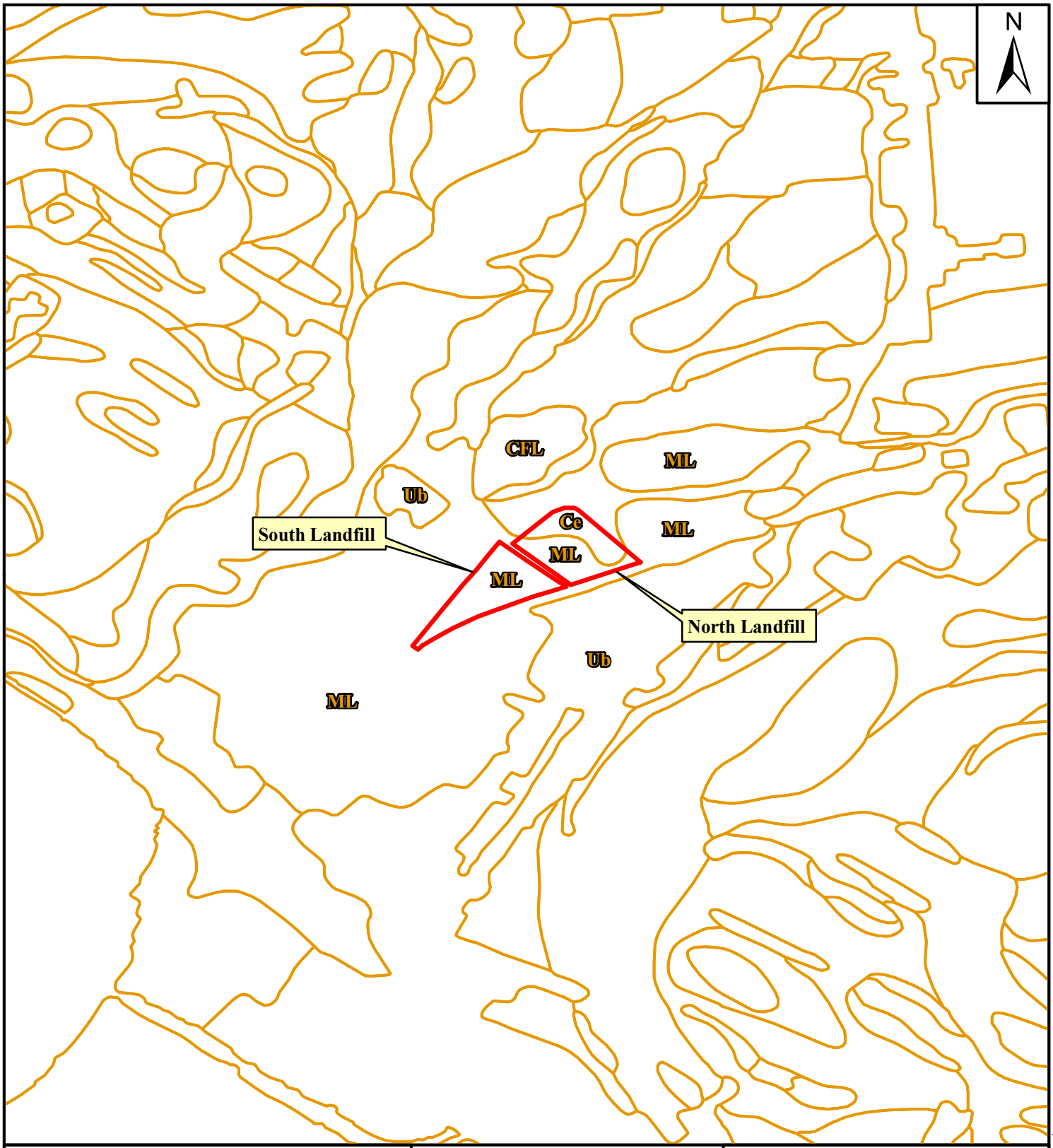
At the time of field investigation the Project area was devoid of vegetation except isolated patches of wetland flora such as cattails (*Typha* sp.) and reeds (*Phragmites* sp.). However, prior to recent vegetative clearing the Project area flora also included several species of deciduous softwoods (Drew Lent, personal communication, December 2012).

The Project area lies mostly within the Urban land soil association, however the northwestern quadrant of the North Landfill lies within the Carlisle-Palms soil association. Generally, Carlisle-Palms soils are deep, very poorly drained, and occur in waterlogged bogs, outwash plains, and flood plains. Urban land soils have been so altered by development that natural soil identification is not feasible. Two Soil Mapping Units — Made Land (Ma) and Carlisle muck (Ce) — are recorded for the Project area and generally correspond to the two soil associations mentioned above (Hutton and Rice 1977). Project area soils are summarized in Table 1 and depicted in Figure 2.

Table 1. Soil Descriptions for the Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project, City of Syracuse and Town of Salina, Onondaga County, New York

Name	Soil Horizon Depth cm (in)			Color	Texture, Inclusions	Slope %	Drainage	Landform
Carlisle muck (Ce)	Oa1-3	0 – 165	(0 – 65)	Blk	Muck	0-2	Very poor	Swamps, Marshes
	Oa4	165 – 274	(65 – 108)	VDkBr	Muck			
	Oa5	274 – 282	(108 – 111)	VDkBr	Muck			
	IIC2	282 – 295	(111 – 116)	G	ClLo			
Made land, chemical waste	N/A			N/A	N/A	N/A	N/A	N/A

Source: Hutton and Rice (1977)
Key: Color: Blk – Black, G – Gray, Br – Brown, V – Very, Dk – Dark; Texture: Cl – Clay, Lo – Loam, Sa – Sand, Si – Silt, Muck – Muck



Description of Soil Units Within Project Boundary
Ce - Carlisle muck
ML - Made land

Legend

Project Boundary

USDA Soil Boundary

Source: U.S. Department of Agriculture, Natural Resources Conservation Service; Soil Survey Geographic (SSURGO) database for Onondaga County, New York 2010.

0 1,000 2,000 Feet

0 240 480 Meters

Figure 2. USDA Soils Map for the Cooper Crouse-Hinds North Landfill and South Landfill Project, Town of Salina, Onondaga County New York.

Prepared For: Cooper Crouse-Hinds, LLC

Prepared By: TETRA TECH

Date: 2/2013

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1.2.2 Past and Present Land Uses and Current Conditions

Evidence of prehistoric and historic land use practices in and around the Project area was derived from a review of site files at the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP's) Field Service Bureau, the New York State Museum, published and unpublished archaeological studies (Bradley 1979, 1987; Ritchie 1980; Ritchie and Funk; Parker 1920), local histories (Beauchamp 1908; Clark 1840; Clayton 1878), and historic maps (see Section 1.2.4 below). These sources record six prehistoric archaeological sites recorded within 1.6 km (1 mi) of the Project area (Table 2).

Generally the aboriginal inhabitants of the region showed a preference for lake, stream, river and marsh associations, knolls, and small bluffs. The Project area is situated in a swampy salt marsh just below the confluence of two perennial streams, referred to as Bear Trap Creek and Ley Creek. These waters drain into Onondaga Lake about 1.6 km (1 mi) downstream of the Project area. Although poor drainage make it unlikely that the Project area was utilized prehistorically for a settlement of any size, other specialized prehistoric activity areas may have existed at one time. In this setting only special purpose sites, such as extractive or ritual sites, are expected.

Specifically near the Project area, early to mid-eighteenth century Euro-American settlers and aboriginals of the Onondaga Nation were commercially producing salt from the springs at Onondaga Lake through a boiling process. The economic potential of the Onondaga salt springs motivated New York state to negotiate the 1788 Treaty of Fort Stanwix, which featured the transfer of Onondaga land around Onondaga Lake to the state on the condition that the land would be used for the production of salt for the common benefit of the people of New York and the Onondaga Nation. In 1797 New York State created the Onondaga Salt Spring Reservation – a 1.6 km (1 mi) wide strip of land around the southern shore of Onondaga Lake where salt production, storage, and sale were regulated and taxed. Salt exploitation was further stimulated in the early-nineteenth century by the advent of the solar drying method of salt production. Using this process salt production boomed, which in turn led to the rebranding of the City of Syracuse as the "Salt City" (Kappel 2000). By the mid-nineteenth century Lewis Henry Morgan recorded the Onondaga word for the modern Town of Salina as "*Te-ga-jik-ha-do*" signifying "Place of salt" (Morgan 1922). Salt production remained an important industry locally into the early-twentieth century when salt deposits were depleted and the Onondaga Salt Spring Reservation was closed (Kappel 2000).

As the salt industry waned in the late-nineteenth century manufacturing sprang up as the major local industry (Kappel 2000). One prominent manufacturer was the Crouse-Hinds company, whose factory was constructed adjacent to the Project area in 1911. Between the mid-1950s and 1989 Crouse-Hinds reportedly used the North Landfill for disposal of wastes generated at their adjacent manufacturing facility (i.e. foundry sand). Crouse-Hinds also used the South Landfill for disposal of manufacturing wastes beginning in 1960. Between 1960 and early-1965 the South Landfill also accepted approximately 1,529 m^3 (2,000 yd^3) of municipal solid waste per week from the City of Syracuse. All landfilling at the South Landfill ceased by 1969 (Tetra Tech 2012).

1.2.3 Previous Cultural Resource Investigations

A review of archaeological site files at the NYSOPRHP indicates that the Project area has not been previously surveyed for cultural resources. No historic structures or properties listed in or eligible for listing in the State or National Register of Historic Places (S/NRHP) were recorded in the vicinity of the Project area. A total of eight previously recorded archaeological sites were recorded within 1.6 km (1 mi) of the Project area, one of which is immediately adjacent to the Project area (Table 2). Two of the eight sites (NYSOPRHP sites) reference each other therefore the actual number of sites in the vicinity is six.

Table 2. Previously Identified Cultural Resources within 1.6 km (1 mi) of the Cooper-Crouse Hinds North and South Landfills Project, City of Syracuse and Town of Salina, Onondaga County, New York.

NYSOPRHP Site #	Site Name	Distance to APE m(ft)	Time Period	Site Type
06740.000416	Parker #87	974 (3196)	No info	No info
06740.000415	Parker #86	1439 (4721)	No info	No info
	NYSM 4235, Kaneenda, ACP Onda 83A	1416 (4646	Historic Native (1700)	Village
	NYSM 4239, ACP Onda 86A	764 (2507)	Unidentified precontact	Traces of occupation
	NYSM 4240, ACP Onda 87	0	Historic Native(?)	Camp or hamlet
	NYSM 4281	102 (335)	Unidentified precontact	Traces of occupation
	NYSM 6641, ACP Onda 86B	1142 (3747)	No info	Cemetery
	NYSM 6642	1027 (3369)	Unidentified precontact	Camp

The closest known aboriginal site was recorded by Parker (1920) as a "Camp or hamlet," adjacent to the south of the Project area. Elsewhere in the Town of Salina the presence of a few prehistoric campsites and "traces of occupation," as well as historic period sites including Jesuit missions from the seventeenth and eighteenth centuries and a French fort from the early-eighteenth century were also noted by Parker (1920). Little information is provided for these Parker sites and geographical confirmation has not occurred. There appears to be confusion surrounding the actual location of Parker 83 and 86 based on NYSM records.

1.2.4 Historic Maps and Photographs

Project area land use history is well documented in a series of historic maps and aerial photographs. Table 3 summarizes the historic map and photographic research conducted for this study and describes where select maps and aerial photographs can be found in this report. Unfortunately, many of these historic documents were not able to be reproduced here.

Table 3. Summary of Historic Maps and Photographs Depicting the of the Cooper-Crouse Hinds North and South Landfills Project area, City of Syracuse and Town of Salina, Onondaga County, New York.

Title	Author	Date	Report Reference
A Map of Part of Onondaga Lake, and its vicinity, in the State of New York. From Actual Survey	Anonymous	Ca. 1800	--
Map of the Village of Salina	Geddes	1807	--
Map of Part of the Onondaga Salt Springs Reservation	Kellogg	1827	--
Atlas of Onondaga County	Dawson	1860	--
Atlas of Onondaga County	Sweet	1874	--
Sanborn Fire Insurance Map of Syracuse	Sanborn	1892	Figure 3
Atlas of the State of New York	Bien	1895	--
Syracuse, New York 15 Minute Series Quadrangle	USGS	1898	Figure 4
Atlas of the City of Syracuse N.Y. and Suburbs	Hopkins	1924	--
Airmap of City of Syracuse	AirMap Corp.	1926	Attachment B
Aerial Photograph	Crouse-Hinds	1927	Attachment B
Sanborn Fire Insurance Map of Syracuse	Sanborn	1928	Figure 5
Onondaga Aerial Photograph	Cornell University	1938	--
Aerial Photograph	Crouse-Hinds	1948	Attachment B

Title	Author	Date	Report Reference
Syracuse West, New York 7.5 Minute Series Quadrangle	USGS	1947	Figure 6
Onondaga Aerial Photograph	Cornell University	1951	--
Aerial Photograph	Crouse-Hinds	1952	Attachment B
Aerial Photograph	Crouse-Hinds	1954	Attachment B
Map of Syracuse	Polk	1954	--
Onondaga Aerial Photograph	Cornell University	1966	--
Syracuse West, New York 7.5 Minute Series Quadrangle	USGS	1973	Figure 1
Aerial Photograph	Crouse-Hinds	1995	Attachment B

Figure 3. Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project location on the 1892 (Vol.2) Sanborn Fire Insurance Map.

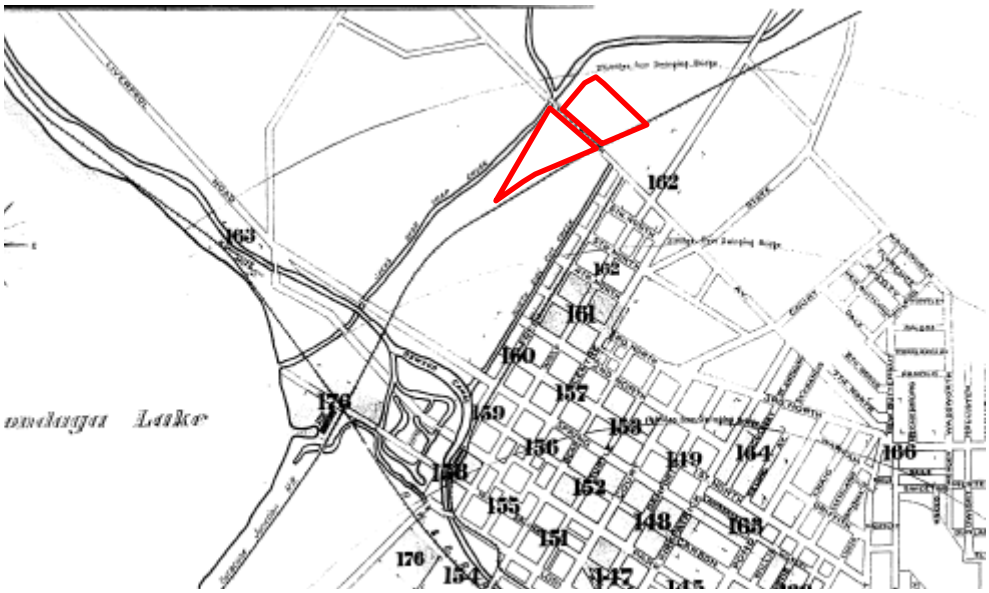


Figure 4. Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project location on the 1898 USGS Syracuse, New York 15 Minute Series Quadrangle.

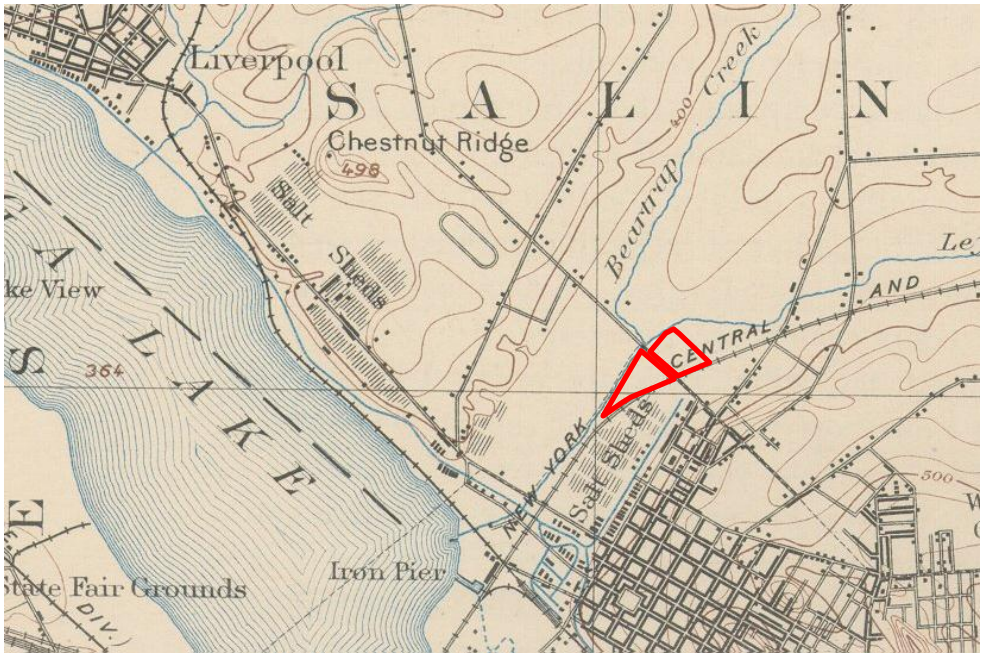


Figure 5. Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project location on the 1928 (Vol 4) Sanborn Fire Insurance Co. Map of Syracuse.

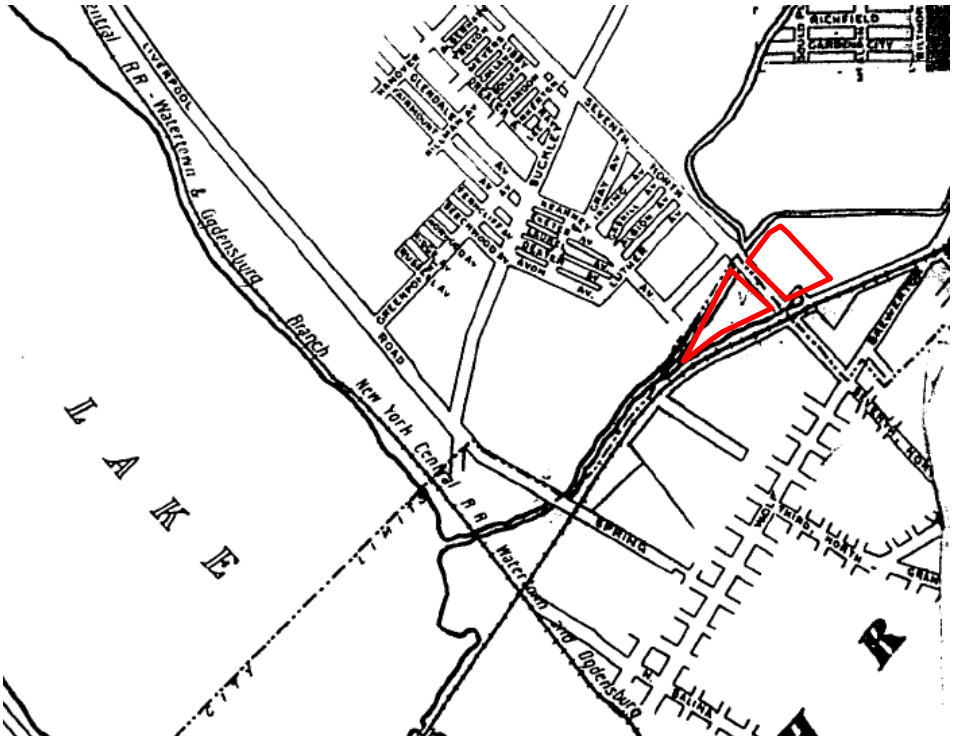
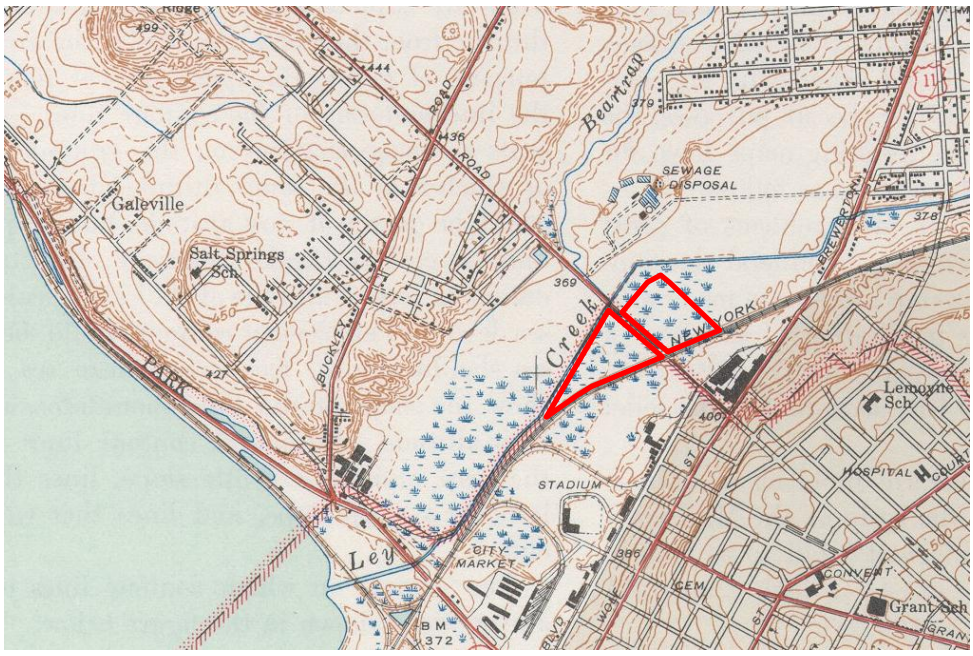


Figure 6. Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project on the 1947 USGS Syracuse West, New York 7.5 Minute Series Quadrangle.



Generally, these sources indicate that from the late-nineteenth to early-twentieth century significant transportation and industrial related developments occurred adjacent to the Project area including the construction of Seventh Street along its present alignment, the channelization of Ley (aka Mud) Creek, the construction of the Syracuse Junction (now CSX) Railroad grade, the construction and operation of numerous salt sheds, and the construction of the Crouse-Hinds factory. Despite being surrounded by development, the Project area remained apparently unaltered until the mid-twentieth century when aerial photographs confirm use of the Project area as a landfill.

1.3 PREVIOUS DISTURBANCE

The entire Project Area was previously disturbed in the late-twentieth century by landfill grading and dumping activities. In 2010, as part of a remediation feasibility study, a series of 39 boreholes was excavated throughout the Project Area. This testing revealed widespread disturbances and thick surficial fill layers. Typically, fine brown to black foundry sand, often mixed with metal filings or slag, was found layered with mixed municipal waste (e.g. plastic, fiberglass, beer cans, shoes) to a depth of 1.2 – 3.7 m (4 – 12 ft) below ground surface (BGS). Below the fill peat or silt with shell inclusions was encountered to a maximum depth of 3.0 – 4.3 m (10-14 ft) BGS (Tetra Tech 2012).

1.4 FIELD RECONNAISSANCE

The entire Project area was pedestrian surveyed in December 2012 by Tetra Tech project archaeologist David Ingleman. The survey included visual assessment, site walkover, and photographic documentation. Results of the field reconnaissance are discussed below in Section 2: Archaeological Sensitivity Assessment and Recommendations.

2.0 ARCHAEOLOGICAL SENSITIVITY ASSESSMENT AND RECOMMENDATIONS

2.1 ARCHAEOLOGICAL SENSITIVITY ASSESSMENT

The sensitivity assessment for the Phase IA archaeological reconnaissance survey included a visual assessment, site walkover and photodocumentation of the Project area, and background research including archaeological site file searches at the NYSOPRHP, published and unpublished archaeological studies, and historic research. The assessment for archaeological sensitivity of the Project area was based on site characteristics (*e.g.* landform/terrain, soil characteristics, and proximity to water). Also taken into consideration was the nature and level of observed and documented disturbance and modification to the landscape in the Project area due to historic and recent human development.

The site walkover indicated that the Project area is situated in a swampy, low lying area with poor drainage. Furthermore, intensive disturbances were observed throughout the Project area. Sundry late-twentieth century artifacts (e.g. rubber soled shoes, assorted plastics, unidentified ferrous metal objects, varicolored glass bottles, shag carpet, Styrofoam, white ware, etc.) were observed scattered throughout the surface of the South Landfill and in the northeast corner of the North Landfill. However, all these artifacts appear to be less than 50 years old and therefore do not meet the minimum age threshold to be considered historic for the purposes of S/NRHP evaluation. Instead, they document the disturbance of the Project area by landfilling activities. Project area conditions are depicted in Attachment A: Photographic Record.

The greatest factors limiting the archaeological potential of the Project area are the environmental setting followed by the nature and extent of modern disturbances. Poor drainage and swampy conditions make the presence of prehistoric and/or historic habitation sites unlikely. In this setting only special purpose sites, such as extractive or ritual sites, are expected. However, the potential of discovering such sites is further limited by the intensive and extensive disturbances associated with late-twentieth century landfilling activities in the Project area. Therefore there is virtually no chance that significant undisturbed prehistoric or historic archaeological deposits could be adversely affected by Project activities.

2.2 TESTING RECOMMENDATIONS

The Phase IA reconnaissance survey of the Project area indicated that there are no historic structures within the Project area. The CSX railroad grade (formerly Syracuse Junction Railroad) located adjacent to the Project area is greater than 50 years old; however design plans indicate no impacts to this resource.

Evidence of prehistoric wetland resource extraction and processing within the Project area is expected to manifest in the archaeological record as small, ephemeral surface or near surface expressions. Unfortunately, if these types of sites formerly existed within the Project area they were likely destroyed by late-twentieth century landfill activities. There is also no evidence of any kind of substantial historic use of the Project area. Therefore, any physical evidence of historic use of the Project area is expected to have manifested in the archaeological record as small ephemeral artifact deposits located at or near the surface. Unfortunately these deposits would also have become mixed and disturbed with late-twentieth century rubbish when landfilling significantly altered the natural landscape. In summary, if prehistoric or historic archaeological resources were ever present within the Project area it is not probable that any intact deposits remain. Given this situation no further archaeological investigations are recommended.



Legend

- Project Boundary
- Wetlands
- Photograph Location/Number

Source: ESRI World Imagery, US-NY-Syracuse 2011.

0 225 450
Feet

0 50 100
Meters

Figure 7. Phase IA Cultural Resources Investigation Map for the Cooper Crouse-Hinds North Landfill and South Landfill Project, Town of Salina, Onondaga County New York.

Prepared For: Cooper Crouse-Hinds, LLC

Prepared By: TETRA TECH

Date: 2/2013

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1892 *Fire Insurance Maps of Syracuse, New York*, Vol. 2. Sanborn-Perris, Pelham, New York.
1928 *Fire Insurance Maps of Syracuse, New York*, Vol. 4. Sanborn-Perris, Pelham, New York.

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Thompson, John Henry
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United State Geological Survey (USGS)
1898 *Syracuse, New York*, 15 Minute Series Quadrangle.
1947 *Syracuse West, New York*, 7.5 Minute Series Quadrangle.
1973 *Syracuse West, New York*, 7.5 Minute Series Quadrangle (Photorevised 1978).

ATTACHMENT A

PHOTOGRAPHIC RECORD

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 1
Direction: NE
Comments: Overview of North Landfill, photographed from southern corner. Note disturbed stream segment, referred to as Stream A. Note also elevated CSX railroad grade to right adjacent to Project area and overhead National Grid power lines. Yellow poles mark southern Project area and property boundary.



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 2
Direction: N
Comments: Overview of North Landfill, photographed from southern corner. Note disturbed stream segment, referred to as Stream A. Note also overhead National Grid power lines at center.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 3
Direction: NE
Comments: Overview of North Landfill photographed from southern corner. Note disturbed stream segment, referred to as Stream A. Note also overhead National Grid power lines to center left. Note also Seventh North Street to left.



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 4
Direction: NE
Comments: Overview of North Landfill photographed from eastern corner. Note also riprap in foreground. Yellow poles mark northern Project area and property boundary.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 5
Direction: WNW
Comments: Overview of North Landfill photographed from eastern corner. Note reeds in Wetland A and riprap in foreground.



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 6
Direction: W
Comments: Overview of North Landfill from eastern corner. Note elevated CSX Railroad grade to left and overhead utility lines.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 7
Direction: SW
Comments: Overview of North Landfill from eastern corner. Note elevated CSX Railroad grade to left and rip-rap in foreground.



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 8
Direction: N
Comments: View of disturbed ground surface in North Landfill photographed from about 50 m (164 ft) northwest of eastern corner. Note mixed late-20th century debris on surface is municipal waste encroached from the adjacent Plaza East Landfill (to right).

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 9
Direction: SE
Comments: Overview of North Landfill from the northern corner. Note mounded foundry sand. Note also Cooper Crouse-Hinds plant in background. Yellow poles mark northern Project area and property boundary.



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 10
Direction: S
Comments: Overview of North Landfill from the northern corner. Note snow fencing around monitoring well in foreground and mounded foundry sand.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 11
Direction: SW
Comments: Overview of North Landfill from the northern corner. Note Ley Creek to right (in tree line) and mounded foundry sand.



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 12
Direction: SW
Comments: View of ground disturbance along the west side of the north landfill. Note prevalent ground disturbance and mixed late-20th debris. Note also Ley Creek in background in tree line).

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 13
Direction: SE
Comments: View of deep foundry sand deposit in "Area 3", near center of North Landfill. Note standing water in bottom of excavation. Note also CSX Railroad grade and Cooper Crouse-Hinds plant in background.



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 14
Direction: SE
Comments: Overview of the North Landfill photographed from the western corner. Note Seventh North Street to right (past fence line). Note also Cooper Crouse-Hinds plant in background.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 15
Direction: NW
Comments: Overview of South Landfill photographed from eastern corner. Note Seventh North Street to right.



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 16
Direction: SW
Comments: Overview of South Landfill photographed from eastern corner. Note CSX railroad grade to left.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 17
Direction: NE
Comments: Overview of South Landfill, photographed from southern corner. Note Ley Creek to left, Wetland C in center, and CSX railroad grade to right.



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 18
Direction: SE
Comments: Overview of South Landfill photographed from western side. Note prevalent ground disturbances and mounded foundry sand. Note also Cooper Crouse-Hinds plant in background.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York



Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 19
Direction: WSW
Comments: Overview of South Landfill photographed from center of landfill. Note mounded foundry sand and Wetland C in background.



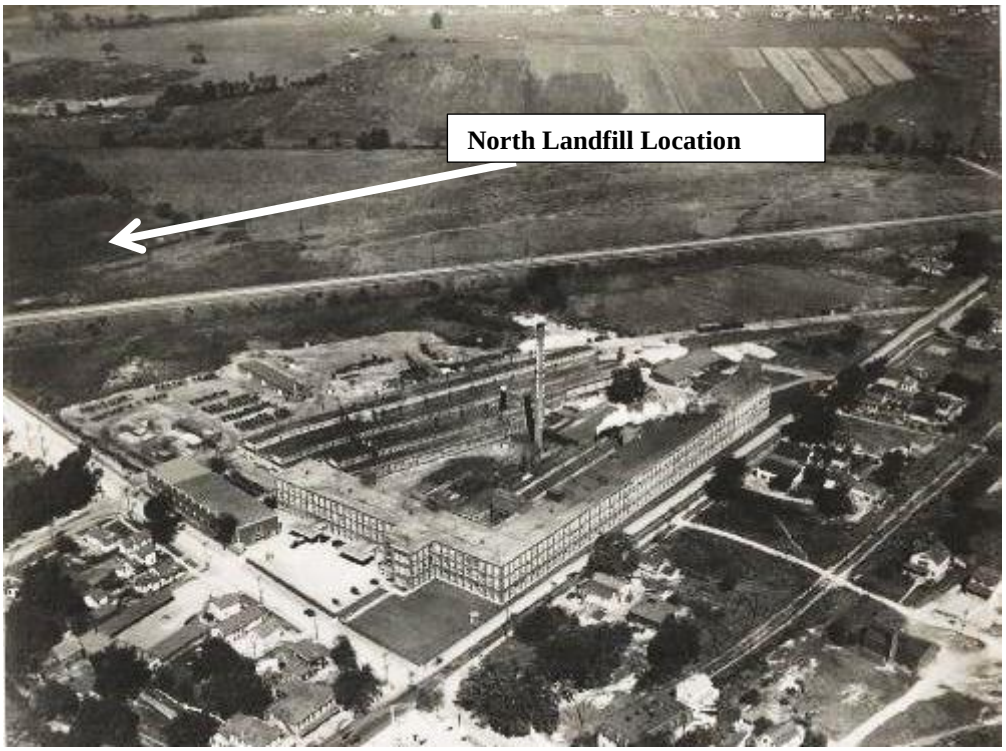
Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 20
Direction: E
Comments: Overview of South Landfill photographed from center of landfill. Note Wetland C in middle ground, CSX railroad grade in background, and Cooper Crouse-Hinds plant in distant background.

ATTACHMENT B

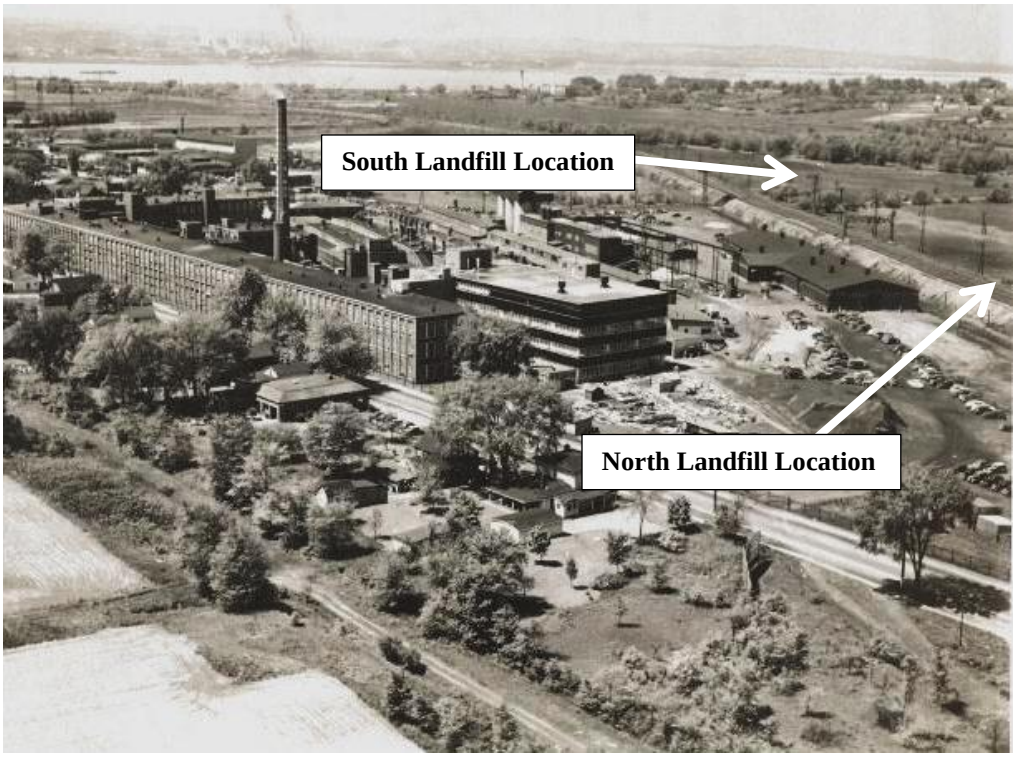
HISTORIC PHOTOGRAPHS



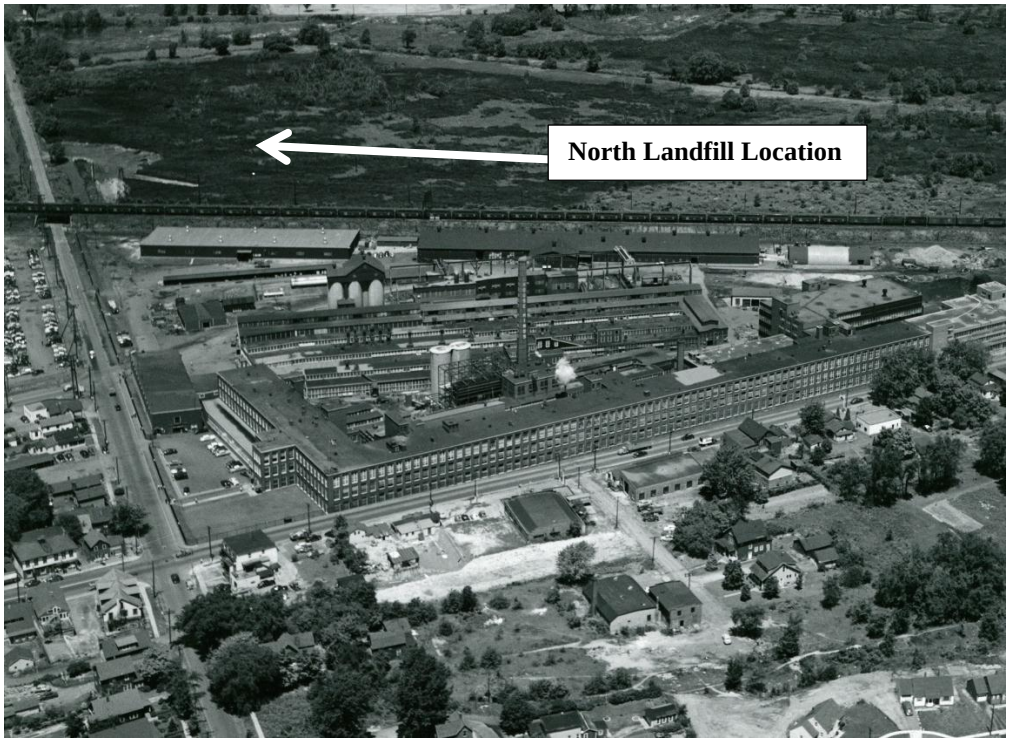
Portion of the 1926 *Airmap of City of Syracuse*, by the Airmap Corporation of America.



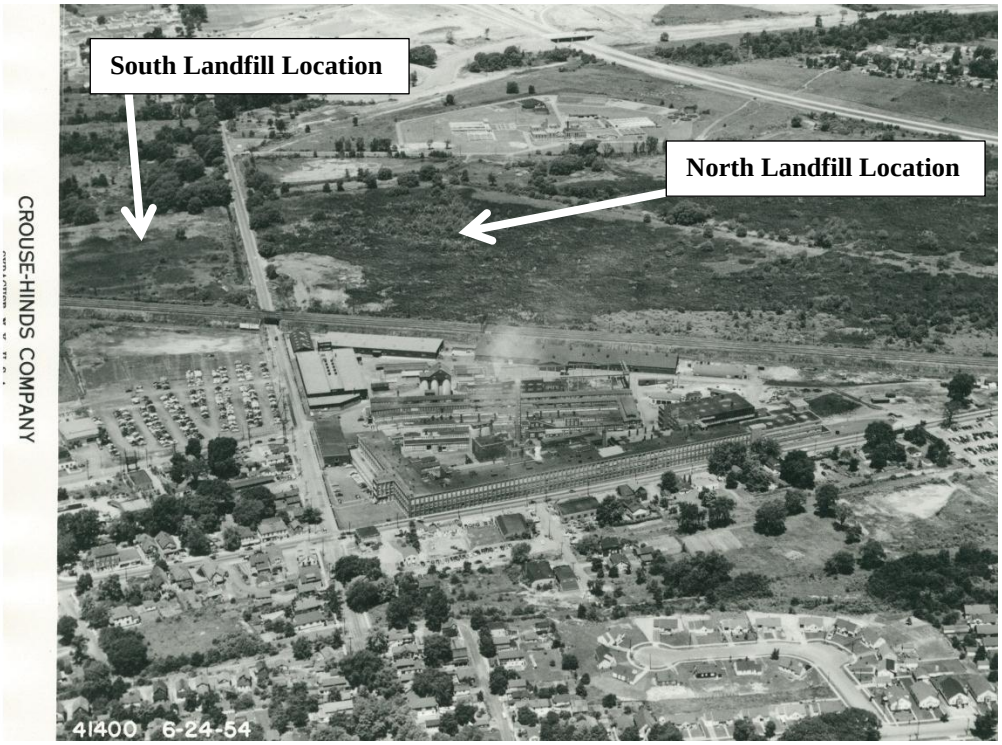
Aerial photograph of the Crouse-Hinds facility in 1927, showing part of the North Landfill location.
Source: Cooper Crouse-Hinds



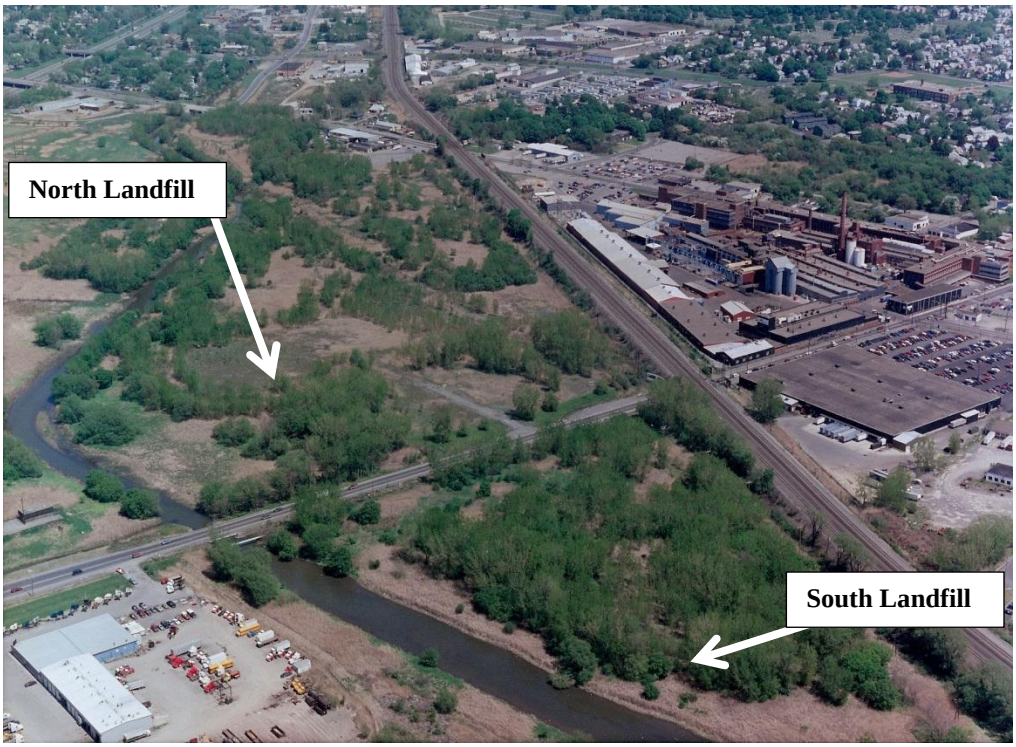
Aerial photograph of the Crouse-Hinds facility in 1948, showing the South Landfill and part of the North Landfill.
Source: Cooper Crouse-Hinds



Aerial photograph of the Crouse-Hinds facility in 1952, showing the North Landfill location.
Source: Cooper Crouse-Hinds



Aerial photograph of the Crouse-Hinds facility in 1954, showing the North Landfill location and part of the South Landfill location.
Source: Cooper Crouse-Hinds



Aerial photograph of the Crouse-Hinds facility in 1995, showing the North Landfill and the South Landfill.
Source: Cooper Crouse-Hinds

APPENDIX E

CALCULATIONS

FOR

NO LOSS OF FLOOD STORAGE

TETRA TECH

January 3, 2014
117-2202046.19

Mr. Russell Houck, P.E.
Department of Engineering
City of Syracuse
233 E. Washington Street, Room 401
Syracuse, NY 13202

RE: SWPPP for CCH Landfills - Calculations for No Loss of Flood Storage at North and South CCH Landfills

Dear Mr. Houck:

The relocation of contaminated soils and wetland sediments to the center of each landfill property (the South Landfill in the City of Syracuse and the North Landfill in the Town of Salina) and the construction of a landfill cap at each landfill are required by the NYSDEC as a final remedy. At the request of the City of Syracuse, each landfill design was examined and modified as necessary so that the final cap design and resulting topography will result in no loss of flood storage in the event of a 100-year flood (flood elevation of 374') at each landfill, and that the landfill caps will not encroach on the Flood Insurance Rate Map (FIRM) floodway.

Attachment A includes the email chain between Tetra Tech and the City of Syracuse, with other interested parties copied, that lists the concerns to be addressed. The City summary email of November 7, 2013 provides six issues listed below in bold with responses in italics.

1. Please provide the proposed analysis of excavation/fill within the floodplain for the North and South Landfills. Note that the 1% annual chance flood elevation that was provided to Tetra Tech of 374.0 feet is in NAVD88 vertical datum. I don't believe this can be considered the same datum as AMSL and elevation adjustments may need to be made.

We have verified with Aerometrics that the survey topographic contours used in the landfill cap design are in NAVD88 vertical datum. Aerometrics confirmed by email (Attachment A) that the reference to "NGS Mean Sea Level" on the Aerometric survey (Attachment B) is equivalent to NAVD88. NAVD88 is also referenced on Fire Insurance Rate Map Panel 208 of 520 included after Figure 6 in the SWPPP. NAVD88 is the vertical reference datum used for both the landfill design and 100-year flood elevation.

Each landfill property (North and South) was input into AutoCAD using the Aerometric survey data. A cut and fill calculation was then performed for each landfill using elevation 374 as the planar tin. The four calculations are shown on Figures 1 through 4 in Attachment C.

TETRA TECH
175 North Corporate Drive, Suite 100, Brookfield, WI 53045
Tel 262.792.1282 Fax 262.792.1310 www.tetratech.com

***South Landfill Analyses of Excavation/Fill Within the Floodplain**:*

- *Attachment C Figure 1 – South Landfill Existing – The South Landfill as it exists today, with a flood storage volume of 2,900,127 cubic feet below elevation 374. This would be the water volume that the South Landfill Property would hold in the event of the 100-year flood. The calculated number to the left of the "Volume at or below 374" is the volume of earth on the property above elevation 374. The calculated number to the right is the sum.*
- *Attachment C Figure 2 – South Landfill Proposed – The South Landfill as it would exist if the wetland sediment relocation, buffer zone construction, and landfill cap construction as shown in the 95% Design Documents were completed. The new flood storage volume would be 3,273,300 cubic feet below elevation 374. The difference of "Existing" versus "Proposed" is a surplus (gain in flood storage) of 373,173 cubic feet.*

***North Landfill Analyses of Excavation/Fill Within the Floodplain**:*

- *Attachment C Figure 3 -North Landfill Existing – The North Landfill as it exists today, with a flood storage volume of 3,195,702 cubic feet below elevation 374. This would be the water volume that the North Landfill Property would hold in the event of the 100-year flood. The calculated number to the left of the "Volume at or below 374" is the volume of earth on the property above elevation 374. The calculated number to the right is the sum.*
- *Attachment C Figure 4 - North Landfill Proposed – The North Landfill as it would exist if the wetland sediment relocation, buffer zone construction, and landfill cap construction as shown in the 95% Design Documents were completed. The new flood storage volume would be 3,277,690 cubic feet below elevation 374. The difference of "Existing" versus "Proposed" is a surplus (gain in flood storage) of 81,988 cubic feet.*

2. We agree with the revisions to the North landfill cap to eliminate the floodway encroachment.

At the northwest corner of the North Landfill, the edge of the cap has been moved to the southeast and buffer zone cell TP-69 on Sheet 7A has been enlarged so that no portion of the landfill cap is within the floodway. This change is also shown on revised sheets 11 and 13 included in Attachment D and on revised Figures 3 and 5 in the SWPPP. The required changes to other sheets to modify the North Landfill cap area will be included in the 100% (Final) Design Documents.

3. Please provide the revised SWPPP when ready.

The revised SWPPP is attached.

4. With the acceptable SWPPP, the City will provide the SWPPP acceptance form.

Please return the signed MS4 form at your earliest convenience.

5. As noted in the SWPPP, greater than 5 acres will be disturbed at one time as part of the project, and a request will be sent to the City. After receipt of this request, we will provide an authorization letter to the owner. NYSDEC will also need to provide authorization for the greater than 5 acre disturbance.

Prior to the start of work, a request to disturb more than 5 acres at one time will be sent to the City. NYSDEC will also be notified so that the authorization from NYSDEC for the greater than 5 acre disturbance can be granted.

6. The City also requires that the owner provide a Stormwater Maintenance Agreement to maintain any site storm water management facilities, and an Access Agreement allowing the City access to the site for storm water management inspections. Models of these agreements are provided on the City Storm Water Management webpage:

http://www.syracuse.ny.us/Stormwater_Management.aspx .

These agreements can take a little time for the City to review and approve, but there should be more than sufficient time to have these agreements finalized and filed before work commences. The agreements should not be altered from the model form.

Once the City MS4 is signed and returned, the Notice of Intent (NOI) will be submitted to the NYSDEC to obtain coverage under SPDES General Permit GP-0-10-001. Upon receipt of NYSDEC coverage under this general permit, and incorporation of any additional comments to the 95% Design Documents, the Final Design will be submitted to NYSDEC for approval. Once the NYSDEC Design Approval is obtained, the above-mentioned Stormwater Maintenance Agreement and Access Agreement will be completed for City review and approval. The City model forms will be used.

Attachments to this Calculation

A. Email Chain Between Tetra Tech and the City of Syracuse plus the Aerometric email
B. Aerometric Survey
C. Figures 1-4 referenced above
D. Revised 95% Design Sheets 7A, 11, and 13

I trust this information meets your needs. If you have any questions please do not hesitate to call.

Sincerely,
Tetra Tech Inc.

Daniel L. Morgan

Daniel L. Morgan, P.E.
Senior Engineer
encl.

ATTACHMENT A

EMAIL CHAIN

Morgan, Dan

From: Houck, Russell <RHouck@syrgov.net>
Sent: Thursday, November 07, 2013 8:54 AM
To: Morgan, Dan; Richard Mustico
Cc: Robison, Mary; Noel, Mike; William Nechamen; Kevin Delaney; Kelli Higgins-Roche
Subject: RE: Crouse Cooper Hinds Landfill, Syracuse - Floodplain Issues/ SWPPP

Dan and Richard:
Thank you for addressing the City's concerns regarding potential floodplain impacts with the Crouse Copper Hinds Landfill project. The City, along with NYSDEC floodplain management personnel in Syracuse and Albany, reviewed the proposed analyses and revisions to the project to address these concerns. The City believes the proposed work satisfies our concerns and will help reduce potential adverse impacts from flooding in the project area. The NYSDEC also indicated that the proposal was adequate to address these concerns. I have summarized more specifically the proposal items and process for completing the stormwater management requirements:

1. Please provide the proposed analysis of excavation/fill within the floodplain for the North and South Landfills. Note that the 1% annual chance flood elevation that was provided to Tetra Tech of 374.0 feet is in NAVD88 vertical datum. I don't believe this can be considered the same datum as AMSL and elevation adjustments may need to be made.

2. We agree with the revisions to the North landfill cap to eliminate the floodway encroachment.

3. Please provide the revised SWPPP when ready.

4. With the acceptable SWPPP, the City will provide the SWPPP acceptance form .

5. As noted in the SWPPP, greater than 5 Acres will be disturbed at one time as part of the project, and a request will be sent to the City. After receipt of this request, we will provide an authorization letter to the owner. NYSDEC will also need to provide authorization for the greater than 5 acre disturbance.

6. The City also requires that the owner provide a Stormwater Maintenance Agreement to maintain any site stormwater management facilities, and an Access Agreement allowing the City access to the site for stormwater management inspections. Models of these agreements are provided on the City Stormwater Management webpage http://www.syracuse.ny.us/Stormwater_Management.aspx . These agreements can take a little time for the City to review and approve, but there should be more than sufficient time to have these agreements finalized and filed before work commences. The agreements should not be altered from the model form.

Thank you again for your attention to the City's concerns and please don't hesitate to contact me with any questions of if additional information is needed.

- Russell

Russell Houck, P.E., Cert. Floodplain Mgr.
Facilities Engineer
Department of Engineering
City of Syracuse
233 E. Washington Street, Room 401
Syracuse, NY 13202
315-448-8059 (Office)
315-530-0249 (Cell)
rhouck@syrgov.net

From: Morgan, Dan [mailto:Dan.Morgan@tetratech.com]
Sent: Thursday, October 31, 2013 3:45 PM
To: William Nechamen; Kelli Higgins-Roche; Kevin Delaney; Richard Mustico; Houck, Russell
Cc: Robison, Mary; Morgan, Dan; Noel, Mike
Subject: RE: Crouse Cooper Hinds Landfill, Syracuse - Floodplain Issues/ SWPPP

Hello Kevin Delaney and Russell Houck,

I have reviewed the email below and further reviewed the 95% Landfill Cap Design with regards to the floodway encroachment and floodplain excavation and fill concerns. I believe that the concerns expressed can be addressed with changes to the North Landfill (Town of Salina) landfill cap area and buffer zone finished grades at both landfills.

In order to address the concerns, we need to agree on the 1% annual flood elevation at each landfill so that the modifications to the buffer zone finished grades (lowering the central floor of each buffer zone to increase the flood storage and decrease the imported backfill) produce the desired result.

Please confirm that a flood water elevation of 374' is the target for the South Landfill in the City of Syracuse. We will then produce an analyses that shows that the volume of flood water capacity of the existing topography will be equaled or exceeded by the finished topography with the landfill cap installed for the South Landfill site area.

Please confirm that a flood water elevation of 374' is the target for the North Landfill in the Town of Salina. We will then produce an analyses that shows that the volume of flood water capacity of the existing topography will be equaled or exceeded by the finished topography with the landfill cap installed for the North Landfill site area.

With regards to floodway (dashed blue line on map number 36067C0208F) encroachment:

For the South Landfill, the floodway boundary is along the western edge of the property boundary. The edge of the landfill buffer zone may be within the floodway, but when finished will be at a lower elevation than currently exists. We do not see any need to modify the current design along Ley Creek (except as described above for flood water capacity, which will result in a lower amount of imported fill).

For the North Landfill, a review indicates that the northwest corner of the landfill cap may lie within the floodway. This corner of the cap will be converted into buffer zone and the landfill cap terminated at the floodway edge. The remaining floodway area within the North Landfill is buffer zone or wetland, both of which will be finished at a lower elevation than currently exists.

Once the target flood water elevation is determined, we will produce the analyses and include this analyses in the SWPPP.

If I have not correctly interpreted the concerns, please let me know.

Thank you.

Daniel L. Morgan, P.E. | Associate Engineer
Office: 262.792.1282 ext. 269 | FAX: 262.792.1310 | Mobile: 262.408.9399
dan.morgan@tetratech.com

Tetra Tech Inc
175 N Corporate Drive | Suite 100 | Brookfield WI 53045 |www.tetratech.com

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Morgan, Dan

From: Morgan, Dan
Sent: Thursday, October 31, 2013 2:45 PM
To: William Nechamen; Kelli Higgins-Roche; Kevin Delaney; Richard Mustico; RHouck@syrgov.net
Cc: MRobison@syrgov.net; Morgan, Dan; Noel, Mike
Subject: RE: Crouse Cooper Hinds Landfill, Syracuse - Floodplain Issues/ SWPPP

Hello Kevin Delaney and Russell Houck,

I have reviewed the email below and further reviewed the 95% Landfill Cap Design with regards to the floodway encroachment and floodplain excavation and fill concerns. I believe that the concerns expressed can be addressed with changes to the North Landfill (Town of Salina) landfill cap area and buffer zone finished grades at both landfills.

In order to address the concerns, we need to agree on the 1% annual flood elevation at each landfill so that the modifications to the buffer zone finished grades (lowering the central floor of each buffer zone to increase the flood storage and decrease the imported backfill) produce the desired result.

Please confirm that a flood water elevation of 374' is the target for the South Landfill in the City of Syracuse. We will then produce an analyses that shows that the volume of flood water capacity of the existing topography will be equaled or exceeded by the finished topography with the landfill cap installed for the South Landfill site area.

Please confirm that a flood water elevation of 374' is the target for the North Landfill in the Town of Salina. We will then produce an analyses that shows that the volume of flood water capacity of the existing topography will be equaled or exceeded by the finished topography with the landfill cap installed for the North Landfill site area.

With regards to floodway (dashed blue line on map number 36067C0208F) encroachment:

For the South Landfill, the floodway boundary is along the western edge of the property boundary. The edge of the landfill buffer zone may be within the floodway, but when finished will be at a lower elevation than currently exists. We do not see any need to modify the current design along Ley Creek (except as described above for flood water capacity, which will result in a lower amount of imported fill).

For the North Landfill, a review indicates that the northwest corner of the landfill cap may lie within the floodway. This corner of the cap will be converted into buffer zone and the landfill cap terminated at the floodway edge. The remaining floodway area within the North Landfill is buffer zone or wetland, both of which will be finished at a lower elevation than currently exists.

Once the target flood water elevation is determined, we will produce the analyses and include this analyses in the SWPPP.

If I have not correctly interpreted the concerns, please let me know.

Thank you.

Daniel L. Morgan, P.E. | Associate Engineer
Office: 262.792.1282 ext. 269 | FAX: 262.792.1310 | Mobile: 262.408.9399
dan.morgan@tetratech.com

Tetra Tech Inc
175 N Corporate Drive | Suite 100 | Brookfield WI 53045 |www.tetratech.com

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From: William Nechamen [mailto:wsnecham@gw.dec.state.ny.us]
Sent: Wednesday, October 23, 2013 12:15 PM
To: Kelli Higgins-Roche; Kevin Delaney; Richard Mustico; RHouck@syrgov.net
Cc: MRobison@syrgov.net; Morgan, Dan
Subject: Re: Crouse Cooper Hinds Landfill, Syracuse - Floodplain Issues/ SWPPP

Kevin: can you take the lead within the region? Kelli: I'll need you to take a look and include Jennifer. I agree with Russ's concerns and possible approaches.
William Nechamen
Chief, Floodplain Management Section
New York State Department of Environmental Conservation
518-402-8146

Sent via Blackberry

>>> "Houck, Russell" <RHouck@syrgov.net> 10/23/2013 12:45:38 PM >>>
Mr. Mustico, Mr. Nechamen and Mr. Delaney,
The City of Syracuse Engineering Department is reviewing the draft SWPPP for the proposed Cooper Crouse-Hinds North and South Landfill project which is planned to be located adjacent to Ley Creek, and within the Ley Creek delineated floodplain. The South Landfill is planned to be located within the City of Syracuse, and the North Landfill located across Seventh North Street in the Town of Salina. The two landfills are planned to consolidate and cap PCB-containing soils and sediments. Both Syracuse and the Town of Salina have effective Flood Insurance Studies for Ley Creek, with a floodway delineated. FEMA is also has draft preliminary FIS and mapping for Ley Creek (dated June 2012 for Syracuse), and planned to be made effective in 2014. The floodways for these two studies are similar in extent in this area.

As planned, both the North and South Landfills will have significant excavation and fill within the 1% annual chance food hazard zone. In addition, the project as proposed will have significant excavation within the floodway in both Syracuse and Salina. Fill is also proposed, to a lesser extent, within the floodway within Salina.

The City of Syracuse has provided comments on the SWPPP to Tetra Tech. We have been in contact with Dan Morgan from TetraTech and appreciate his patience on our review. TetraTech quickly and satisfactorily addressed the majority of these comments. However, we still have concerns with how floodplain management is being addressed. TetraTech's responses indicate no negative impacts to flooding, but there is not an analysis to support this. Excavation is noted as increasing flood storage, which it will; however the fill from the two landfills has not been considered as potentially affecting flood elevations. It appears from the design that fill will exceed excavation within the floodplain.

We recognize that this is a NYSDEC-lead project, and we have reached out to the Region 7 NYSDEC Floodplain Coordinator (Kevin Delaney), who contacted the Dam Safety, Coastal and Flood Protection Bureau (Bill Nechamen) for input. We ask that the NYSDEC floodplain coordinators in Albany and Syracuse review the project and weigh in on potential impacts to the floodplain. The NYSDEC's review and recommendations on the floodplain issues would be welcomed and most likely satisfy the City's concerns.

We believe that, at a minimum, an analysis should be conducted comparing the excavation and fill within the 1% annual chance flood hazard zone, with the results of this analysis included in the SWPPP (goal of excavation exceeding fill). Although the floodway encroachment is not within our municipal jurisdiction (though immediately upstream of Syracuse), typically a floodway encroachment hydraulic analysis is required for this situation, and a No-Rise Certification

provided by the Engineer. To simplify matters, a possible option would be to avoid any fill within the floodway, or at least having none of the proposed landfill within the floodway. Within Syracuse, per City codes, the floodway hydraulic analysis would need to show no increase at all in flood elevations. The analysis should meet the Town of Salina requirements.

Outside of the floodway, but within the floodplain, the City may require a technical analysis to determine a project's impact on flood elevations. By FEMA definition, fill outside of the floodway should not result in an increase to flood elevations greater than 1 foot. However, raising flood elevations by up to one foot in this location would increase the 1% annual flood hazard extents, and impact a greater number of businesses than it currently does (primarily a commercial district). An increase in flood elevations would negatively impact the local area.

Based on these concerns, we ask that the NYSDEC look closely at the proposed project and potential floodplain impacts, and we welcome comments and recommendations. We are available for any discussion on the project.

Thanks,
Russell

Russell Houck, P.E., Cert. Floodplain Mgr.
Facilities Engineer
Department of Engineering
City of Syracuse
233 E. Washington Street, Room 401
Syracuse, NY 13202
315-448-8059 (Office)
315-530-0249 (Cell)
rhouck@syrgov.net

Morgan, Dan

From: Noel, Mike
Sent: Friday, November 08, 2013 11:55 AM
To: Morgan, Dan
Subject: FW: vertical datums

-----Original Message-----
From: Ward, Heath
Sent: Friday, November 08, 2013 11:49 AM
To: Noel, Mike
Subject: FW: vertical datums

Mike, below is exactly what we needed from Ed.
He verified that the topography is based on the North American Vertical Datum of 1988.

From: Edward Crossan [ecrossan@aerometric.com]
Sent: Friday, November 08, 2013 9:45 AM
To: Ward, Heath
Subject: Re: vertical datums

Heath,

As per your recent request with regard to the data on Cooper Crouse-Hinds Landfill, the original mapping submitted by Aerometcic on December 2012 was based on horizontal datum NAD83(Central), vertical datum was NAVD 88(Geoid 09). All units are in feet,call me if you have any questions.

Thanks Ed.

[Quantum Geospatial Logo]
Edward Crossan<mailto:ecrossan@quantumspatial.com> CP, SP VP., Account Manager
45180 Business Court, Suite 800,Dulles, VA 20166
P: (703) 471-4510 M: (703) 887-3116

AeroMetric is now Quantum Spatial. Read all about it here.<http://quantumspatial.com/news/article/Quantum-Spatial-Formed>

On Thu, Nov 7, 2013 at 3:43 PM, Ward, Heath <Heath.Ward@tetratech.com<mailto:Heath.Ward@tetratech.com>> wrote:
Hi Ed, would you mind just sending me an email with any information you have?
I will need to have an explanation in writing, regardless, so that I can present it to Syracuse city officials.
thanks again.

p.s. if you really would rather talk, let me know and I can give you a buzz.

Heath Ward | CAD Designer / IT Coordinator
Direct: 414.550.7911<tel:414.550.7911> | Main: 262.792.1282<tel:262.792.1282> | Fax: 262.792.1310<tel:262.792.1310> Heath.Ward@tetratech.com<mailto:Belinda.Talkington@tetratech.com>

Tetra Tech | Complex World, Clear Solutions™
175 N Corporate Dr | Suite 100 | Brookfield WI 53045 | (Google Map)<http://www.google.com/maps?q=175+North+Corporate+Drive,+Brookfield,+WI+53045&hl=en&sll=34.150543,-118.07833&sspn=0.0255,0.038409&vpsrc=0&t=m&z=16>
www.tetratech.com<http://www.tetratech.com/>

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[cid:image002.png@01CE2FB0.22DAD780] <http://www.twitter.com/tetratech>
[cid:image003.png@01CE2FB0.22DAD780] <http://www.linkedin.com/company/tetra-tech>

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From: Ward, Heath
Sent: Thursday, November 07, 2013 11:43 AM
To: ecrossan@aerometric.com<mailto:ecrossan@aerometric.com>
Subject: vertical datums

Good morning Ed,
I am working with Mike Noel on the Cooper Crouse – Hinds Landfill in Syracuse, NY. The attached topo map was generated by Aero-Metric.
The map gives reference to the vertical datum as NGS MEAN SEA LEVEL.
We have since been inquired by the local municipalities to establish a relationship between your vertical data mentioned above and NAVD88.
The reason is that there are some flood plain issues, and the City of Syracuse suspects that the datums are not the same. Although based on what I found, I believe them to be identical.
So basically, are they the same? If so, please provide a brief explanation. If they are not the same...can you offer a conversion factor?
The City of Syracuse is concerned about the 374' elevation, which has 100-year flood significance...and they (and we) want to be sure that 374' on your map is 374' NAVD88.
Thank you in advance for your assistance in this matter.

Heath Ward | CAD Designer / IT Coordinator
Direct: 414.550.7911<tel:414.550.7911> | Main: 262.792.1282<tel:262.792.1282> | Fax: 262.792.1310<tel:262.792.1310> Heath.Ward@tetratech.com<mailto:Belinda.Talkington@tetratech.com>

Tetra Tech | Complex World, Clear Solutions™

175 N Corporate Dr | Suite 100 | Brookfield WI 53045 | (Google Map)<http://www.google.com/maps?q=175+North+Corporate+Drive,+Brookfield,+WI+53045&hl=en&sll=34.150543,-118.07833&sspn=0.0255,0.038409&vpsrc=0&t=m&z=16>
www.tetratech.com<http://www.tetratech.com/>

[cid:image001.png@01CE2FB0.22DAD780]<http://www.facebook.com/tetratech>[cid:image002.png@01CE2FB0.22DAD780]<http://www.twitter.com/tetratech> [cid:image003.png@01CE2FB0.22DAD780]
<http://www.linkedin.com/company/tetra-tech>

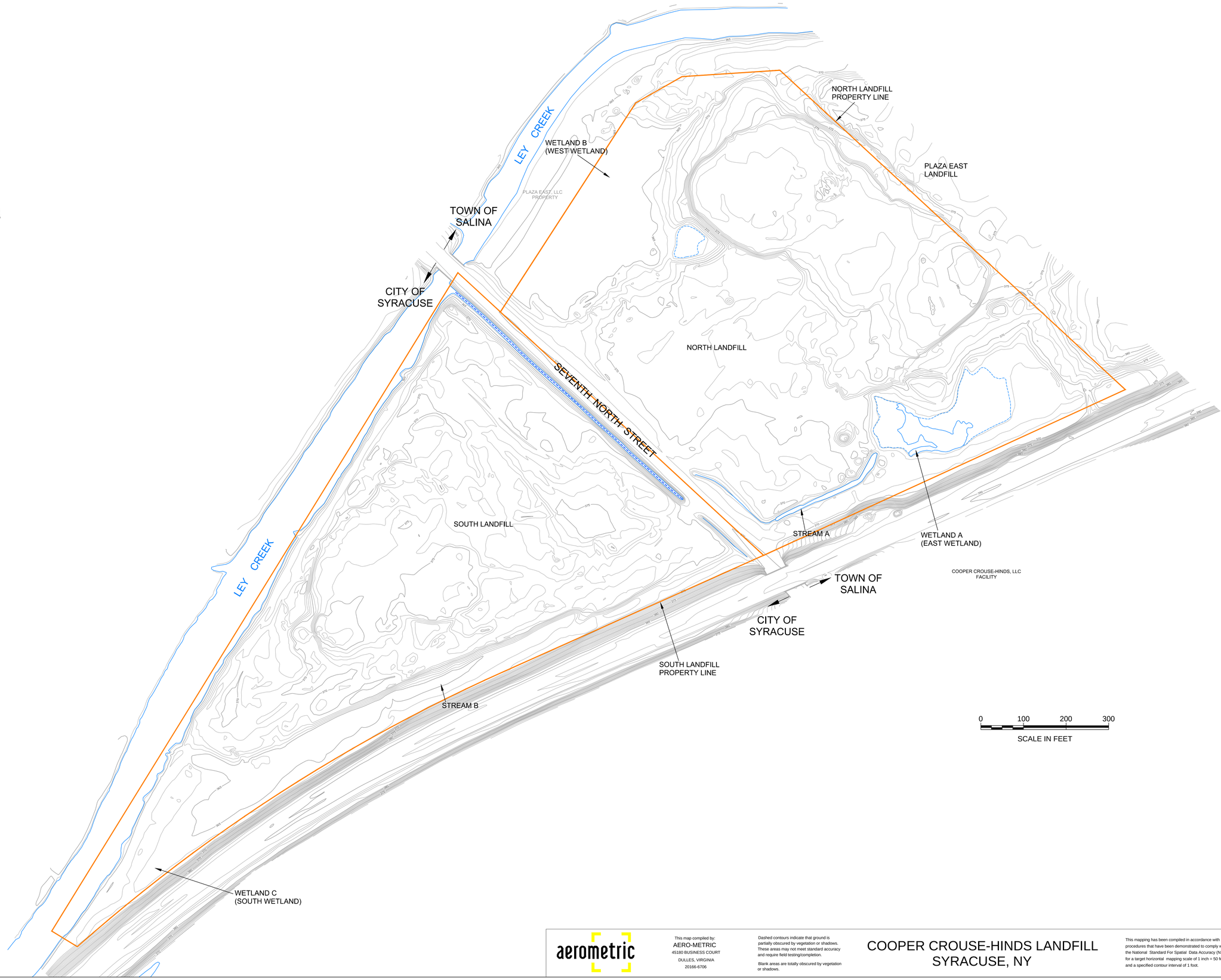
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ATTACHMENT B

AEROMETRIC SURVEY

Based on New York State Plane Grid Coordinates
NY Central Zone True North at 76 deg. 35' meridian
of west longitude

NORTH



0 100 200 300

SCALE IN FEET

aerometric

This map compiled by:
AERO-METRIC
45180 BUSINESS COURT
DULLES, VIRGINIA
20166-6706

Dashed contours indicate that ground is partially obscured by vegetation or shadows. These areas may not meet standard accuracy and require field testing/completion.

Blank areas are totally obscured by vegetation or shadows.

COOPER CROUSE-HINDS LANDFILL
SYRACUSE, NY

This mapping has been compiled in accordance with procedures that have been demonstrated to comply with the National Standard For Spatial Data Accuracy (NSSDA), for a target horizontal mapping scale of 1 inch = 50 feet and a specified contour interval of 1 foot.

This map compiled by photogrammetric methods from aerial photography dated 11-15-2012
Grid based on New York State Plane
Coordinate System NAD 1983
Vertical datum based on NGS Mean Sea Level

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\AEROMETRIC\OFFICIAL SURVEY MAP.DWG

ATTACHMENT C

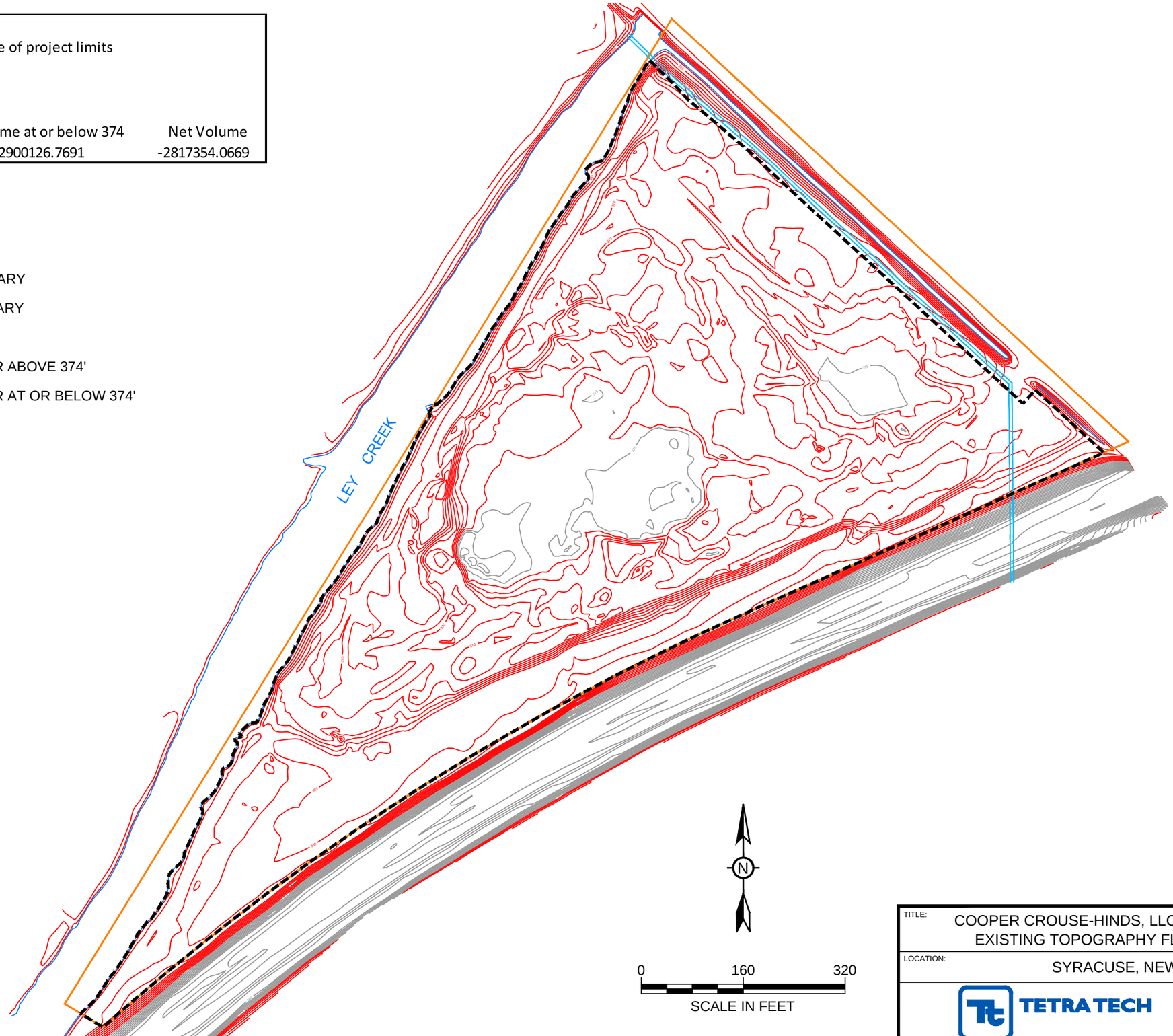
FIGURES 1-4

SOUTH LANDFILL EXISTING
Volume generated from topography inside of project limits
Volume of EXISTING based on a planar tin.
Cubic Feet

Surface	Volume above 374	Volume at or below 374	Net Volume
EXISTING	82772.7022	-2900126.7691	-2817354.0669

EXPLANATION

- LEY CREEK BOUNDARY
- PROPERTY BOUNDARY
- PROJECT LIMITS
- EXISTING CONTOUR ABOVE 374'
- EXISTING CONTOUR AT OR BELOW 374'
- WATER MAIN



N

0 160 320

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
EXISTING TOPOGRAPHY FLOOD STORAGE

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	11/26/13

FIGURE: 1

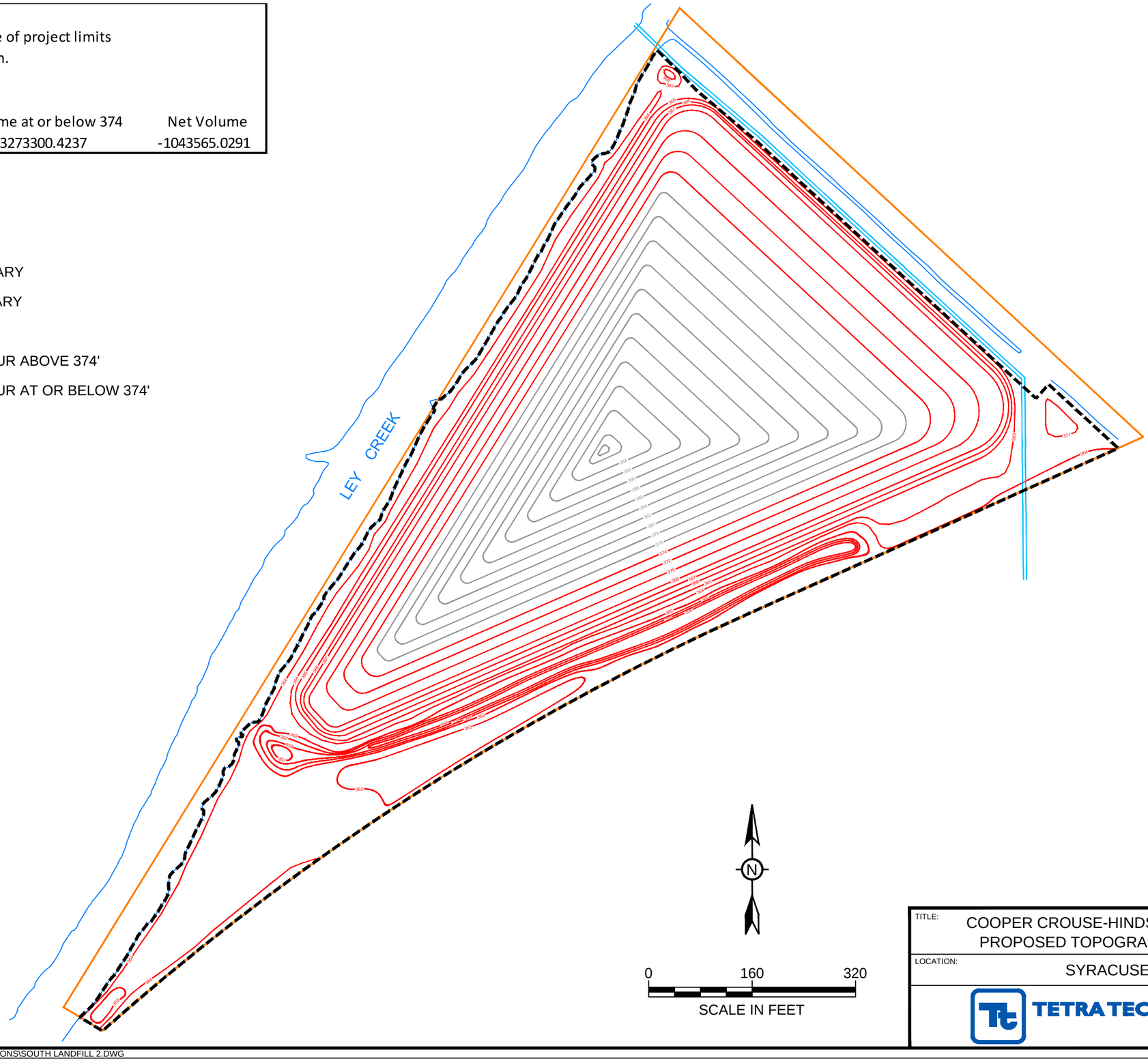
S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\STORMWATER CALCULATIONS\SOUTH LANDFILL 1.DWG

SOUTH LANDFILL PROPOSED
Volume generated from topography inside of project limits
Volume of PROPOSED based on a planar tin.
Cubic Feet

Surface	Volume above 374	Volume at or below 374	Net Volume
PROPOSED	2229735.3947	-3273300.4237	-1043565.0291

EXPLANATION

- LEY CREEK BOUNDARY
- PROPERTY BOUNDARY
- PROJECT LIMITS
- PROPOSED CONTOUR ABOVE 374'
- PROPOSED CONTOUR AT OR BELOW 374'
- WATER MAIN



N

0 160 320

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
PROPOSED TOPOGRAPHY FLOOD STORAGE

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	11/26/13

FIGURE: 2

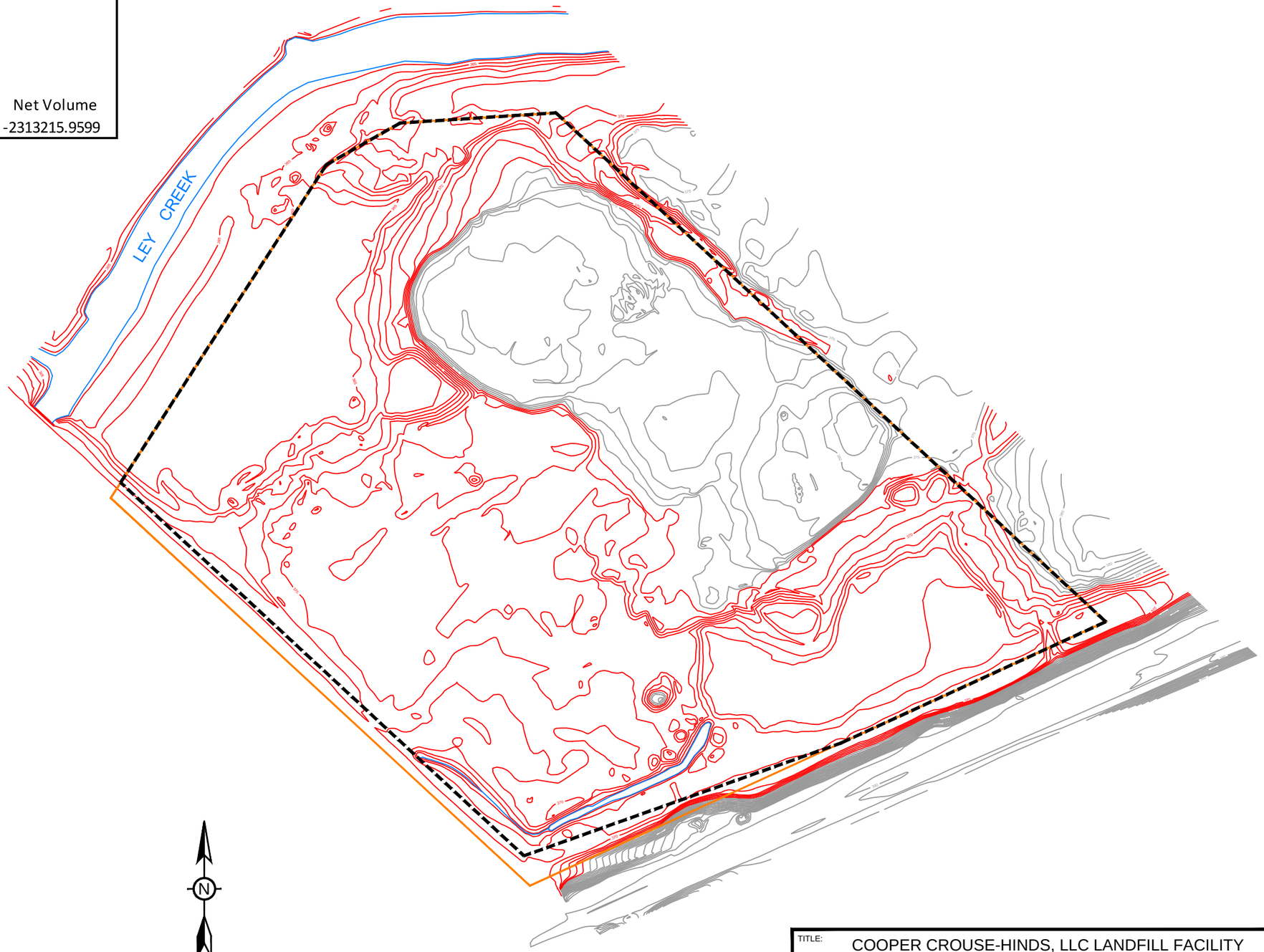
S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\STORMWATER CALCULATIONS\SOUTH LANDFILL 2.DWG

NORTH LANDFILL EXISTING
Volume generated from topography inside of project limits
Volume of EXISTING based on a planar tin.
Cubic Feet

Surface	Volume above 374	Volume at or below 374	Net Volume
EXISTING	882485.7672	-3195701.7271	-2313215.9599

EXPLANATION

- LEY CREEK BOUNDARY
- PROPERTY BOUNDARY
- PROJECT LIMITS
- EXISTING CONTOUR ABOVE 374'
- EXISTING CONTOUR AT OR BELOW 374'



0 160 320
SCALE IN FEET

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
EXISTING TOPOGRAPHY FLOOD STORAGE

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	11/27/13

FIGURE: 3

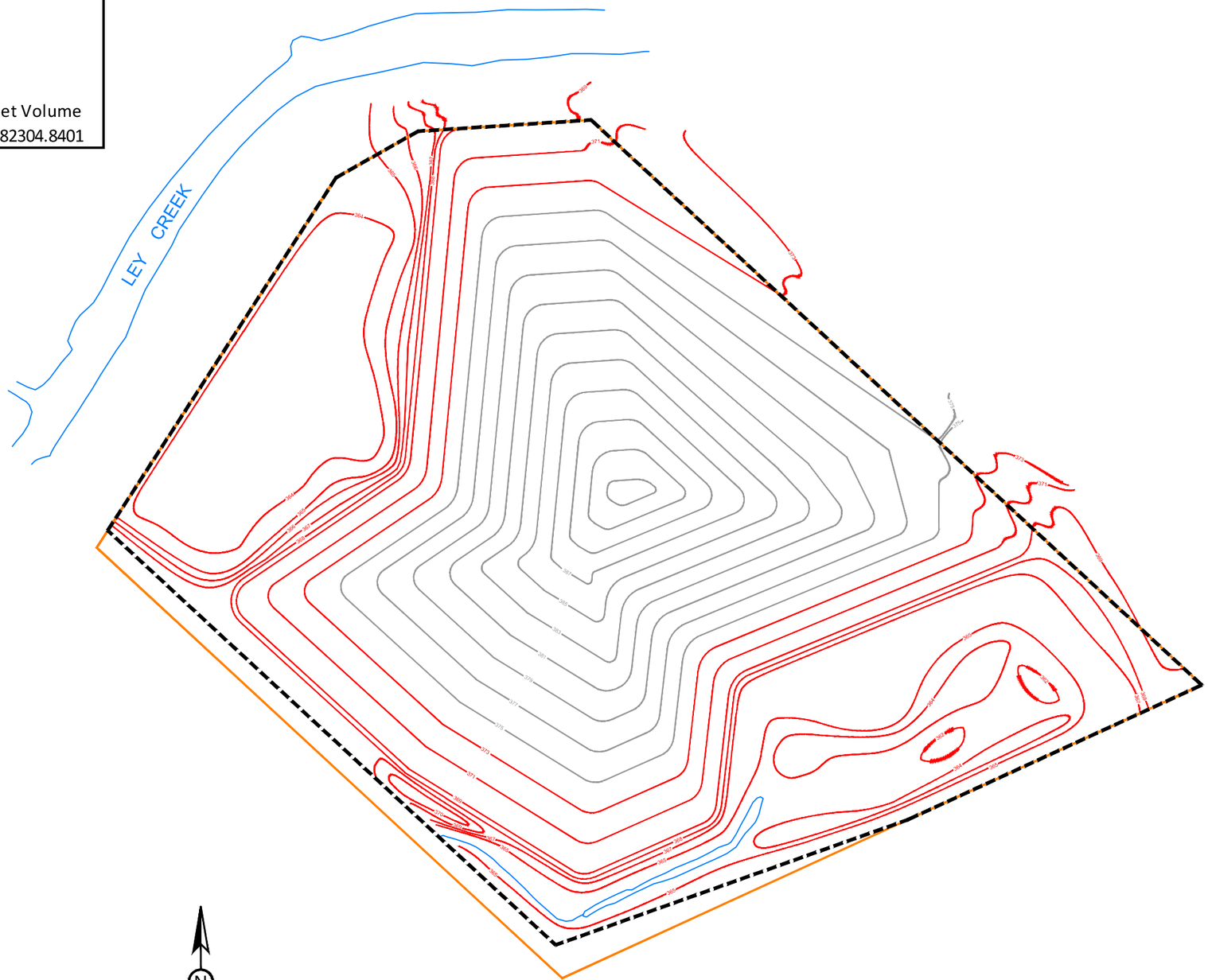
S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\STORMWATER CALCULATIONS\NORTH LANDFILL 1.DWG

NORTH LANDFILL PROPOSED
Using conversion factor of 1.
Volume of PROPOSED based on a planar tin.
Cubic Feet

Surface	Volume above 374	Volume at or below 374	Net Volume
PROPOSED	2395385.1297	-3277689.9698	-882304.8401

EXPLANATION

- LEY CREEK BOUNDARY
- PROPERTY BOUNDARY
- PROJECT LIMITS
- PROPOSED CONTOUR ABOVE 374'
- PROPOSED CONTOUR AT OR BELOW 374'



N

0 160 320

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
PROPOSED TOPOGRAPHY FLOOD STORAGE

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	11/25/13

FIGURE: 4

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\STORMWATER CALCULATIONS\NORTH LANDFILL 2.DWG

ATTACHMENT D

REVISED 95% DESIGN SHEETS 7A, 11, and 13

	Excavation	Base of	Calculated	Calculated	Estimated	Area	Estimated	Estimated
	Sequence	Excavation	Cut	Cut	Fill		Topsoil	Seed Mix
		Elevation	Volume	Volume	Volume		Volume	Mulch
Test Pit		(FT MSL)	(CUFT)	(CUYD)	(CUYD)	(SQFT)	(CUYD)	(SQYD)
TP-69	701	361	118,288	4,381	3,866	16,836	312	1,871
TP-27	702	359	14,813	549	484	2,110	39	234
TP-70	703	361.3	16,111	597	527	2,621	49	291
TP-26	704	360	38,088	1,411	1,245	5,331	99	592
TP-72	705	361.1	18,743	694	613	3,127	58	347
TP-OW-2	706	360.7	5,424	201	177	931	17	103
TP-OW-1	707	360.3	11,410	423	373	1,754	32	195
TP-73	708	364	8,382	310	274	2,716	50	302
TP-25	709	360	13,220	490	432	2,005	37	223
TP-74	710	361.4	19,006	704	621	3,170	59	352
TP-75	711	361.8	13,255	491	433	3,079	57	342
TP-24	712	360.5	26,568	984	868	4,764	88	529
Total			303,308	11,234	9,914	48,444	897	5,383

NOTES:

1. ABANDON (2) EXISTING MONITOR WELLS SHOWN ON THIS SHEET.
2. ONCE BACKFILL PLACED, GRADE TEMPORARY SWALES ALONG EAST EDGE TO DIRECT LANDFILL CAP AREA WATER FLOW INTO LANDFILL CAP AREA AND PLACE SILT FENCE AS NECESSARY TO PROTECT SEED MIX-MULCH IN BUFFER ZONE V-SWALE.
3. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.

LEY CREEK

30-FOOT BUFFER FROM EDGE OF WETLAND B

NORTH LANDFILL

SEVENTH NORTH STREET

TP-28 TP-69 TP-11 MW-1 TP-29 TP-27 MW-5 TP-9 TP-70 TP-71 TP-26 TP-30 TP-10 TP-6 TP-72 TP-31 TP-OW-2 TP-94 TP-OW-1 TP-7 TP-73 TP-25 TP-74 TP-85 TP-32 TP-84 TP-93 TP-8 TP-4 TP-86 TP-76 TP-75 TP-24 TP-95 TP-83 TP-87 TP-1 TP-34 TP-23 TP-5 TP-88 TP-96 TP-90 TP-91 TP-89 TP-22 TP-36 TP-35 TP-2 TP-92 TP-3

EXPLANATION

- EXCAVATION LIMITS
- NOVEMBER 2012 HOT SPOT EXCAVATION
- TP-48 TEST PIT LOCATION AND DESIGNATION
- MW-1 MONITOR WELL LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE

0 50 100 150

SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND B 30' BUFFER ZONE EXCAVATIONS

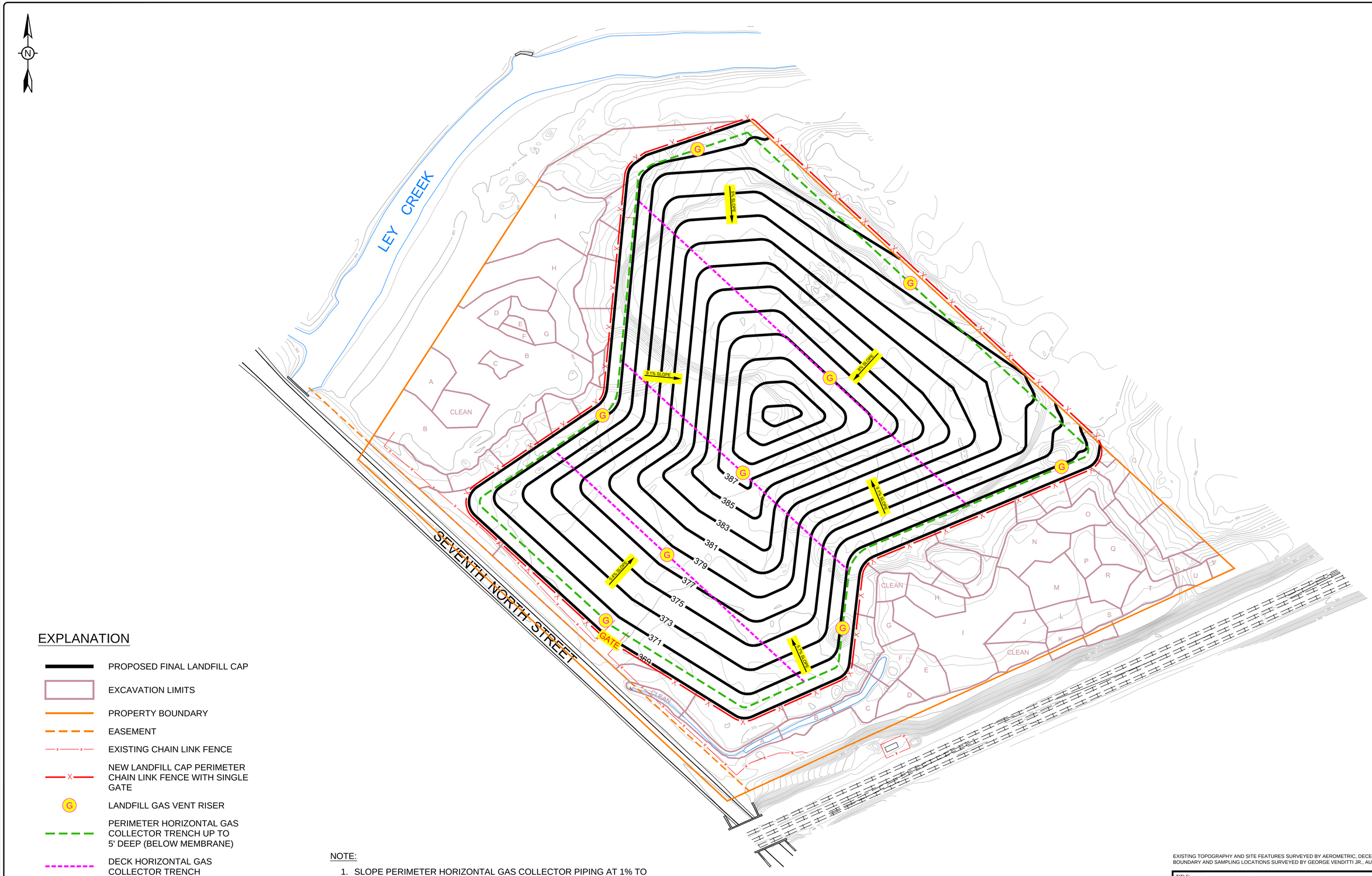
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	12/11/13

SHEET: 7A

S:\SAD\COOPER\SYRACUSE\CLOSURE DESIGN\100% FINAL DESIGN\SHEET 7A - WETLAND B TEST PIT EXCAVATIONS.DWG



EXPLANATION

- PROPOSED FINAL LANDFILL CAP
- EXCAVATION LIMITS
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- NEW LANDFILL CAP PERIMETER CHAIN LINK FENCE WITH SINGLE GATE
- G — LANDFILL GAS VENT RISER
- PERIMETER HORIZONTAL GAS COLLECTOR TRENCH UP TO 5' DEEP (BELOW MEMBRANE)
- DECK HORIZONTAL GAS COLLECTOR TRENCH

NOTE:

1. SLOPE PERIMETER HORIZONTAL GAS COLLECTOR PIPING AT 1% TO VENTS (LOW POINT) FROM MIDPOINT BETWEEN PERIMETER HORIZONTAL GAS COLLECTOR PIPING VENTS (HIGH POINT).

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

0 70 140 210

SCALE IN FEET

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
NORTH LANDFILL FINAL SURFACE PLAN

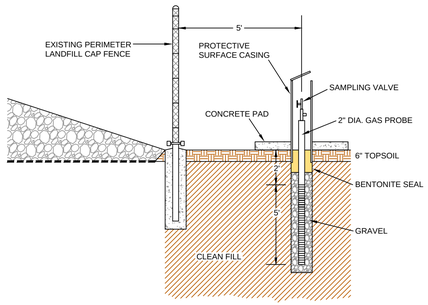
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

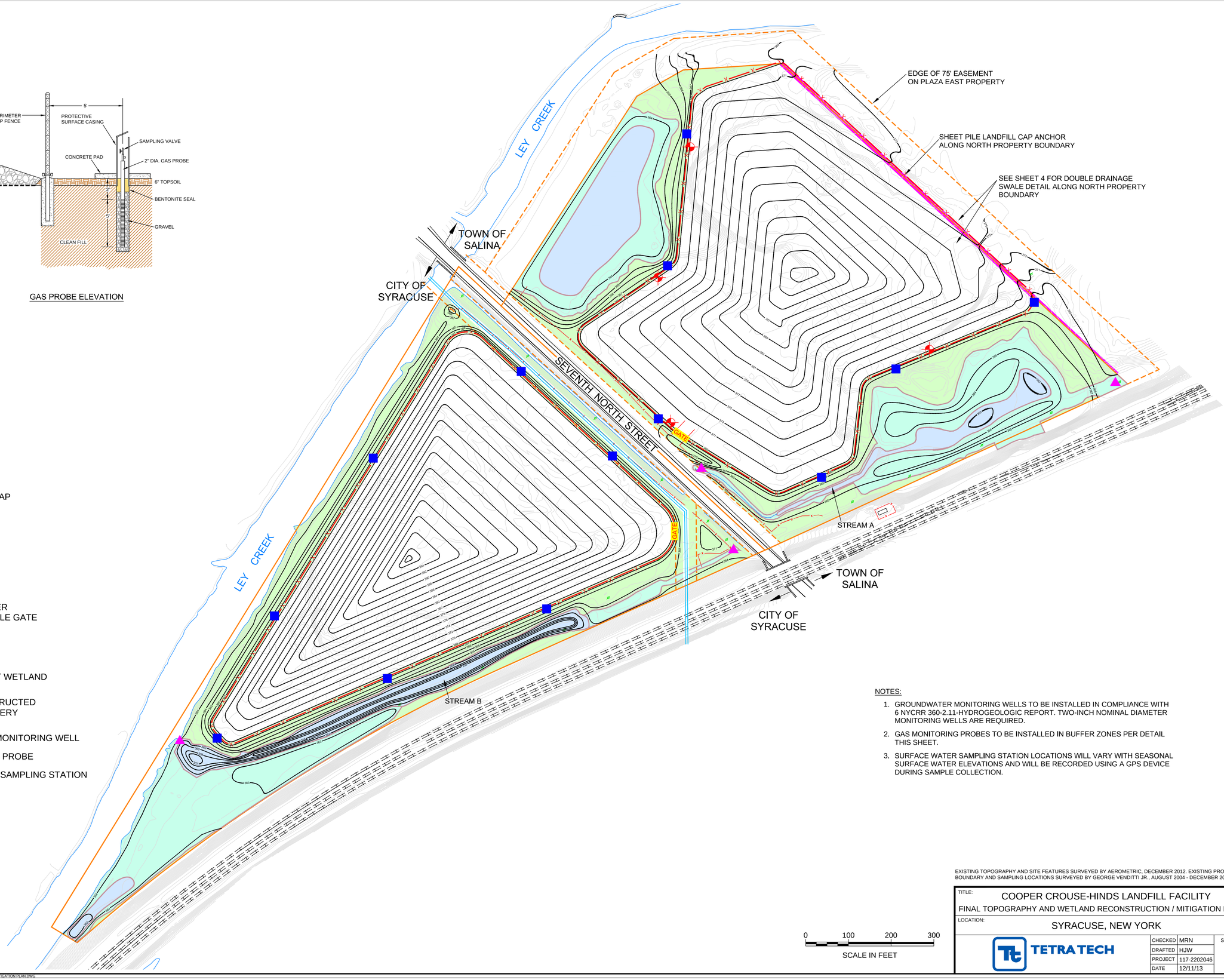
CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	12/11/13

SHEET: 11

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\100% FINAL DESIGN\SHEET 11 - NORTH LANDFILL FINAL SURFACE PLAN.DWG



GAS PROBE ELEVATION



EXPLANATION

- PROPOSED FINAL LANDFILL CAP
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- NEW LANDFILL CAP PERIMETER CHAIN LINK FENCE WITH SINGLE GATE
- BUFFER ZONE
- RECONSTRUCTED EMERGENT WETLAND
- OPEN WATER WITH RECONSTRUCTED EMERGENT WETLAND PERIPHERY
- PROPOSED GROUNDWATER MONITORING WELL
- PROPOSED GAS MONITORING PROBE
- PROPOSED SURFACE WATER SAMPLING STATION

NOTES:

1. GROUNDWATER MONITORING WELLS TO BE INSTALLED IN COMPLIANCE WITH 6 NYCRR 360-2.11-HYDROGEOLOGIC REPORT. TWO-INCH NOMINAL DIAMETER MONITORING WELLS ARE REQUIRED.
2. GAS MONITORING PROBES TO BE INSTALLED IN BUFFER ZONES PER DETAIL THIS SHEET.
3. SURFACE WATER SAMPLING STATION LOCATIONS WILL VARY WITH SEASONAL SURFACE WATER ELEVATIONS AND WILL BE RECORDED USING A GPS DEVICE DURING SAMPLE COLLECTION.

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

0 100 200 300

SCALE IN FEET

TITLE:
COOPER CROUSE-HINDS LANDFILL FACILITY
FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION / MITIGATION PLAN

LOCATION:
SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	12/11/13

SHEET: 13

S:\CAD\COOPERSYRACUSE\CLOSURE DESIGN\100% FINAL DESIGN\SHEET 13 - FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION-MITIGATION PLAN.DWG

APPENDIX F

INSPECTION FORMS

Construction Storm Water Inspection Report

Project Name and Location: Landfill Cap Construction, Cooper Crouse-Hinds, LLC Facility, South Landfill, Seventh North Street, City of Syracuse, Onondaga County, New York

Permit: SPDES General Permit GP-0-10-001

Date of this report:_____ Time of Entry _____ Time of Exit _____

Weather Conditions: _____

On-Site Representative: _____

Inspector Name: _____

Yes	No	N/A	
			Copy of NOI posted for public viewing
			Up-to-date and signed SWPPP on site
			Copy of SPDES General Permit on site
			Litter containers on site and maintained
			Access driveways in good condition
			50'/30' Buffer Zone vegetated and free of grubbed area soil and sediment
			Silt fence complete, vertical, and in good condition
			Local storm water convergence points contained using silt fence, straw bale dikes, and chipped mulch
			Any need for collected soil or sediment relocation?
			Any pooled water on site?
			Any need for additional silt fence?
			Any need for additional straw bale dike?
			Any need for additional wet swale for local storm water detention?
			Wetland C in good condition?
			Stream B in good condition

			Drain along Seventh North Street in good condition?
			East zone along RR right-of-way in good condition?
			Ley Creek east bank in good condition?

Notes on inspection:

_____
_____
_____
_____
_____
_____
_____
_____
_____

Number of photographs taken: _____

Contractor contact information for remedies/repairs as required by this inspection:

Name: _____

Address:

_____
_____

Telephone: _____

Email: _____

CC this report to:

Tom.Bonk@cooperindustries.com

Nelson.Olavarria@cooperindustries.com

Mike.Noel@tetratech.com

Construction Storm Water Inspection Report

Project Name and Location: Landfill Cap Construction, Cooper Crouse-Hinds, LLC Facility, North Landfill, Seventh North Street, Town of Salina, Onondaga County, New York

Permit: SPDES General Permit GP-0-10-001

Date of this report:_____ Time of Entry _____ Time of Exit _____

Weather Conditions: _____

On-Site Representative: _____

Inspector Name: _____

Yes	No	N/A	
			Copy of NOI posted for public viewing
			Up-to-date and signed SWPPP on site
			Copy of SPDES General Permit on site
			Litter containers on site and maintained
			Access driveways in good condition
			30' Buffer Zone vegetated and free of grubbed area soil and sediment
			Silt fence complete, vertical, and in good condition
			Local storm water convergence points contained using silt fence, straw bale dikes, and chipped mulch
			Any need for collected soil or sediment relocation?
			Any pooled water on site?
			Any need for additional silt fence?
			Any need for additional straw bale dike?
			Any need for additional wet swale for local storm water detention?
			Wetland A in good condition?
			Stream A in good condition

			Wetland B in good condition?
			East zone along RR right-of-way in good condition?

Notes on inspection:

_____
_____
_____
_____
_____
_____
_____
_____
_____

Number of photographs taken: _____

Contractor contact information for remedies/repairs as required by this inspection:

Name: _____

Address:

_____
_____

Telephone: _____

Email: _____

CC this report to:

Tom.Bonk@cooperindustries.com

Nelson.Olavarria@cooperindustries.com

Mike.Noel@tetratech.com

SIGNED ENVIRONMENTAL EASEMENTS

Lisa Dell, County Clerk
401 Montgomery Street
Room 200
Syracuse, NY 13202
(315) 435-2226

Onondaga County Clerk Recording Cover Sheet

Received From :
SALINA-ROSE

Return To :
NYS DEPT OF ENVIRONMENTAL CONSERVATION
6252 BROADWAY
ALBANY, NY 12233

Method Returned : MAIL

First PARTY 1
COOPER CROSE-HINDS LLC

First PARTY 2
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Index Type : Land Records
Instr Number : 2018-00004920
Book : **Page :**

Type of Instrument : Easement
Type of Transaction : Ease, R-Way
Recording Fee: $110.50
Recording Pages : 13

The Property affected by this instrument is situated in Syracuse, in the County of Onondaga, New York

Real Estate Transfer Tax

RETT # :	7250
Deed Amount :	$0.00
RETT Amount :	$0.00
Total Fees :	$110.50

State of New York
County of Onondaga

I hereby certify that the within and foregoing was recorded in the Clerk's office for Onondaga County, New York

On (Recorded Date) : 01/31/2018
At (Recorded Time) : 3:56:48 PM

Doc ID - 0263617100013

Lisa Dell, County Clerk

This sheet constitutes the Clerks endorsement required by Section 319 of Real Property Law of the State of New York

Entered By: BCASIMIRO Printed On : 01/31/2018 At : 3:57:37PM

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 11th day of January, 2018, between Owner(s) Cooper Crouse-Hinds, LLC, having an office at 1201 Wolf Street, Syracuse, NY 13208, County of Onondaga, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 635 Seventh North Street in the City of Syracuse, County of Onondaga and State of New York, known and designated on the tax map of the County Clerk of Onondaga as tax map parcel number: Section 01.01 Block 01 Lot 03, being the same as that property conveyed to Grantor by deed dated August 24, 2016 and recorded in the Onondaga County Clerk's Office in Liber and Page 5395/0761. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 19.07 +/- acres, and is hereinafter more fully described in the Land Title Survey dated March 30, 2016 prepared by Michael P. Merithew of Thew Associates Land Surveyors, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, Grantor, is the owner of real property located at the address of 7th North Street in the Town of Salina, County of Onondaga and State of New York, known and designated on the tax map of the County Clerk of Onondaga as tax map parcel numbers: Section 073 Block

01 Lots 08.1, 08.3 and 08.4, being the same as that property conveyed to Grantor by deeds dated August 24, 2016 and recorded in the Onondaga County Clerk's Office in Liber and Page 5395/0753, 5395/0749 and 5395/0757, respectively. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 21.02 +/- acres, and is hereinafter more fully described in the Land Title Survey dated March 30, 2016 prepared by Michael P. Merithew of Thew Associates, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule B; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Order on Consent Index Number: R7-0666-05-11, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may only be used for:

Industrial uses as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Onondaga County Department of Health to render it safe for use as drinking water or for industrial purposes, and

the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential, Restricted Residential or Commercial purposes as defined in 6NYCRR 375-1.8(g)(i), (ii) and (iii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the

property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: 734004
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section

Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Cooper Crouse-Hinds, LLC:

By: _____

Print Name: Lizbeth L. Wright

Title: Vice President and Secretary Date: 12/12/2017

Grantor's Acknowledgment

STATE OF OHIO)
) ss:
COUNTY OF CUYAHOGA)

On the 12th day of December, in the year 2017, before me, the undersigned, personally appeared Lizbeth L. Wright, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of Ohio

ONDREA SAFFO
NOTARY PUBLIC • STATE OF OHIO
Recorded in Cuyahoga County
My commission expires Sept. 22, 2021

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
~~Robert W. Schick, Director~~ Michael Ryan, Asst. Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 11th day of January, in the year 2018, before me, the undersigned, personally appeared Michael Ryan, Asst. Director, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

Environmental Easement
To Be Acquired By
New York State Department of Environmental Conservation
From
Crouse-Hinds Company

Surveyor's Description
Contains: 19.07 Acres

All that tract or parcel of land situate in the City of Syracuse, County of Onondaga, State of New York, being part of Salt Marsh Lots 2, 4, 6, 8, and Reclaimed Lot 47, and being more precisely described as follows:

Beginning at the intersection of the apparent centerline of 7th North Street (66-foot width) with the northwesterly line of a parcel of land conveyed by Consolidated Rail Corporation to New York Central Lines, LLC by deed dated June 1, 1999 and recorded in the Onondaga County Clerk's Office on November 15, 1999 in Liber 4370 of Deeds at Page 92, said point also being on the division line between the Town of Salina and the City of Syracuse;

thence along the northerly line of New York Central Lines, LLC, the following two courses and distances:

1. South 65 degrees 53 minutes 20 seconds West a distance of 667.73 to a point;

2. along a curve deflecting to the left, having a central angle of 17 degrees 28 minutes 49 seconds and a radius of 3,918.83 feet, an arc length of 1,195.59 feet (chord: S 57°08'55" W, 1,190.96 feet) to a point on the northeasterly line of of a parcel of land conveyed by George P. Baker, Richard C. Bond, Jervis Langdon, Jr., and Willard Wirtz, Trustees of the Property of Penn Central Transportation Company to the County of Onondaga by deed dated May 11, 1971 and recorded in the Onondaga County Clerk's Office on March 7, 1972 in Liber 2471 of Deeds at Page 431.

thence North 58 degrees 31 minutes 35 seconds West, along the northeasterly line of the County of Onondaga, a distance of 70.39 feet to a point on the northerly line of the Marsh Lots;

thence North 31 degrees 39 minutes 25 seconds East, along the northerly line of the marsh lots, a distance of 1,815.87 feet to a point in the apparent centerline of 7th North Street;

thence South 47 degrees 12 minutes 50 seconds East, along the apparent centerline of 7th North Street, a distance of 976.95 feet to the **Point of Beginning**.

To contain 19.07 acres of land, more or less.

The above-described parcel is intended to be a portion of the same premises conveyed by Mulfi Realty Corporation to Crouse-Hinds Company by deed dated September 15, 1948 and recorded

in the Onondaga County Clerk's Office on September 17, 1948 in Liber 1350 of Deeds at Page 623.

The above mentioned bearings and distances were taken from a map titled "Boundary Survey for a Portion of Lands of Crouse Hinds Showing Monitor Well Locations, Part of Lot 27 Town of Salina, Salt Marsh Lots 2, 4, 6, 8, & Reclaimed Lot 47, City of Syracuse, Onondaga County, State of New York", dated January 5, 2004 and last revised November 2, 2012, prepared by George Venditti Jr. NYS Licensed Land Surveyor No. 049447, and is distinguished as Project No. 88-012-04.

SCHEDULE "B" PROPERTY DESCRIPTION

Environmental Easement
To Be Acquired By
New York State Department of Environmental Conservation
From
Cooper Crouse Hinds, LLC

Surveyor's Description
Contains: 21.02 Acres

All that tract or parcel of land situate in the Town of Salina, County of Onondaga, State of New York, being part of Military Lot No. 27, and being more precisely described as follows:

Beginning at the intersection of the apparent centerline of 7th North Street (66-foot width) with the northwesterly line of a parcel of land conveyed by Consolidated Rail Corporation to New York Central Lines, LLC by deed dated June 1, 1999 and recorded in the Onondaga County Clerk's Office on November 15, 1999 in Liber 4370 of Deeds at Page 92, said point also being on the division line between the Town of Salina and the City of Syracuse;

thence North 47 degrees 12 minutes 50 seconds West, along the apparent centerline of 7th North Street and along the division line between the Town of Salina and the City of Syracuse, a distance of 841.32 feet to a point on the southerly line of a parcel of land conveyed by East Plaza, Inc to East Plaza, LLC by deed dated January 15, 1999 and recorded in the Onondaga County Clerk's Office on August 20, 1999 in Liber 4347 at Page 74;

thence along the southerly line of Plaza East, LLC, the following four courses and distances:

1. North 32 degrees 54 minutes 10 seconds East a distance of 584.60 feet to a concrete monument (possibly obliterated);

2. North 60 degrees 27 minutes 45 seconds East a distance of 125.00 feet to a found concrete monument;

3. North 86 degrees 16 minutes 10 seconds East a distance of 230.00 feet to a concrete monument (possibly buried);

4. South 47 degrees 12 minutes 50 seconds East a distance of 1,104.01 to a point on the northerly line of New York Central Lines, LLC, said course passing over a concrete monument (possibly obliterated) at a distance of 1,004.65 feet;

thence South 65 degrees 22 minutes 30 seconds West, along the northerly line of New York Central Lines, LLC, a distance of 933.52 feet to the **Point of Beginning**.

To contain 21.02 acres of land, more or less.

The above-described parcel is intended to be a portion of the same premises conveyed by Cooper Industries, Inc. to Cooper Crouse Hinds, LLC by deed dated September 1, 2004 and recorded in the Onondaga County Clerk's Office on January 26, 2005 in Liber 4870 of Deeds at Page 226.

The above mentioned bearings and distances were taken from a map titled "Boundary Survey for a Portion of Lands of Crouse Hinds Showing Monitor Well Locations, Part of Lot 27 Town of Salina, Salt Marsh Lots 2, 4, 6, 8, & Reclaimed Lot 47, City of Syracuse, Onondaga County, State of New York", dated January 5, 2004 and last revised November 2, 2012, prepared by George Venditti Jr. NYS Licensed Land Surveyor No. 049447, and is distinguished as Project No. 88-012-04.

Lisa Dell, County Clerk
401 Montgomery Street
Room 200
Syracuse, NY 13202
(315) 435-2229

Onondaga County Clerk Recording Cover Sheet

Received From :
SALINA-ROSE

Return To :
NYSDEC
625 BROADWAY
ALBANY, NY 12233

Method Returned : MAIL

First PARTY 1
PLAZA EAST LLC

First PARTY 2
COMMISSIONER OF THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Index Type : Land Records
Instr Number : 2018-00013883
Book : **Page :**

Type of Instrument : Easement
Type of Transaction : Ease, R-Way
Recording Fee: $100.50

Recording Pages : 11

Real Estate Transfer Tax	
RETT # :	8977
Deed Amount :	$0.00
RETT Amount :	$0.00
Total Fees :	$100.50

Doc ID - 0280788600011

State of New York

County of Onondaga

I hereby certify that the within and foregoing was recorded in the Clerk's office for Onondaga County, New York

On (Recorded Date) : 03/28/2018

At (Recorded Time) : 11:39:21 AM

Lisa Dell, County Clerk

This sheet constitutes the Clerks endorsement required by Section 319 of Real Property Law of the State of New York

Entered By: BCASIMIRO Printed On : 03/28/2018 At : 11:40:12AM

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 20th day of March, 2018, between Owner(s) Plaza East, LLC, having an office at P.O. Box 156, East Syracuse, NY 13057, County of Onondaga, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of Brewerton Road in the City of Syracuse, County of Onondaga and State of New York, known and designated on the tax map of the County Clerk of Onondaga as tax map parcel number: Section 073 Block 01 Lot 10.1, being the same as that property conveyed to Grantor by deed dated January 15, 1999 and recorded in the Onondaga County Clerk's Office in Liber and Page 4347/74. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.104 +/- acres, and is hereinafter more fully described in the Land Title Survey dated July 6, 2017 prepared by Robert H. Korosec, L.L.S. of Thew Associates Land Surveyors, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is

extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Order on Consent Index Number: R7-0666-05-11, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may only be used for:

Industrial uses as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Onondaga County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential, Restricted Residential or Commercial purposes as defined in 6NYCRR 375-1.8(g)(i), (ii) and (iii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation

Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against

the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: 734004
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the

recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Plaza East, LLC:

By: _____

Print Name: Joseph Basile, Jr.

Title: Member Date: 2/23/18

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF)

On the 23rd day of February, in the year 2018, before me, the undersigned, personally appeared Joseph Basile Jr., personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

Robert F. Baldwin. Jr.
Notary Public, State of New York
Qualified in Onondaga Co. No. 02BA4815221
My Commission Expires December 31, 20[illegible]

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Michael J. Ryan, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 20th day of March, in the year 2018, before me, the undersigned, personally appeared Michael J. Ryan, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

Environmental Easement
To Be Acquired By
New York State Department of Environmental Conservation
From
Plaza East, LLC

Surveyor's Description
Contains: 1.104 Acres

All that tract or parcel of land situate in the Town of Salina, County of Onondaga, State of New York, being part of Military Lot No. 27, and being more precisely described as follows:

Beginning at the intersection of the northerly line of a parcel of land conveyed by Consolidated Rail Corporation to New York Central Lines, LLC by deed dated June 1, 1999 and recorded in the Onondaga County Clerk's Office on November 15, 1999 in Liber 4370 of Deeds at Page 92 with the easterly line of a parcel of land conveyed by Cooper Crouse-Hinds LLC, successor to Cooper Crouse Hinds, Inc. successor to and assignee of Cooper Industries, Inc., successor by merger to Crouse-Hinds Company to Cooper Crouse-Hinds LLC by deed dated August 24, 2016 and recorded in the Onondaga County Clerk's Office on October 14, 2016 in Liber 5395 of Deeds at Page 753 (Instrument No. 36548), said point having New York State plane coordinates (NAD83/2011 - Central Zone) of 1,124,455.0 feet North and 934,213.8 feet East;

thence along the easterly and northerly lines of Cooper Crouse-Hinds LLC, the following two courses and distances:

1. North 47 degrees 12 minutes 50 seconds West a distance of 1,104.01 to the reputed location of a concrete monument, said course passing over the reputed location of a concrete monument at a distance of 99.36 feet;
2. South 86 degrees 16 minutes 10 seconds West a distance of 31.14 feet to a point;

thence through a parcel of land conveyed by East Plaza, Inc. to East Plaza, LLC by deed dated January 15, 1999 and recorded in the Onondaga County Clerk's Office on August 20, 1999 in Liber 4347 at Page 74 the following four courses and distances:

1. North 14 degrees 52 minutes 07 seconds West a distance of 60.00 feet to a point;
2. North 75 degrees 07 minutes 53 seconds East a distance of 60.00 feet to a point;
3. South 14 degrees 52 minutes 07 seconds East a distance of 37.75 feet to a point;

4. South 47 degrees 12 minutes 50 seconds East a distance of 1,128.78 feet to a point on the northerly line of New York Central Lines, LLC;

thence South 65 degrees 22 minutes 30 seconds West, along the northerly line of New York Central Lines, LLC, a distance of 43.32 feet to the **Point of Beginning**.

To contain 1.104 acres of land, more or less.

The above-described parcel is intended to be a portion of the same premises conveyed by East Plaza, Inc. to East Plaza, LLC by deed dated January 15, 1999 and recorded in the Onondaga County Clerk's Office on August 20, 1999 in Liber 4347 at Page 74.

The above-mentioned coordinates, bearings, and distances are referenced to the North American Datum of 1983, 2011 adjustment (NAD83/2011), projected on the New York State Plane Coordinate System (Central Zone).