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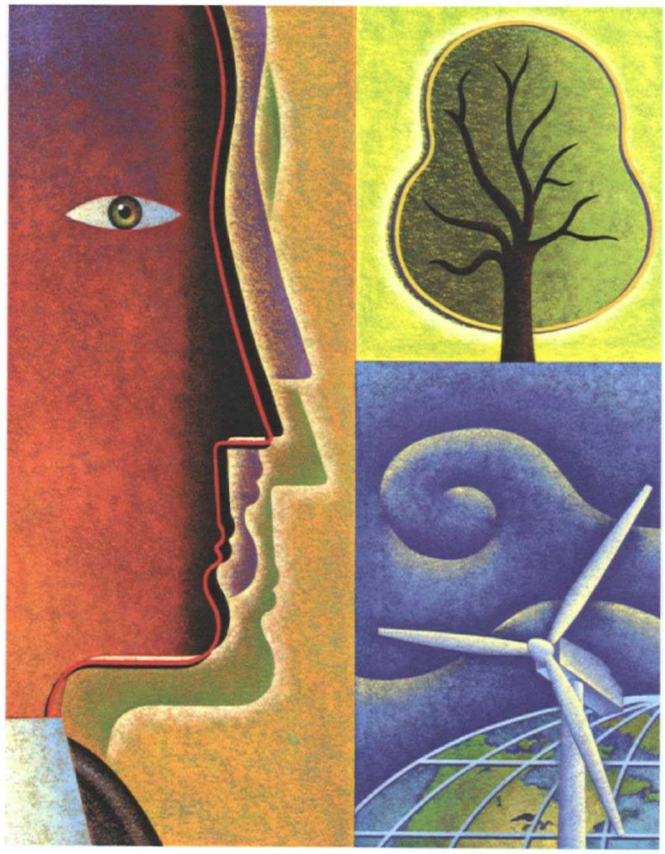
Remedial Investigation Workplan (RIW)
MW-19/Hot Spot 1 Area of Concern (AOC)

USEPA ID NJD002168748

L.E. Carpenter & Company
170 Main Street
Borough of Wharton, Morris County, NJ

November 2008



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Section 1
Introduction

1.1 Objective and Scope

RMT, Inc. (RMT) has prepared this Remedial Investigation Workplan (RIW), on behalf of L.E. Carpenter & Company (LEC), to comply with the corrective action requirements outlined in the New Jersey Department of Environmental Protection (NJDEP) Notice of Deficiency (NOD) letter dated October 16, 2008, received by LEC on October 20, 2008 (Appendix A).

This RIW proposes further investigation in the MW-19/Hot Spot 1 (MW19HS1) Area of Concern (AOC) located at the northwest corner of the LEC property to delineate both laterally and vertically the nature and extent of residual source material contributing contaminant mass to the shallow groundwater aquifer causing exceedances of applicable New Jersey Groundwater Quality Criteria (NJGWQC). This RIW incorporates the suggested workplan elements outlined in both the NJDEP Technical Requirements for Site Remediation N.J.A.C. 7:26E-4.2 [Remedial Investigation Workplan], and Chapter 2 of the United States Environmental Protection Agency (USEPA) document *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA/540/G-89/004, OSWER Directive 9355.3-01, October 1988). This report is certified in accordance with requirements outlined in N.J.A.C 7:26E-1.5 (Appendix B).

1.2 Project Management

A tabulated summary of the roles and responsibilities of the various RIW project team members is presented in Table 1.

Section 2
Site Background and Physical Setting

2.1 Site Location

The LEC property ("Site") is located at 170 North Main St., Borough of Wharton, Morris County, New Jersey (Figure 1). The Site comprises Block 301, Lot 1 and Block 703, Lot 30 on the tax map of the Borough of Wharton, and occupies 14.6 acres in a mixed-use industrial, commercial and residential area. The Site is bordered to the south by the Rockaway River; by a vacant lot (Wharton Enterprises) to the east-southeast; and by a former compressed gas facility (Air Products) to the northeast. A residential area borders the Site to the northwest (Ross Street) and the Washington Forge Pond borders the Site to the west. A drainage ditch is located between the Air Products property and the Site. A pedestrian foot trail (rails-to-trails area), constructed along the former railroad right-of-way, bisects the Site from north to south. During active LEC operations, the Site consisted of several buildings and structures, some of which were demolished during the early 1990's as part of site decommissioning activities. Buildings 8, 9, 15, 16 and 17, located to the west of the rails-to-trails area, remain.

Figure 2 is an existing conditions map that depicts overall Site layout including individual buildings present at the Site, property boundary, monitoring well network, the rails-to-trails area, wetland boundaries, excavated areas [2005 source reduction], surface water bodies, and other pertinent Site features. The MW19HS1 AOC is located on the northwest side of the LEC site, at the intersection of N. Main Street and Ross Street.

2.2 Site Operational History

As outlined below, historical site operations have been subdivided into two categories (1) mining and forging, and (2) vinyl manufacturing.

2.2.1 Mining and Forging Operations

Morris County and the Wharton area has been an iron mining district since the early 1700's. The earliest known use of the Site was as an iron forge, termed the "Washington Forge." The Washington Forge was built in about 1795 and probably used iron ore from deposits in and around the Wharton area. Economically viable iron deposits were discovered at the Site, subsequently site operations changed from forging to underground iron mining. According to a New Jersey Department of Labor publication (NJDOL, 1989), the Washington Forge Mine and West Mount Pleasant Mine are located "in the LEC lot." The NJDOL report states that the Washington Forge Mine opened in

1868 with the construction of two inclined shafts 20 feet apart on the grounds of the old forge.

The mine was worked until 1875 when it was closed because of the difficulty in handling groundwater seepage into the mine (Bayley, 1910). The mine reportedly opened again in 1879 after a drainage tunnel to the Orchard mine was completed. The Orchard mine was located south across the Rockaway River from the LEC site. The Washington Forge mine was permanently abandoned in 1881. The West Mt. Pleasant Mine connects with the Washington Forge Mine with an inclined access shaft located about 170 feet northeast of the southern-most Washington Forge mineshaft. The iron forge and mining history above shows that transportation of iron ores from various locations in Morris County onto the LEC property occurred over a period of at least 86 years (1795–1881). Much of the fill materials found on-site was derived from these iron mining operations.

2.2.2 Vinyl Manufacturing

The LEC facility was involved in the production of vinyl wall coverings from 1943 to 1987. The making of vinyl wall coverings involves several manufacturing processes that were carried out in the various buildings comprising the Site. The first step in the process is referred to as lamination. Lamination involves the bonding of fabric to the vinyl film using a plastisol adhesive in conjunction with heat and pressure. The fabric/film laminate is then coated with a plastisol compound in order to texturize the material in preparation for printing. The printing process involves the application of decorative print patterns and/or protective topcoat finishes. When printing is completed, the product is inspected and packaged for shipment to the consumer.

The manufacturing process involved the generation of liquid waste solvents including xylene and methyl ethyl ketone, waste pigments, and the generation of condensate from fume condensers. Additionally, airborne particulate matter was collected via a dust collector. Non-contact cooling water was discharged into the Rockaway River under a New Jersey Pollution Discharge Elimination System Permit. From 1963 until 1970 LEC disposed of its wastes, including a polyvinyl chloride (PVC) waste material into an unlined on-site impoundment. The facility was originally heated by coal, and later converted to #6 fuel oil.

Former vinyl manufacturing operations west of the rails-to-trails area including raw material storage, drum storage and printing occurred in Building 9 [adjacent to the MW19HS1 AOC]. The lamination process was performed in Building 8 located directly to the east of Building 9.

Active manufacturing, of vinyl wall coverings, ceased in 1987. Since that time the portion of the Site east of the pedestrian trail (former railroad crossing) has been inactive except for remedial, investigative, and monitoring activities. Access is currently restricted to the area east of the pedestrian trail by a locked gate and an 8-foot high chain-link fence. Some of the buildings west of the pedestrian trail have been subleased as warehouse space, and for small manufacturing operations.

2.3 Soils and Topography

The Pre (2005) and Post (2005) source removal site topography are depicted on Figures 3 and 4, respectively. As previously mentioned in Section 2.1, Figure 2 is an existing Site conditions map, showing all existing groundwater monitoring wells, surface water staff gauges, ground topography, and other Site features. In general, the LEC property is flat to gently sloping. The LEC property is topographically split by the former railroad track bed, currently a recreational trail. Surface drainage on the northwestern side of the trail is to the northeast into the low area around the MW-18 well cluster. Surface drainage on the southeastern side of the recreational trail is predominantly eastwards towards the drainage ditch, but is southwards towards the Rockaway River on the 60-100 foot wide strip along the river.

The distribution of surficial soils at and surrounding the Site is shown on Figure 5. Note that a transition into finer-grained soils (Whitman very stony loam) occurs directly east of the former LEC Building 14 and RR spur and can be seen on the section of the USDA soils map reproduced on Figure 5. A detailed summary of soil types found at the LEC facility and their characteristics can be found in Section 2.3 of the Remedial Action Workplan (RAWP) (RMT, April 2004).

2.4 Site Geology

The regional and local geology is detailed in the 2004 RAWP, the March 28, 2003 Abandoned Mines Evaluation report, and in the Roy F. Weston September 1992 *Final Supplemental Remedial Investigation Addendum*. This section summarizes geologic information from those reports, as well as from other available sources.

The LEC site is located in the Dover Quadrangle, within the Highlands Physiographic province. Bedrock in this area consists mainly of Precambrian age metamorphic and igneous rocks arranged in northeastward trending ridges separated by valleys that range between 200-300 feet below the ridge crests. These rocks have been mapped by Sims, Davidson, and Koch (1949), and a portion of their map in the immediate vicinity of the LEC site is reproduced on Figure 5.

The bedrock formations host extensive magnetite deposits that comprise one of the oldest mining regions in the United States (the Dover mining district). The iron ore deposits are denoted on Figure 5 as northeast-trending solid and dashed red lines. These lines represent the

strike of the somewhat tabular lathe-shaped ore bodies, or the interception of the ore bodies with the earth's surface. The ore bodies, along with their host rocks, dip approximately 40+ degrees southeast.

The bedrock deposits are covered by variable thicknesses of unconsolidated soils from glacial (deposited directly by former ice sheets) and alluvial (deposited by glacial melt-waters and post-glacial streams) processes. These deposits have been mapped by Stanford (1989) on the scale of the Wharton 7.5-minute quadrangle (1-inch = 2,000 feet) and part of that map is reproduced herein on Figure 5.

Regionally, Wharton is located near the southernmost extent of the most recent Wisconsinan glaciation event, within a terminal moraine (see inset on Figure 5 labeled "Maximum Extent of Wisconsinan Glaciation"). A terminal moraine is composed of glacial till (a heterogeneous mixture of clay, silt, sand, and gravel) deposited directly from glacial ice at the terminus of the glacier, or various proportions of till and stratified drift. Stratified drift included in terminal moraines would be deposited in ephemeral ponds and puddles between glacier and moraine or within small basins within the moraine itself, and as fans and stream channel fillings mainly on the distal slope of the moraine.

Following the retreat of the Wisconsinan ice-sheet, the ancestral Rockaway River formed as glacial melt-waters drained away from glacial lakes, as shown on the inset in Figure 5. The terminal moraine till deposits shown on the surficial geology map on Figure 5 are colored in bright green (symbol Qlwtm); these deposits are closely associated with the lodgment (basal glacial) till colored in the lighter green color (symbol Qlwt). Two other deposit types mapped on the regional surficial geologic map that are relevant to the LEC site are Rockaway River outwash gravels and more recent post-glacial alluvium consisting of silt and fine sand with minor clay and pebble to cobble gravel.

The processes described above are responsible for the naturally occurring deposits found at the LEC site. Near-surface soils at the LEC site range from artificial fill covering Rockaway River outwash sand and gravel on approximately the western half of the Site, and deposits that appear to range from finer-grained post-glacial alluvium and/or till along the eastern half of the area.

2.5 Site Hydrogeology

The hydrogeologic conditions of the Site have been presented in the 1990 *Report of Revised Investigation Findings, L.E. Carpenter & Company*, by GeoEngineering, Inc., and in the 1992 Weston report entitled *Final Supplemental Remedial Investigation Addendum for L.E. Carpenter and Company*.

In the western portion of the Site, the upper stratum is composed largely of sand and gravel outwash, overlain by a thin layer of fill. In the eastern portion of the Site, this outwash unit is overlain by relatively low-permeability silt and clay that occurs within the upper 5 to 10 feet, based on the 1992 Weston *Supplemental Remedial Investigation* Report. Presumably these finer-grained deposits mostly represent alluvium from the Rockaway River, although some may also be a result of post-depositional melting of outwash-entrained blocks of glacial ice. However, borings installed to construct the Enhanced Fluid Recovery (EFR) well network in 1997, and exploratory test pitting performed in December 2001 to further investigate the source area east of the rails to trails path identified a significant amount of sand and gravel in the upper alluvial unit at a number of locations within the free product zone that were previously identified as being silt alluvium. In addition, it now appears that the upper alluvial unit is thinner than previously thought, is quite variable laterally, and includes areas of silty sand as well as silt and clay. The upper alluvial unit of silt, sand, and clay overlies deeper permeable units (up to 170 feet total in thickness) composed of stratified drift of sand and gravel deposits originating from glacial-melt outwash.

The shallow sediments that occur just beneath the surface on the western portion of the Site have a hydraulic conductivity of approximately 37 feet/day (Weston, 1992a). The hydraulic conductivity of the upper stratum of silt and clay alluvium that occurs in the eastern portion of the Site has not been measured, but is likely on the order of 1 foot/day or less, based on geologic log descriptions. The horizontal hydraulic gradient varies across the Site, but it averages approximately 0.0016 ft/ft, based on examination of equipotential maps from GeoEngineering (1990), Weston (1992a), and RMT (2003). Assuming a typical effective porosity of 0.3 (Freeze and Cherry, 1979), the horizontal groundwater seepage velocity is approximately 73 ft/year in the shallow portion of the outwash sand.

Shallow groundwater flow is substantially affected by adjacent surface water bodies. Shallow groundwater flow direction in the shallow aquifer east of the recreational trail (the former rail spur) is generally toward the east. Washington Forge Pond acts as a constant head boundary that provides the driving head for both shallow and deep groundwater flow. As a result, areas of the Site exhibit upward vertical gradients, while the drainage ditch acts as a discharge zone, as does the downstream portion of the Rockaway River. The portion of the Rockaway River south of and immediately adjacent to the Site is often a losing reach, particularly in drought periods when the groundwater levels beneath the Site are depressed a few feet and a gradient from the river into the Site occurs. As one moves downstream the River oscillates between losing and gaining and the flow regime is often difficult to define.

Shallow groundwater flow is also affected by the presence of the drainage ditch. The drainage ditch acts as a local groundwater "sink," and shallow groundwater flow from a large portion of the Site is controlled by the drainage ditch.

The regional groundwater "sink" for this area is the Rockaway River, and it is this feature that causes the strong upward vertical gradients observed for all of the on-site well clusters. Historical water level data for the Site confirms the predominant upward vertical gradients across the Site.

Historically, shallow groundwater at the southern edge of the Site often appears to be recharged directly by the Rockaway River and flows towards the Site before turning eastward toward the drainage ditch and the narrow Wharton Enterprise property, between the former Air Products property and the Rockaway River. At other times, flow at the southern edge of the Site appears to head east-northeast parallel to the Rockaway River. Shallow groundwater on the Air Products property flows southeast, south, and southwest towards the drainage ditch.

Site-wide shallow groundwater contours and associated flow pattern for 3rd Quarter 2008 (3Q08) are shown on Figure 6. The contours were prepared by utilizing the surveyed groundwater elevations from the new Post Remedial Monitoring (PRMP) wells, existing Site wells, and river and ditch surface water elevations collected during the 3Q08 monitoring event conducted in July 2008.

2.6 Wetlands

The locations of "National Wetland Inventory" wetlands near the Site are shown on Figure 7.

2.6.1 Remediation in Wetland Areas

More detailed delineation of wetlands was performed as part of the 2005 source reduction. A portion of the source reduction action included excavation of soil within the wetland areas located along the drainage ditch on the eastern side of the LEC site, and within the off-site Wharton Enterprise property east of the LEC property line. LEC applied for a Freshwater Wetlands/Open Water Fill Permit General Permit No. 4 ~ Hazardous Site Investigation and Cleanup in accordance with N.J.A.C 7:7A-5.4. Delineation of these wetland areas was facilitated via review of historical Letters of Interpretation [LOI] and on-site surveying performed in March 2004 by a wetlands expert [JFNew]. Authorization to proceed with source reduction remedial activities within the wetland and transition areas was provided in the *Authorization for Freshwater Wetlands Statewide General Permit No. 4 (File No. 1439-04-0001.1 FWW 040001)* ("the GP-4 permit") dated February 25, 2005. Information specific to these wetland delineation activities is presented in the *Freshwater Wetlands General Permit 4 Application* (RMT and

JFNew, October 5, 2004), subsequent response to NJDEP DLUR comments on the GP-4 permit application, and the GP-4 permit itself.

2.6.2 Installation of Monitoring Devices in Wetland Areas

Discussions were initiated between RMT and both NJDEP and USEPA during the fourth quarter of 2005 (4Q05) regarding the development and installation of the post source reduction Site monitoring network in accordance with the submitted PRMP. A formal regulatory review and comment letter regarding the PRMP was received by LEC on February 22, 2006. RMT prepared a response to the February 22, 2006 NJDEP comments in Section 1 of the 1Q06 Remedial Action Progress Report (RAPR) dated May 9, 2006. NJDEP approved the 1Q06 RAPR including response to the PRMP comments in their letter dated March 30, 2007.

RMT, on behalf of LEC, began installing the PRMP monitoring well network on June 5, 2006. RMT and LEC submitted the necessary GP-14 permit application to the NJDEP Bureau of Land Use (BLU) on August 14, 2006 requesting authorization to install the remaining five monitoring wells in the wetland area located east of the Site (Wharton Enterprise property). In February 2007, RMT was notified during follow up conversations regarding approval of the GP-14 application that a modification to the existing Stream Encroachment Permit (1439-04-0001.1 FHA040001 SEP) would be required in order to allow the placement of fill material in the 100-year floodplain. This fill material was required because the remaining five monitoring wells needed to be installed through mounds to facilitate screening the shallow water table with a properly constructed well. RMT submitted the requested SEP modification to NJDEP BLU on March 26, 2007. Follow-up conversations with BLU in 2Q07 required that minor modifications to GP-14 Figure 3 be made (*i.e.*, visual depiction of the 50-ft transition zone). A revised Figure 3 was submitted to LURP on July 25, 2007.

On February 29, 2008, RMT received both the GP-14 permit and the Minor Modification to the Stream Encroachment permit. These permits provided BLU authorization to begin construction activities on the installation of the five (5) remaining mounded wetland area PRMP wells. However, the GP-14 permit contained a special condition which prohibited any grading or construction activities within the 100-year floodplain between the dates of March 15 and June 15 due to trout maintenance on the Rockaway River. RMT sent a letter to the NJDEP Bureau of Freshwater Fisheries, dated March 18, 2008, formally requesting a waiver from the requirements of GP-14 Permit Special Condition No. 1- *Prohibition of construction activities between the dates of March 15 and June 15 to protect the trout stocked water of the Rockaway River*. In an email dated March 25, 2008, RMT was granted a waiver for the time restriction period March 15 to June 15 for

well installation, construction and restoration from the NJDEP BLU. RMT installed the five (5) mounded wetland area PRMP wells during the week of April 7, 2008.

2.7 Land Use, Environmentally Sensitive Areas and Sensitive Human Receptors

Figure 8 shows potential environmental and human receptor sensitive areas within an area defined by a 1,000-foot radius from the area of concern boundary. The area of concern is defined as the LEC site, together with the western portion of the Wharton Enterprises area (encompassing the easternmost extent of dissolved-phase groundwater contamination emanating from the Site). Sensitive environmental areas within 1,000 feet of the area of concern include the Rockaway River bordering the Site to the south and wetland areas located along the drainage ditch on the eastern side of the LEC site, within the off-site Wharton Enterprise property east of the LEC property line, and various wetlands located within 1,000 ft to the north and west of the Site. Human receptors within 1,000 feet of the Site include the high density, multiple dwelling residential areas located immediately southwest of the Site, and the single unit, medium density residential area located north of the Site. The nearest public community water supply well is located outside of the 1,000-foot radius area, approximately 3,000 feet to the west (upgradient) from the Site boundary. Additional public community water supply wells are located to the southeast, with the closest being approximately 3,500 feet from the Site boundary.

Section 3
MW19HS1 AOC Background and Evaluations

The 1986 Administrative Consent Order (ACO) defines the Site as Block 301, Lot 1 and Block 703, Lot 30 within the Borough of Wharton. The MW19HS1 AOC is located within Block 301, Lot 1; immediately west of Building 9 in the northwest corner of the Site [Ref. Figure 2]. In accordance with the 1986 ACO, GeoEngineering, Inc. (GEI) and Roy F. Weston (Weston) conducted a site wide Remedial Investigation (RI) beginning in 1989, and based on its complexity, separated the Site into three distinct areas. The MW19HS1 AOC was contained in Area III. The historical Area III figure [Figure 8] contained within the 1990 RI that shows pertinent Site features and sample locations specific to that portion of the Site located west of the rails-to-trails [a railroad right of way in 1990], and more importantly the MW19HS1 AOC, is presented in Appendix C.

This AOC is associated with two former 10,000-gallon underground storage tanks (UST E-3 and UST E-4 and associated piping), which reportedly contained waste methyl ethyl ketone (MEK) and pigments, and MEK respectively. The approximate locations of the former USTs and associated piping are presented on Figure 2.

3.1 Soil and Groundwater Investigation and Remediation ~ 1990 through 2005

In 1989, four (4) test pits (TP-63 to TP-66) were excavated around the two USTs. Soil samples were collected from immediately above the water table (between 7 feet and 9 feet bgs) and analyzed for volatile organic compounds (VOCs), base neutral organics (BNO), and priority pollutant metals. No VOCs were detected above quantification limits and residual concentrations of cadmium were detected in TP-63. However, test pit sample results did identify elevated concentrations of bis (2-ethylhexyl) phthalate (DEHP). Subsequently, DEHP was identified as a primary MW19HS1 area contaminant of concern (COC).

USTs E-3 and E-4 and visually impacted soil surrounding the USTs were removed from the Site in 1991. A detailed account of Site UST removal activities is presented in the *Final Technical Report for Tank Removal Operations* (Roy F. Weston, September 1991). In 1991, after tank removal activities had been completed, Weston installed groundwater monitoring well MW-19 in the area immediately adjacent to the excavation to determine whether groundwater had been impacted by previous operations conducted at the facility. The results of the groundwater sampling activities conducted at that time did not identify the presence of VOCs at concentrations above the method detection limits with the exception of 2-Butanone (MEK).

RI activities and subsequent remedial feasibility evaluations continued at the Site until 1992. Following completion of the Remedial Investigation/Feasibility Study (RI/FS), NJDEP issued a Record of Decision (ROD) for the Site in 1994. As outlined in the 1994 ROD (Page 6), Area III contained soil contamination above cleanup levels (mainly DEHP). As outlined in the ROD, Area III soils were contaminated at concentrations that posed an unacceptable risk to both human health and the environment, and as such remediation was required. As outlined in chosen ROD alternative No. 4, "Hot Spot" soil excavation was the chosen remedy for the MW19HS1 AOC. Subsequently, a Workplan for Phase I ROD Implementation was prepared in October 1994 and approved by NJDEP for field implementation.

Based on a review of the report entitled *Second Quarter Progress Report* (Roy F. Weston, Inc., August 1996), on November 30, 1994, Weston began the excavation of DEHP impacted soils in the MW19HS1 AOC. Four (4) additional step-out excavation events were conducted on December 6th, 12th 16th and 20th 1994 as post excavation side wall sampling continued to show elevated concentrations of DEHP above the Site cleanup objective of 100 mg/kg. On December 12, 1994, further excavation south was stopped within 5 ft of monitoring well MW-19 (presumably to avoid destruction of the well), and within 6 ft of Building 9 to a total depth of 9 ft below ground level (bgl) to avoid potentially undermining the buildings foundation. The final size of the excavation (as of the December 20, 1994 excavation event) was reportedly 70 feet long, ranged from 16 to 33 feet in width, and had an average depth of 9 feet below grade. Approximately 190 cubic yards of soil were removed from the excavation in 4Q94. The approximate location of the 1994 excavation is presented on Figure 9.

As shown on Figure 2-6 in the 2Q96 Progress Report, one side wall sample collected December 12, 1994 located on the south side of the excavation (HS1-PES-30) showed a DEHP concentration (140 mg/kg) above the cleanup objective of 100 mg/kg. As a result, NJDEP required the collection of additional soil samples to further delineate the distribution of DEHP in soils. In addition, NJDEP also required evaluation of VOCs in soils within the MW19HS1 area. These samples (B-1 through B-6) were collected in May 1996. No VOCs were detected above cleanup objectives in any of the eleven soil sampled analyzed. DEHP was detected in all eleven soil samples, however, samples collected at depths within the vadose (non saturated) zone were all below the cleanup objective. Deeper samples collected at depths that correspond to below the water table exhibited concentrations above the cleanup objective. Subsequently, the presence of DEHP in soils in the MW19HS 1 was related to fluctuations in the water table. No further soil excavation was recommended in the 2Q96 Progress Report, or has been performed to date.

Quarterly groundwater sampling events conducted at MW-19 by Weston during first and second quarter 1995 identified the presence of BTEX, in addition to MEK, at concentrations exceeding the NJGWQS stipulated in the ROD. In October 1996, Weston submitted a

delineation plan to the NJDEP to further define the extent of VOC impact to groundwater and further delineate both VOC and DEHP impact to saturated and non-saturated soils in the MW19/HS1 AOC. Temporary monitoring wells were installed and sampled and soil samples were collected an analyzed. The results of chemical analyses performed on the groundwater samples collected from the temporary monitoring wells identified the presence of VOCs at concentrations similar to those identified in monitoring well MW-19 in 1995. Additionally, the soil samples collected at both borings B-3 and B-2A indicated DEHP concentrations of 790 mg/kg and 220 mg/kg respectively, exceeding the "Impact to Groundwater Soil Cleanup Objective" of 100 mg/kg outlined in the 1994 Record of Decision (ROD).

RMT received approval of an additional MW19/HS1 area groundwater delineation plan in January 1998. Subsequently, in February 1998, RMT conducted a subsurface investigation that included the installation and sampling of an additional five (5) groundwater monitoring wells (MW19-1 through MW-19-5). VOC concentrations exceeding the NJGWQS were identified at MW19-1 (center of the plume); MW19-2; MW19 and at MW19-5. However, when compared to the VOC concentrations found during Weston's 1996 sampling (BW-1 through BW-9), significant reductions in the concentrations of VOCs were found at monitoring wells MW19 and MW19-2. As no remedial action had been performed (other as the 1994 soils excavation), it was concluded that natural attenuation of the volatile groundwater contaminants (toluene, ethylbenzene, xylene) was likely occurring. Groundwater samples were also analyzed for the presence of DEHP. DEHP concentrations exceeding NJGWQS were found at MW19-1 (center of the plume) and at MW19-5 (downgradient well).

The NJDEP letter dated July 15, 1998 required LEC to further delineate the downgradient extent of BTEX and DEHP impact to groundwater in the MW19HS1 AOC and establish a clean zone for both parameters per the Technical Requirements for Site Remediation (N.J.A.C. 7:26E-4.4). RMT, on behalf of L.E. Carpenter, prepared an investigation workplan and submitted it to the NJDEP in November 1998. Per discussions and correspondence with the NJDEP (December 21, 1998), RMT was authorized to perform a groundwater screening investigation utilizing Hydropunch® or other similar methodology.

Off-site Hydropunch® sampling activities were performed on April 21, 1999. Significant difficulties advancing the Hydropunch® tool in the approved off-site locations were encountered due to the localized geology (large cobbles and boulders) seen at the LEC site. A total of twenty-four (24) advancement attempts were made, four (4) of which (HP-1 through HP-4) penetrated the water table. Results of the Hydropunch® investigation are documented in the report entitled *MW-19/Hot Spot 1 Off-Site Subsurface Investigation* (RMT, June 1999). Analytical results obtained from groundwater samples collected from the four (4) Hydropunch® locations did not reveal concentrations of either BTEX or DEHP above Site

specific cleanup criteria. This suggested that no off-site migration of contaminants of concern was occurring.

3.2 Soil Gas Investigation and Vapor Intrusion

The NJDEP, in their comment letter regarding the 3rd Quarter 2005 Monitoring Report dated December 27, 2005, voiced their concern over the high levels of toluene detected in MW-19-5. In their letter, the NJDEP claimed free product must be present and requested a vapor intrusion evaluation be performed on both the north and south sides of Ross St. in accordance with the new NJDEP Vapor Intrusion Guidance Document dated October 2005, and updated March 2006.

RMT responded to the December 27, 2005 letter in the 4th Quarter Groundwater Monitoring Report dated February 2006. In that response, RMT pointed out that, according to the NJDEP's Vapor Intrusion (VI) Guidance Document (October 2005), a VI evaluation must be completed if a receptor is within 30 feet of a BTEX plume (or within 100 feet if product is present). RMT continued on to say that the Site currently has no free product issue as evidenced by the use of oil-water interface probes in the most contaminated monitoring wells within the MW19HS1 AOC (*i.e.*, MW-19, MW-19-5, and MW-19-7) none of which have ever generated any measurable free product. The lack of free product is also evidenced by the fact that all individual BTEX concentrations are well below each parameters solubility limit. However, part of LEC Building 9 (Figure 9) lies within 30-feet of the area with residual soil and groundwater contamination, and therefore a soil vapor intrusion evaluation work plan was submitted in Section 4.4 of the 4th Quarter 2005 Quarterly Groundwater Monitoring Report.

The VI work plan was discussed with and approved by NJDEP during the conference call held on February 22, 2006. NJDEP formalized their approval to proceed with the scope of work outlined in the workplan in an email sent the same day. The soil gas investigation was performed on March 1 and 2, 2006. This investigation was documented in the report entitled *Soil Gas Investigation in the MW19/Hot Spot 1 Area L.E. Carpenter & Company Borough of Wharton* (RMT, May 2006).

Detectable soil gas constituents were collocated with the dissolved-phase concentrations in groundwater. Based on the groundwater hydraulics, and given Darcy's mathematical law governing groundwater flow, RMT concluded that groundwater with dissolved-phase concentrations of COC's cannot migrate directly north across Ross Street and therefore does not pose a risk to the Ross Street residences. The lack of risk from direct northward groundwater migration is also further substantiated by the lack of detectable COC's in both MW-19D and MW-19-8. However, as described in previous monitoring reports, the current groundwater flow direction suggests that the leading edge of the dissolved COC's in groundwater may be

migrating northeasterly towards an empty lot adjacent to a Ross Street residence, which is the reason RMT installed an additional well (MW-19-12) as proposed in the approved PRMP. MW-19-12 was installed in 2Q06 (June 2006), and has never exhibited any detectable concentrations of COCs. Based on these and historic data, RMT did not recommend active remediation be considered for this area as natural attenuation processes are very strong, as well as the fact that based on currently available data, no risk of exposure exists.

3.3 2006 Remedial Investigation and RASR

NJDEP provided comments on the May 2006 Soil Gas Investigation in their Notice of Deficiency (NOD) letter dated June 20, 2007 (Appendix D). The NJDEP was concerned that a residual source of BTEX contamination existed in the MW19HS1 AOC due to the high dissolved phase concentrations remaining in groundwater 15 years after initial source removal actions occurred [*i.e.*, UST and piping removal and remedial excavation], and subsequently required LEC to prepare and submit a Remedial Action Selection Report (RASR) within 30 days following receipt of the letter. RMT responded with a 45-Day extension request for RASR submittal in the letter dated July 17, 2007. The 45-Day RASR extension was approved by NJDEP as outlined in their emailed letter dated July 27, 2007. The RASR was prepared to satisfy the requirements of the June 20, 2007 NJDEP NOD letter, and to document new remedial investigation subsurface data, while meeting the submittal deadline of September 4, 2007.

RMT conducted the remedial investigation between the dates of August 14 and 17, 2007. RMT advanced a total of nine (9) soil borings [SB-07-01 through SB-07-09] [Ref. Figure 9] to further evaluate and define the nature and extent of potential residual contamination acting as a continuing source of shallow groundwater impact.

3.3.1 Building 9 Infrastructure and Interior Boring Locations

Three (3) of the borings [SB-07-01, 02 and 03] were installed within the western interior of Building 9, into the sub slab vadose and saturated zones. These three borings were located with a bias towards the presence of former Building 9 process infrastructure relating to USTs E-3 and 3-4. Specifically, two trench drains [Drain #1 and Drain #2] and associated connection piping were identified in the northwestern corner of Building 9 adjacent to the concrete loading dock [Ref. Figure 2 & 9]. Drain #1 is located close to the western wall of Building 9 and formerly connected the drain system to the two exterior USTs. Drain #1 connection piping to the USTs was removed and the Drain #1 discharge hole was sealed with concrete grout during tank removal operations in 1990/1991. Evidence of a 2 feet wide concrete filled trench [assumed to formerly house piping connecting Drains #1 and #2] was also discovered during Building 9 evaluations. This

concrete filled trench extended approximately 40-feet east from Drain #1 and connected to Drain #2 [Ref. Figure 9].

3.3.2 Exterior Boring Locations

The remaining six (6) boring locations [SB-07-04 through SB-07-09] were installed on the western exterior of Building 9 as shown on Figure 2. Borings SB-07-04 and 06 were installed between the soils remaining east of the former 1994 UST soil excavation [Ref. Figure 2] and the Building 9 footer. These two boring locations were also biased towards former piping runs connecting Drain #1 to USTs E-3 and E-4. Boring SB-07-08 was also installed between the soils remaining east of the former 1994 UST soil excavation and the Building 9 footer but further south [upgradient] into an area that would define a lateral clean zone based on field screening. Boring SB-07-05, 07, and 09 were installed in areas specific to the 1994 UST soil excavation lateral extents and downgradient monitoring well MW-19-5 monitoring well [Boring 09], within the former UST excavation footprint [Boring SB-07-07], and at the leading edge of the soils remaining east of the former 1994 UST soil excavation and the Building 9 loading dock [downgradient] from the trench drain system located with Building 9.

3.3.3 Geology and Soil Sample Results

RMT compared the soil testing results with the New Jersey Soil Cleanup Criteria. Out of the nine samples, only two had any detectable constituents above the applicable direct contact soil cleanup criteria. Borings SB-07-04 and SB-07-09 had DEHP levels above the direct contact criterion for DEHP. Both of these samples were collected within the saturated zone just below the water table (10 to 14 feet below the ground surface). DEHP was not detectable in groundwater from any of the wells in the MW-19 area, confirming DEHP's known characteristics for strong adsorption onto soil particles and lack of mobility within the saturated zone. Both the DEHP and xylene detected in these two samples as well as the soil sample SB-07-01 (also from the saturated zone near the top of the water table) contained both xylene and DEHP above the impact to groundwater cleanup criteria (IGWSCC).

The insert on the bottom left Figure 9 shows that the approximate maximum and minimum aerial distribution of residual contamination based on an analysis of existing groundwater contaminant distribution and groundwater flow direction, and the soil laboratory data and observed Site features (see data summary boxes for total VOC's and SVOC's and the former UST's, connecting lines and interior floor drains. The data shows that residual sources exist associated with both the former tanks and fill lines, but

also under the building floor apparently related to the existing floor drain, which appears to have been grouted in place based on field observations.

The stratigraphy of the area can be visualized by examining the cross sections shown on upper right insert of Figure 9. As can be seen on cross section A-A', there are significant silt and clay-rich soils in the vadose zone and upper saturated zone under Building 9. Most of the area outside of the building and 2-5 feet below the water table consists predominantly of fine to medium grained sand and sand-gravel mixtures. The preponderance of more permeable sand/gravel mixtures several feet below the water table is consistent with the geologic information for the main remediation area on the east side of the recreational trail.

The soil data were used, together with qualitative field observations, photoionization detector (PID) readings, and review of the location of the floor drains and connecting UST pipes to outline the approximate vertical distribution of residual contamination (see red hachure's on the upper right insert of Figure 9). Results indicate that residual contamination in the vadose zone is limited to the areas of initial release along the piping runs and floor drains. A smear zone at the top of the water table apparently is an ongoing "secondary" source that continues to provide contaminant mass to the aquifer, especially during water table fluctuation events.

Boring logs for the MW19HS 1 investigations completed to date are included in Appendix E.

Section 4
Workplan Rationale and Tasks

The following section outlines the rationale behind the development of this RIW, the proposed scope of work, and overall approach.

4.1 Data Collection Objectives and Rationale

Data collection objectives are summarized as follows:

- Delineate vertical and lateral extent of residual sources in the vadose zone under and adjacent to Building 9;
- Fully characterize residual source material for Contaminants of Concern (COCs) under Building 9, especially directly under former floor drains;
- Delineate vertical and lateral extent of smear zone associated with the residual sources;
- Delineate the constituents of concern (COCs) in groundwater under and downgradient from Building 9;
- Collect sufficient information to support development and preparation of a combined Remedial Investigation Report (RIR)/Focused Feasibility Study (FFS) for remediation of fully delineated residual sources in soils and remaining limited groundwater contamination.

As outlined below, activities needed to fill these data gaps include installation of the planned test soil borings shown on Figure 9 and on Table 2, and as described in detail below. These activities will take place as soon as possible following the demolition of Building 9. It is anticipated that the demolition of Building 9 will take place in first quarter of 2009 (1Q09).

4.2 Building 9 Management

As outlined in the October 16, 2008 NOD (Detailed Explanation No. 2), both USEPA and NJDEP agree (in general) with the proposed remedial action outlined in the 2007 RASR. However, the full nature and extent of the contaminated area needs to be delineated in order to fully assess whether the proposed remedy in the 2007 RASR is appropriate and viable. USEPA and NJDEP also indicate that the best way to ensure the comprehensive nature of the delineation efforts is to demolish and remove Building 9 so all areas can be fully assessed for contaminant impact (*i.e.*, sub slab areas, basement areas, footers, and existing infrastructure). The approach to ensure this objective is met is presented in the following sections.

4.2.1 Building 9 Pre-Demolition Survey

Both known and suspect source areas (interior and exterior), and building footers, corners, and infrastructure will be surveyed by a NJ licensed professional surveyor prior to demolition to ensure that the known extent of impact in the MW19HS1 area, as defined in the 2007 RASR, can be reproduced (*i.e.*, staked) in the field once Building 9 has been removed. This will also allow for the evaluation and accurate location of subsurface utilities that may require appropriate management and removal prior to MW19/HS1 remedial action, and will provide a baseline for field truthing the sampling and analysis plan outlined in Section 5.

4.2.2 Building 9 Assessment and Demolition

Building 9 will be demolished and all materials removed including floor slabs, footers and sub basement. An assessment for the presence of asbestos, lead based paint, PCBs, mercury, or other contaminants effecting the safe demolition of Building 9 will be performed, and abated (if applicable) prior to demolition.

4.3 Remaining Sources and Lateral and Vertical Definition Boring Sampling Plan

The data collection objective for the remaining sources is to determine the extent of residual BTEX and DEHP LNAPL (in residual or free phase) so as to determine the magnitude of a potential remedial action needed to eliminate to the extent practicable any remaining contamination within the MW19HS1 area.

The primary method proposed for use is continuous soil sampling with a mini-sonic drilling rig equipped with an outer protective casing that will assure collection of representative samples and prevent any sloughing/cross-contamination within the borehole as it is advanced to total depth. Soil samples will be analyzed both in the field and in the laboratory as outlined generally on the cross-section inset shown on Figure 9.

The sample locations shown on Figure 9 are located within and beyond the extent of the potential LNAPL source based on the existing data. As summarized in Table 2, Borings SB-09-01 through SB-09-07 will be installed to complete the delineation of the vertical and horizontal extent of residual sources under Building 9. Additional horizontal and vertical delineation borings SB-09-08 through SB-09-14 are located based on the extrapolated area of impact as defined by the August 2007 investigation conducted by RMT in support of the previously submitted 2007 RASR.

In addition to the proposed locations shown on Figure 9, it may be necessary to conduct "step-out" borings if additional samples are needed to adequately characterize soil COC extent based on the real-time field data. For example, as shown on Table 2, soil borings SB-09-15 through SB-

09-21 are designed to provide the outermost limit of contamination (anticipated "clean" verification soil boring). At these specific locations, if field data shows contamination to exist, step out borings will be installed at a distance of approximately 15-20 feet further out from the outermost borings shown on Figure 9 (in a direction away from the former Building 9 floor drain area). Step-out borings will continue until field evidence shows that the full lateral extent of residual contamination has been adequately determined.

Representative soil samples will be collected at selected locations for soil analysis by field screening with both hydrophobic dye and oil-N-soil test kits. The hydrophobic dye will be used along a continuous section of sonic core (the core will be split length-wise with a pre-cleaned apparatus such as a knife or chisel). This process will take place as soon as possible after samples have been collected for additional field and laboratory tests at an approximate interval of every 2 feet (in order to minimize any potential off-gassing of potential VOCs from the soil core). Soil samples will be analyzed in the field for the presence of NAPL using an oil-N-soil kit as described in the Quality Assurance Project Plan (QAPP) (Appendix F). Digital photography will be conducted to document the results of these in-field tests. Previous experience within the nearby source reduction area shows that the oil-N-soil method is appropriate to delineate the vertical extent of residual NAPL as outlined in Section 4.2 of the QAPP. These data will be used to guide the total depth of each soil boring. Specifically, as shown on the cross section inset on Figure 9, each boring will be advanced to a minimum of 8-12 feet (1-2 feet below water table), and a maximum depth of between 2-5 feet below the point of no visual, olfactory, and oil-N-soil impact. Borings designed to delineate the outermost "clean" zone are anticipated to be the shallowest borings, while those locations centrally located within former source areas (below the drains) will likely range in total depth from between 20 to 25 feet deep.

Laboratory analysis of soils will be conducted to obtain quantitative data that will provide concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX), DEHP. A maximum of 4 representative samples of each of the known soil types (backfill, silty sand, silt/clayey silt, and sand/gravel) will also be collected to conduct grain size analyses.

Samples from each soil boring will be collected for potential BTEX and DEHP analysis. Following completion of the initial soil core survey with hydrophobic dye, oil-N-soil, and HnU screening, representative samples will be collected at approximately 4-foot intervals and submitted to the laboratory for analysis of BTEX and DEHP. These data will be used following the investigation for comparison to the oil-in-soil and hydrophobic dye field data. The final depths and frequency for collecting these representative samples will ultimately be selected based on the visual observations, geologic logging results, and oil-N-soil and hydrophobic dye results. All of these data will in general provide:

- Complete vertical profiles at all soil boring locations where NAPL residuum and/or free phase product is detected by the field methods, to show results above the peak observable NAPL, at the peak NAPL concentration, and below the peak.

- Sufficient samples from the peak NAPL concentration in at least 3 soil boring locations, anticipated to be located within the central part of the residual source area underneath the location of the former floor drains and/or connector pipe.

Two representative soil samples from each permeable soil unit (anticipated to be 4 samples) will also be submitted for total organic carbon (TOC) analyses. Field sampling methods and the laboratory analytical methods for the soil BTEX and DEHP analyses are further described on Table 2 and in the QAPP (Appendix F).

4.4 Groundwater Sampling Plan

Groundwater grab samples will be collected from selected borings as outlined on Table 2 in order to assess the potential viability of the use of chemical oxidation polishing methods to achieve remedial action objectives for any remaining dissolved phase contaminants in groundwater. Groundwater samples will be collected from proposed soil borings SB-09-01, SB-09-03, SB-09-12, SB-09-13, and SB-09-18. The groundwater samples will be collected within the zone of highest concentration, expected to be within the first several feet below the water table. The samples will be collected by utilizing the outer drill casing advanced to the desired depth, approximately 5 feet below the water table as measured while drilling. Temporary PVC well screen and casing will be lowered within the drill string after advancing to approximately 5 feet within the water table, and then the outer drill casing will be pulled back. A peristaltic pump will then be used to purge the temporary well and collect a groundwater grab sample at a low flow rate per methods outlined in Section 4.6.4 of the QAPP.

A Health and Safety Plan (HASP) developed to implement this scope of work outlined in this section is presented in Appendix G.

4.5 Professional Survey

A survey of each soil boring location will be conducted by a New Jersey licensed surveyor. Each sample location will be surveyed horizontally to an accuracy of one-tenth of a second latitude and longitude.

4.6 Remedial Investigation Report (RIR)

A Remedial Investigation Report (RIR) will be prepared to present the results following implementation of this RIW.

Section 5
Schedule

A detailed Project Schedule to implement the scopes of work outlined in this RIW is presented in Appendix H. As outlined in the schedule, the sequence for implementation is 1) pre-demolition surveying, 2) building demolition assessment, 3) Bldg 9 demolition, and 4) Sampling and analysis.

Section 6
Community Relations

The primary point of contact at the Borough of Wharton is presented in Table 2. The Borough of Wharton will be notified 2 weeks prior to the commencement of the field activities outlined in this RIW, and will be notified with regards to the demolition of Building 9.

Tables

TABLE 1 - PRINCIPAL PERSONNEL CONTACT INFORMATION
L.E. CARPENTER COMPANY (LEC)
BOROUGH OF WHARTON, MORRIS COUNTY, NEW JERSEY, USEPA ID No. NJD00216878

NAME & TITLE	PROJECT RESPONSIBILITY	PROJECT AUTHORITY	COMPANY NAME & ADDRESS	CONTACT INFORMATION
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Richard Hahn Senior Legal Council & Assistant Secretary	PRP Internal Legal Council	Owner/Secretary	**L.E. Carpenter & Company** 170 North Main Street P.O. Box 11 Wharton, NJ 07885	(440) 930-1361 Phone (440) 930-1179 Fax richard.hahn@polyone.com
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Glenn Savary Case Manager	NJDEP Case Manager	Regulator	**New Jersey Department of Environmental Protection (NJDEP)** Bureau of Case Management 401 East State Street P.O. Box 028 Trenton, NJ 08626	(609) 633-1455 Phone (609) 633-1439 Fax Glenn.Savary@dep.state.nj.us
Gwen Zervas, P.E. Section Chief	NJDEP Section Chief (*Former Case Manager*)	Regulator	**New Jersey Department of Environmental Protection (NJDEP)** Bureau of Case Management 401 East State Street P.O. Box 028 Trenton, NJ 08626	(609) 633-1455 Phone (609) 633-1439 Fax
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Jon Rheinhardt CFO/Administrator	Main Borough Point of Contact		**Borough of Wharton** Wharton Municipal Building 10 Roberts Street Wharton, NJ 07885	(973) 361 8444, ext. 11 Phone (973) 361-5281 Fax (973) 713-5518 Mobile Jrheinhardt@whartonnj.com

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Table 2
Sampling Summary Table - MW19HS1 2008 RIW
L. E. Carpenter, Borough of Wharton, Morris County, New Jersey
USEPA ID NJD002168748

Location/Soil Boring No.	Sample Matrix	Approximate Total Boring Depth (BGS)	Sampling Method	Sampling Method	Analytical Parameters[3]	Purpose
SB-09-1	SOIL	25 / every 2 feet	Double Cased Sonic Drilling Core[4]	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Vertical delineation of likely residual source material located on top of former floor drain.
	WATER	25	Temporary Well Point	Low-flow Sampling	BTEX by EPA Method 624 DEHP by EPA Method 625	Potential treatability analysis
SB-09-2	SOIL	25 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Vertical delineation of likely residual source material located on top of former floor drain.
SB-09-3	SOIL	25 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Vertical delineation of likely residual source material located on top of former floor drain.
	WATER	25	Temporary Well Point	Low-flow Sampling	BTEX by EPA Method 624 DEHP by EPA Method 625	Potential treatability analysis
SB-09-4	SOIL	25 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Vertical delineation of potential residual source material located at approximate location of former UST fill line.
SB-09-5	SOIL	20 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Vertical delineation of potential residual source material associated with former building footers.
SB-09-6	SOIL	20 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Vertical delineation of potential residual source material associated with former building footers.
SB-09-7	SOIL	15 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Vertical delineation of potential residual source material associated with former building footers.
SB-09-8	SOIL	20 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Horizontal and verticle delineation step-out boring.
SB-09-9	SOIL	20 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Horizontal and verticle delineation step-out boring.
SB-09-10	SOIL	15 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Horizontal and verticle delineation step-out boring.
SB-09-11	SOIL	15 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Horizontal delineation step-out boring over former sub-basement and former basement pit.
SB-09-12	SOIL	15 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Downgradient horizontal delineation boring for the water-table smear-zone.
	WATER	15	Temporary Well Point	Low-flow Sampling	BTEX by EPA Method 624 DEHP by EPA Method 625	Potential treatability analysis
SB-09-13	SOIL	15 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Downgradient horizontal delineation boring for the water-table smear-zone.
	WATER	15	Temporary Well Point	Low-flow Sampling	BTEX by EPA Method 624 DEHP by EPA Method 625	Potential treatability analysis
SB-09-14	SOIL	15 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Downgradient horizontal delineation boring for the water-table smear-zone.
SB-09-15	SOIL	10 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Anticipated lateral "clean" verification boring. (A) 10 foot step out boring(s) will be completed if original boring is found to be impacted.
SB-09-16	SOIL	10 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Anticipated lateral "clean" verification boring. (A) 10 foot step out boring(s) will be completed if original boring is found to be impacted.
SB-09-17	SOIL	10 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Anticipated lateral "clean" verification boring. (A) 10 foot step out boring(s) will be completed if original boring is found to be impacted.
SB-09-18	SOIL	10 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Anticipated lateral "clean" verification boring. (A) 10 foot step out boring(s) will be completed if original boring is found to be impacted.
	WATER	10	Temporary Well Point	Low-flow Sampling	BTEX by EPA Method 624 DEHP by EPA Method 625	Background groundwater quality
SB-09-19	SOIL	10 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Anticipated lateral "clean" verification boring. (A) 10 foot step out boring(s) will be completed if original boring is found to be impacted.
SB-09-20	SOIL	10 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Anticipated lateral "clean" verification boring. (A) 10 foot step out boring(s) will be completed if original boring is found to be impacted.
SB-09-21	SOIL	10 / every 2 feet	Double Cased Sonic Drilling Core	Visual Observation, PID, Oil-N-Soil Kit, Methanol Preservation	BTEX by EPA Method 8260B DEHP by EPA Method 8270C	Anticipated lateral "clean" verification boring. (A) 10 foot step out boring(s) will be completed if original boring is found to be impacted.

[1] Only about half the total number of samples will be submitted to the laboratory to test for BTEX and DEHP.
[2] All samples will be obtained via sonic drilling core.
[3] Analytical methods listed are the preferential analytical methods to be used by the laboratory. However, equivalent methods may be used if laboratory equipment is down for an extended period of time.
[4] An outer (double) casing will be used while drilling to avoid any overburden sloughing into the bottom of the hole.

BGS = below ground surface

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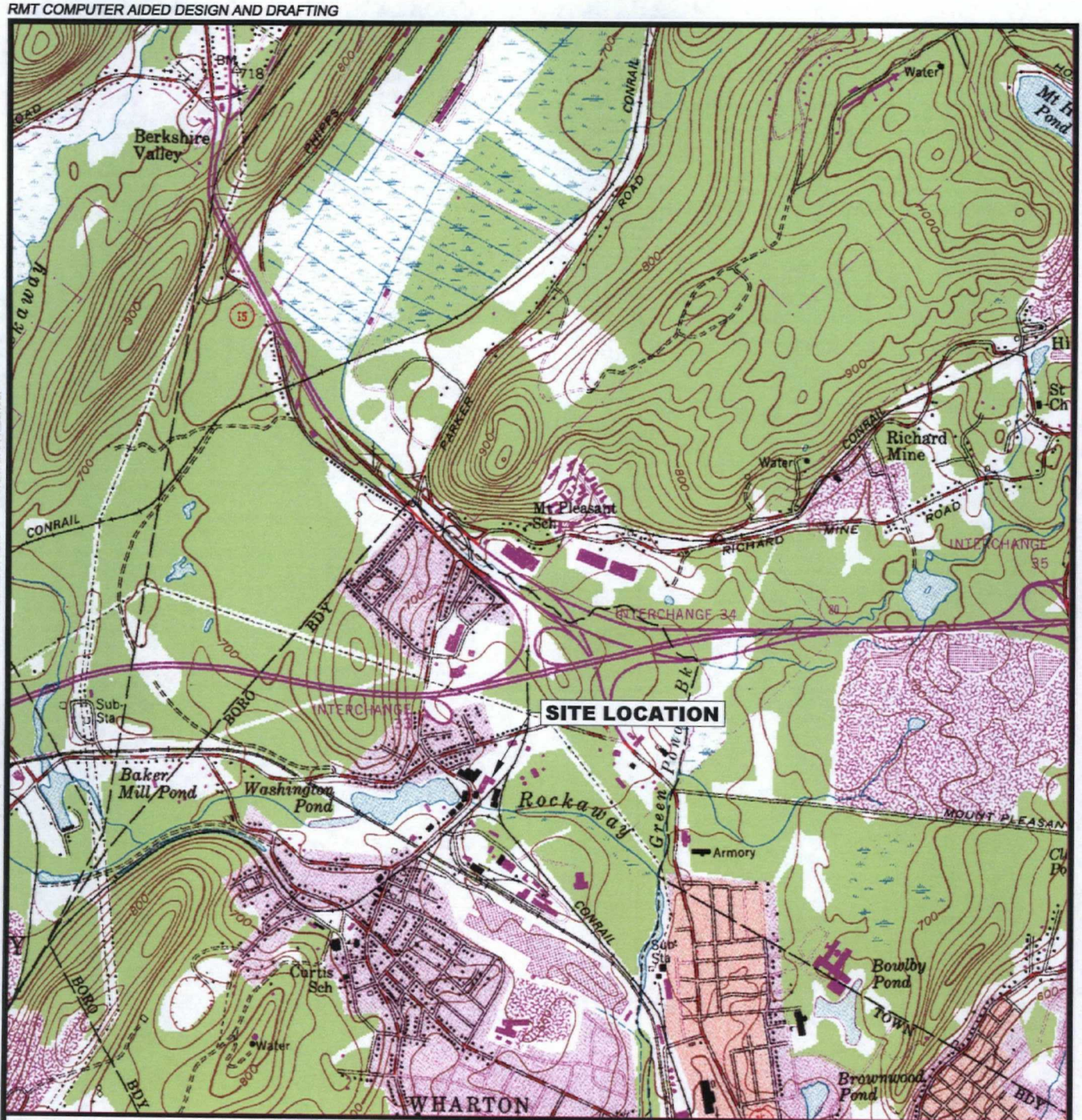
Figures

RMT COMPUTER AIDED DESIGN AND DRAFTING



NEW JERSEY

QUADRANGLE LOCATION

N

0 2000' 4000'

APPROXIMATE SCALE IN FEET

SOURCE

BASE MAP DEVELOPED FROM THE DOVER, NEW JERSEY 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP, DATED 1954, PHOTOREVISED 1981.

RMT

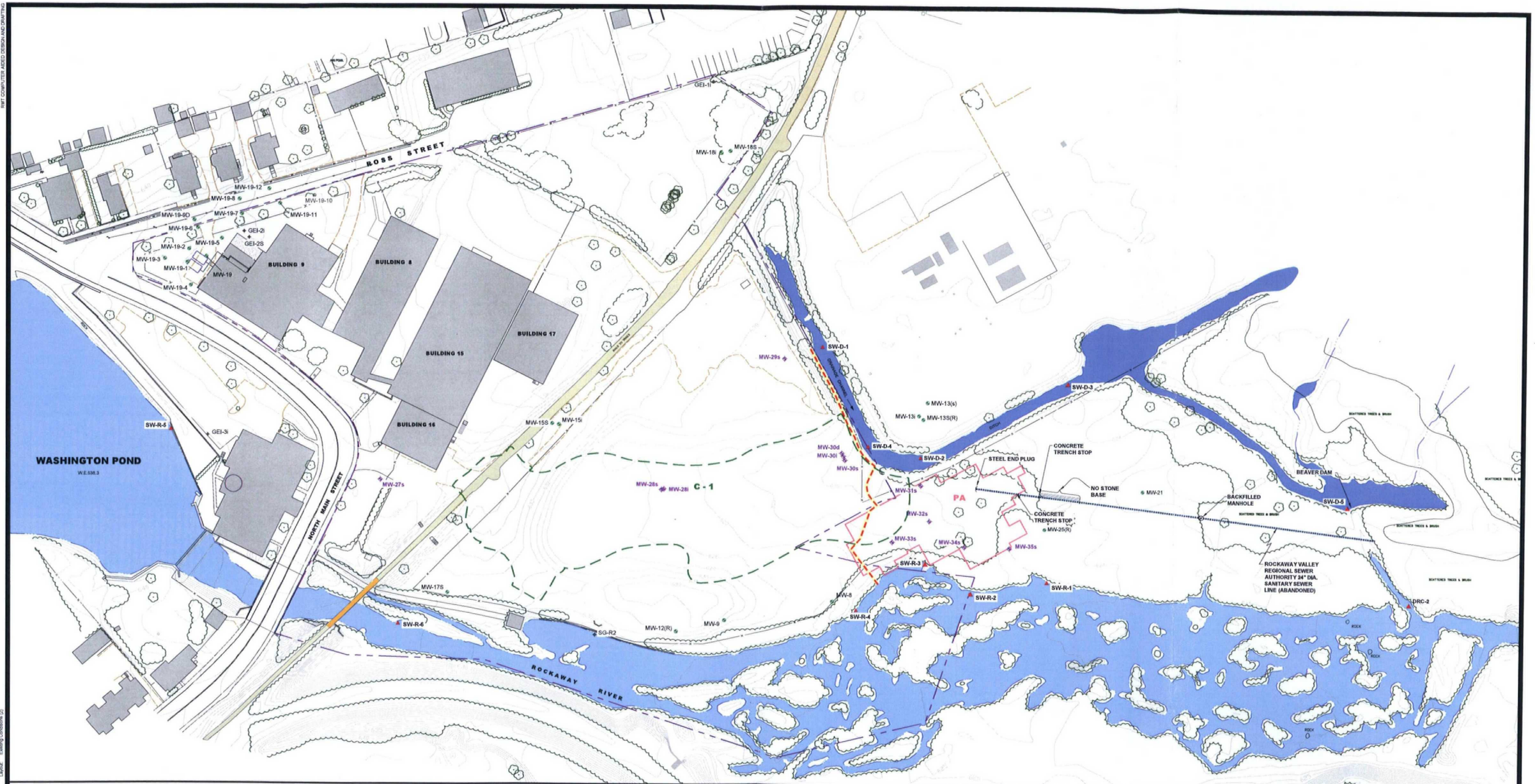
LE CARPENTER
WHARTON, NEW JERSEY

SITE LOCATION MAP

DRAWN BY:	SL
APPROVED BY:	NC
PROJECT NUMBER:	6527.28
FILE NUMBER:	6527.28.01.DWG
DATE:	November 2008

FIGURE 1

PLOT DATA
Drawing Name: J:\06527\28\6527.28.01.dwg
Operator Name: lucidos
Scale: 1"=2000'
Dwg Size: 96645 Bytes
Plot Date: Tuesday, August 28, 2007
Plot Time: 08:33.0442 AM
Attached Xref's: No xref's Attached.



LEGEND

- APPROXIMATE PROPERTY LINE
- FENCE LINE
- TREES
- MW-25(R) — GROUNDWATER ELEVATION MONITORING WELL LOCATION AND NUMBER (s = shallow, i = intermediate, d = deep)
- MW-29s — PRMP MONITORING WELL LOCATION AND NUMBER (s = shallow, i = intermediate, d = deep)
- SG-R1 — RIVER POINT SURFACE WATER ELEVATION
- SG-D1 — DRAINAGE CHANNEL POINT SURFACE WATER ELEVATION
- GEI-2i — PIEZOMETER LOCATION
- SW-R-1 — SURFACE WATER SAMPLING LOCATION (D = DITCH; R = RIVER)
- 630 — POST-REMEDIATION GROUND SURFACE ELEVATIONS CONTOUR INTERVAL = 1 ft.
- PA — AREA WHERE PCB IMPACTED SOILS WERE EXCAVATED
- C-1 — OUTLINE OF 2005 SOURCE REDUCTION AREA AND SUBSURFACE SLURRY MONOLITH
- WESTERN BOUNDARY OF REGULATED WETLAND
- ABANDONED ROCKAWAY REGIONAL SEWER LINE

NOTES

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC SURVEY PROVIDED BYJAMES M.STEWART, INC. LAND SURVEYORS, DRAWING NO 2793-03.DWG, DATED 02-14-02 AS REVISED 04-10-07 (DRAWING NO. 314907REV.DWG).
2. FORMER BUILDING OPERATIONS
   - BUILDING 9: RAW MATERIAL, DRUM STORAGE, AND PRINTING
   - BUILDING 8: LAMINATION
   - BUILDING 15 and 17: INSPECTION, STORAGE, AND DISTRIBUTION
   - BUILDING 16: OFFICES
3. AS DESCRIBED IN THE November 2005 RAR (SEE FIGURE 9 IN THAT REPORT), THE SLURRY MONOLITH AT AND PARALLEL TO THE DRAINAGE CHANNEL DITCH ENDS APPROXIMATELY 10 FEET WEST OF THE ACTUAL WATERS EDGE.

N

0 60' 120' 180' 240'
SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

L.E. CARPENTER
WHARTON, NEW JERSEY

EXISTING CONDITIONS

DRAWN BY: SL, KW	DRAWING SCALE:	PROJECT NO.	J:\06527\28
CHECKED BY: JD,JO	SHOWN	FILE NO.	6527.28.12.dwg
APPROVED BY: JD	DATE PRINTED:	**FIGURE 2**	
DATE: September 2008			

RMT

3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022

RMT COMPUTER AIDED DESIGN AND DRAFTING

Drawing Name: 6527.28.12.dwg Dwg Size: 0.82 Mb
Operator Name: SA Plot Date: April 2008
Drawing Plot Scale: 1:40 Plot Time: 4:30 PM
Layout: Existing Conditions (2)

LEGEND

FENCE LINE

TREES

NOTES

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC SURVEY PROVIDED BYJAMES M.STEWART, INC. LAND SURVEYORS, DRAWING NO 2793-03.DWG, DATED 02-14-02.
2. AERIAL PHOTOGRAPH PROVIDED BY JAMES M. STEWART, INC. LAND SURVEYORS, DATED 02-14-02.

N

0 100' 200' 300' 400'

SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

L.E. CARPENTER
WHARTON, NEW JERSEY

PRE SOURCE REMOVAL
AERIAL PHOTO AND TOPOGRAPHIC MAP

DRAWN BY: SL	DRAWING SCALE: SHOWN	PROJECT NO. J:\06527\28	
CHECKED BY: JO		FILE NO. 6527.28.13.dwg	
APPROVED BY: JD	DATE PRINTED:	**FIGURE 3**	
DATE: November 2008			

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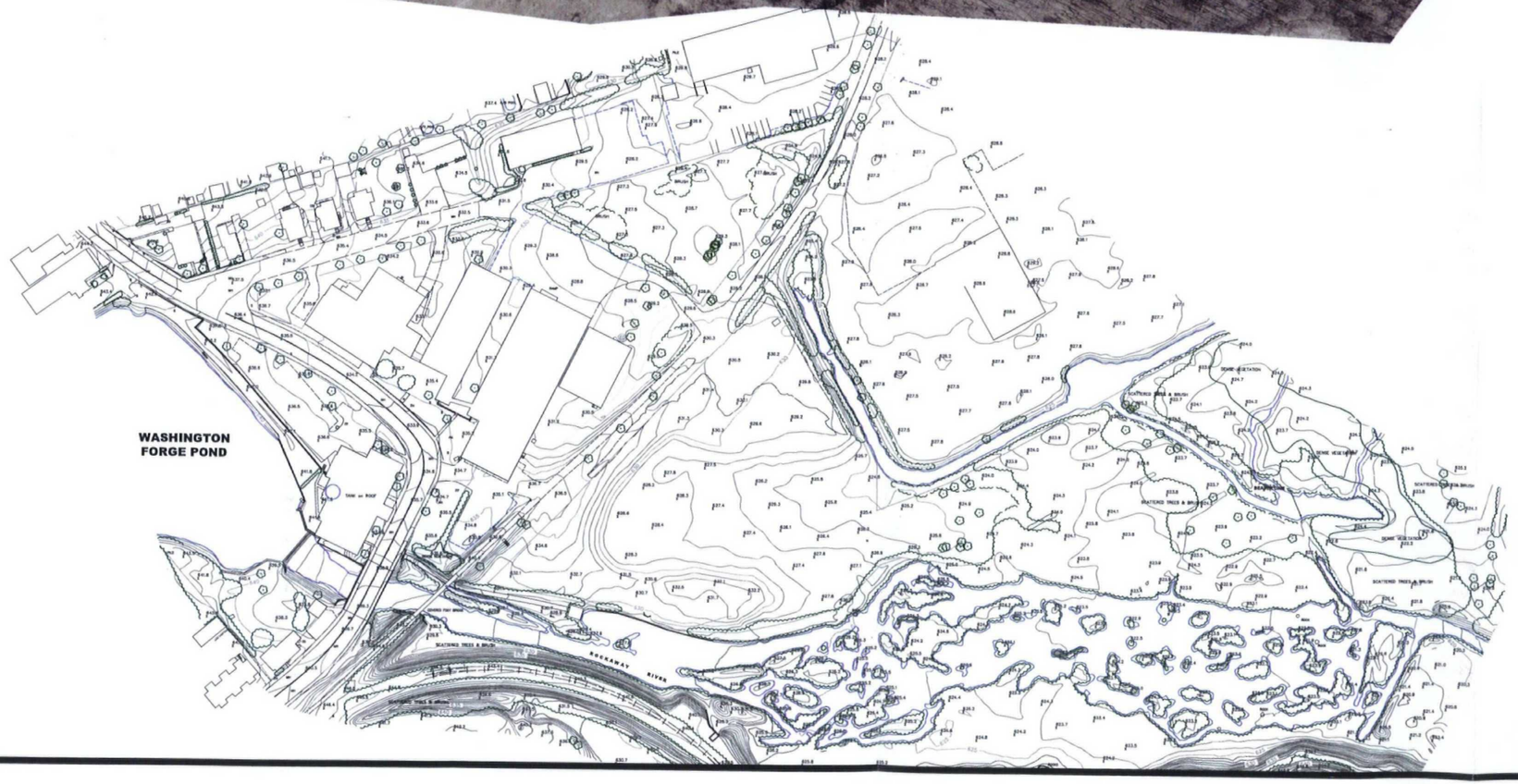
Phone: 734-971-7080
Fax: 734-971-9022

RMT COMPUTER AIDED DESIGN AND DRAFTING

Drawing Name: 6527.28.13.dwg
Drawing Path: S:\Cad\
Drawing Plot Scale: 1:40
Drawing Size: 0.18 MB
Plot Date: Wednesday
Plot Time: 4:52 PM
Layout: Site Plan 20022 (3)



LEGEND

FENCE LINE

TREES

NOTES

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC SURVEY PROVIDED BYJAMES M.STEWART, INC. LAND SURVEYORS, DRAWING NO 2793-03.DWG, DATED APRIL 2007.
2. AERIAL PHOTOGRAPH PROVIDED BY JAMES M. STEWART, INC. LAND SURVEYORS, DATED APRIL 2007.

N

0 100' 200' 300' 400'

SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

L.E. CARPENTER
WHARTON, NEW JERSEY

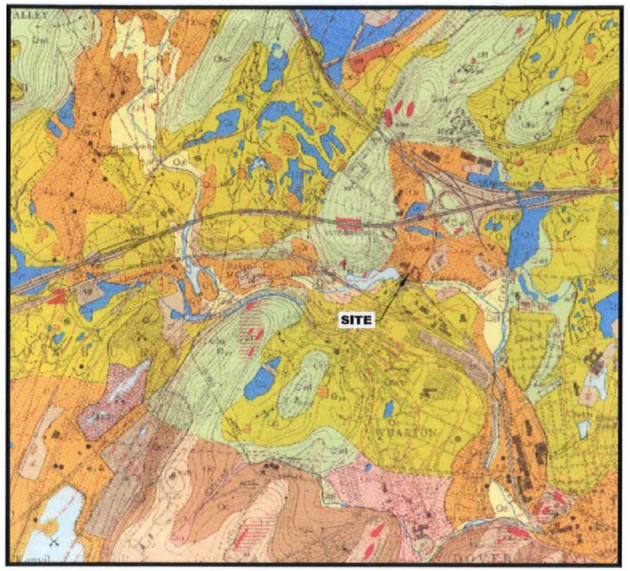
POST SOURCE REMOVAL
AERIAL PHOTO AND TOPOGRAPHIC MAP

DRAWN BY: SL	DRAWING SCALE:	PROJECT NO.	J:\06527\28
CHECKED BY: JO	SHOWN	FILE NO.	6527.28.14.dwg
APPROVED BY: JD	DATE PRINTED:	**FIGURE 4**	
DATE: November 2008			

RMT
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022

RMT COMPUTER AIDED DESIGN AND DRAFTING

Drawing Name: J:\06527\28.14.dwg
Operator Name: SAM LUCIDO
Drawing Plot Scale: 1:40
Dwg Size: 1.11 Mb
Plot Date: March 2008
Plot Time: 4:35 PM
Layout: Site Plan 2007 (6)



GEOLOGIC MAP

0 1750' 3500' 5250' 7000'
SCALE IN FEET

POST-GLACIAL DEPOSITS (HOLOCENE AND LATE WISCONSINAN)

Artificial Fill: Excavated till, sand, gravel, and rock; construction debris (brick, concrete, asphalt); industrial materials (foundry sand, cinders and slag).

Mine Tailings: Piles and embankments of waste rock excavated from iron mines and rock quarries.

Trash Fill: Trash and construction debris mixed and covered with excavated till and weathered bedrock.

Alluvium: Silt and fine sand; minor clay and pebble to cobble gravel.

Swamp and Marsh Deposits: Typically gray silt and clay with minor sand overlain by brown peat, in turn overlain by dark brown to black muck and organic silt.

MAP SYMBOLS

Bedrock Outcrop: Elevation of bedrock surface, contour interval 50 feet (100 feet where data is sparse).

Elevation of Bedrock Surface: Contour interval 50 feet.

GLACIAL DEPOSITS (LATE WISCONSINAN)

Berkshire Valley Deposits: Fluvial-deltaic units (Qbv1, Qbv2, Qbv3, Qbv4) overlying sediments of at least three sequentially filled, unstable proglacial lakes dammed on the south by the Terminal Moraine or older Berkshire Valley units. Deposits in the lakes include sublacustrine and collapsed deltaic sand and gravel (Qlbv1, Qlbv2, Qlbv3, Qlbv4) and lake-bottom and deltaic sand and silt (Qlbvlb).

Qbv2: Coarse cobble and boulder gravel grading southward to cobble gravel, then pebble gravel and pebbly sand.

Glacial Lake Denville Deposits: Sediment deposited in glacial Lake Denville. At the Terminal Moraine, sublacustrine sand and gravel (Qld1) and lake-bottom and deltaic fine sand and silt (Qld1b1) deposited during advance of ice are overlain by till of the moraine (Qltvtm, described below). North of the Terminal Moraine units Qld2 (sublacustrine and deltaic sand and gravel) and Qldlb2 (lake-bottom and deltaic fine sand and silt) were deposited during retreat of ice from the Terminal Moraine.

Rockaway River Outwash: Chiefly cobble gravel. Deposited by meltwater descending the Rockaway valley and entering from tributaries to the north. In Rockaway Borough the deposit is incised into till of the Terminal Moraine.

GLACIAL AND NON-GLACIAL DEPOSITS (PRE-LATE WISCONSINAN)

Glacial Lake Dover Deposits: Lake-bottom and deltaic fine sand and silt (Qldolb) and deltaic sand and gravel (Qldo) deposited in glacial Lake Dover.

Till: Unstratified and unsorted boulders, cobbles, and pebbles in a yellowish-brown (10YR5/4-5/6) (oxidized), grayish-brown (10YR5/2) (unoxidized) silty fine sand to fine to medium sand matrix.

Till of the Terminal Moraine: Yellowish-brown to grayish-brown till as above forming ridge- and kettle topography of the Terminal Moraine.

Glacial and Non-glacial Deposits (Pre-late Wisconsinan)

Colluvium: Unstratified and unsorted boulders, cobbles, and pebbles of angular bedrock debris and some rounded erratics in an orange-brown silty sand matrix.

Colluvium and Weathered Bedrock: Discontinuous colluvium, as above.

Colluvium: Unstratified and unsorted boulders, cobbles, and pebbles of angular bedrock debris and some rounded erratics in an orange-brown silty sand matrix. Partly of late Wisconsinan age. May be as much as 50 feet thick at the base of long, steep slopes

Colluvium and Weathered Bedrock: Discontinuous colluvium, as above, generally less than 10 feet thick, overlying weathered bedrock. The weathered bedrock ranges from sandy (minor clayey sand) saprolite to a rubble of angular cobbles and boulders of fractured rock with little or no matrix. It may be as much as 50 feet thick, but thickness is quite variable. In places the colluvium may be replaced by a diamict produced by in-place mixing of pre-late Wisconsinan till and underlying weathered bedrock, with little or no downslope movement. Partly of late Wisconsinan age.

Surficial Geologic and Glacial Map Source:
Stanford (1989), *Surficial Geologic map of the Dover Quadrangle, Morris and Sussex Counties, New Jersey*, New Jersey Geological Survey Geologic Map Series 89-2.

MAXIMUM EXTENT OF WISCONSINAN GLACIATION

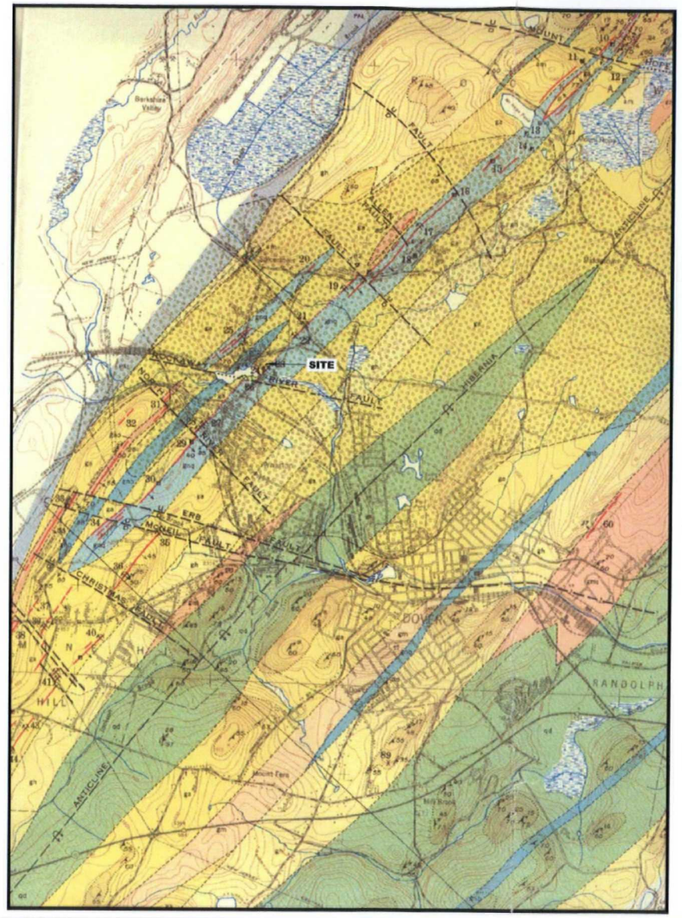
0 1750' 3500' 5250' 7000'
SCALE IN FEET

LEGEND

Wm - Whitman very stony loam

Ua - Urban land

RgA - Ridgebury very stony loam



SEDIMENTARY ROCKS

- Marine deposits
- Undifferentiacated sedimentary rocks
- Alaskite
- Hornblende granite
- Hornblende granite and alaskite
- Alibite-oligoclase granite
- Alibite-oligoclase granite
- Quartz diorite and relaced facies
- Amphibolite and related rocks
- Oligoclase-quartz-biotite gneiss
- Biotite-quartz-feldspar gneiss

Magnetite deposits, showing dip

Linear strong to moderate magnetic anomalies

Generalized magnetite deposits

Mine

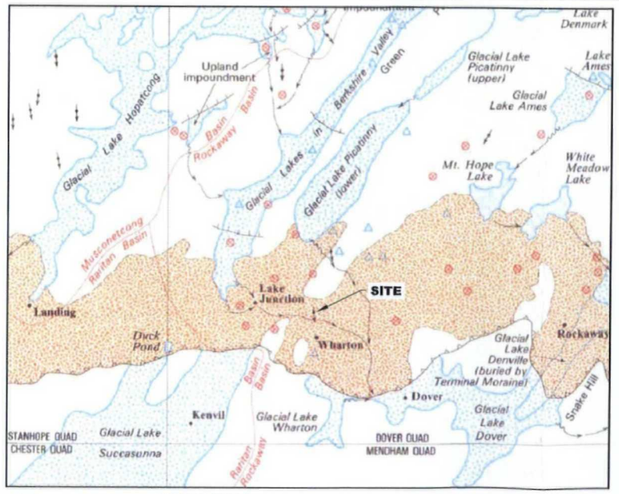
Shaft

Prospect

Geologic Map Source:
Sims, Davidson, and Koch (1949), *Geology and Magnetite Deposits of Dover District, Morris County, New Jersey*, US Geological Survey Professional Paper 287.

SITE BEDROCK GEOLOGY MAP

0 2500' 5000' 7500' 10000'
SCALE IN FEET



EXPLANATION

Divide

Spillway of glacial lake

Route of meltwater

Recessional ice margin

Line of late Wisconsinan ice

Maximum extent of glacial lake

Terminal Moraine

Pebble lithologies

> 25% Precambrian lithologies

> 25% Paleozoic lithologies

SOILS MAP

0 6000' 12,000' 18,000' 24,000'
SCALE IN MILES

Soils Map Source:
Soil Survey of Morris County, New Jersey, United States Department of Agriculture, 1976.

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

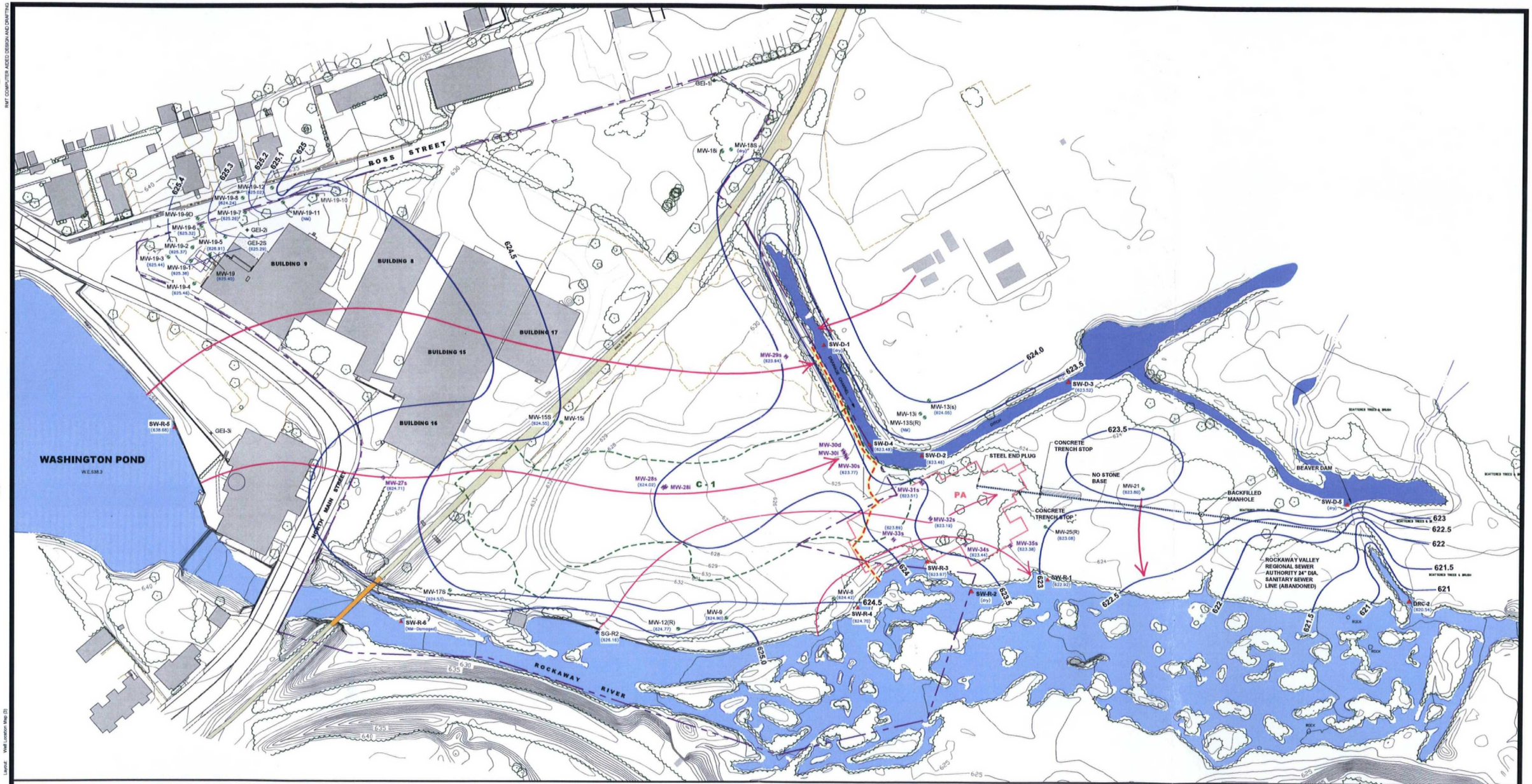
L.E. CARPENTER
WHARTON, NEW JERSEY

SURFICIAL SOILS AND GEOLOGIC MAPS

DRAWN BY: SL	DRAWING SCALE:	PROJECT NO.	J:\06527\28
CHECKED BY: JO	SHOWN	FILE NO.	6527.28.15.dwg
APPROVED BY: JO	DATE PRINTED:	**FIGURE 5**	
DATE: November 2008			

RMT
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022

RMT COMPUTER AIDED DESIGN AND DRAFTING
Drawing Name: J:\06527\28\6527.28.15.dwg
Checked By: JO Date: 11/06/2008
Plotted By: SLebbeck Plot Date: March 2008
Dwg Size: 0.14 Mb Plot Scale: 48.78%
Layout: Regional Geology (5)



LEGEND

- APPROXIMATE PROPERTY LINE
- FENCE LINE
- TREES
- MW-25(R) — GROUNDWATER ELEVATION MONITORING WELL LOCATION AND NUMBER (s = shallow, i = intermediate, d = deep)
- MW-29s — PRMP MONITORING WELL LOCATION AND NUMBER (s = shallow, i = intermediate, d = deep)
- SG-R1 — RIVER POINT SURFACE WATER ELEVATION
- SG-D1 — DRAINAGE CHANNEL POINT SURFACE WATER ELEVATION
- GEI-2i — PIEZOMETER LOCATION
- SW-R-1 — SURFACE WATER SAMPLING LOCATION (D = DITCH; R = RIVER)
- 626 — SHALLOW GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- 630 — POST-REMEDIATION GROUND SURFACE ELEVATIONS
- PA — AREA WHERE PCB IMPACTED SOILS WERE EXCAVATED
- C-1 — AREA WHERE THE LNAPL SMEAR ZONE WAS EXCAVATED AND LATERAL EXTENT OF SUBSURFACE SLURRY MONOLITH
- WESTERN BOUNDARY OF REGULATED WETLAND

NOTES

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC SURVEY PROVIDED BYJAMES M.STEWART, INC. LAND SURVEYORS, DRAWING NO 2793-03.DWG, DATED 02-14-02 AS REVISED 04-10-07 (DRAWING NO. 314907REV.DWG).
2. FORMER BUILDING OPERATIONS
   - BUILDING 9: RAW MATERIAL, DRUM STORAGE, AND PRINTING
   - BUILDING 8: LAMINATION
   - BUILDING 15 and 17: INSPECTION, STORAGE, AND DISTRIBUTION
   - BUILDING 16: OFFICES
3. AS DESCRIBED IN THE November 2005 RAR (SEE FIGURE 9 IN THAT REPORT), THE SLURRY MONOLITH AT AND PARALLEL TO THE DRAINAGE CHANNEL DITCH ENDS APPROXIMATELY 10 FEET WEST OF THE ACTUAL WATERS EDGE.

N

0 60' 120' 180' 240'
SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

L.E. CARPENTER
WHARTON, NEW JERSEY

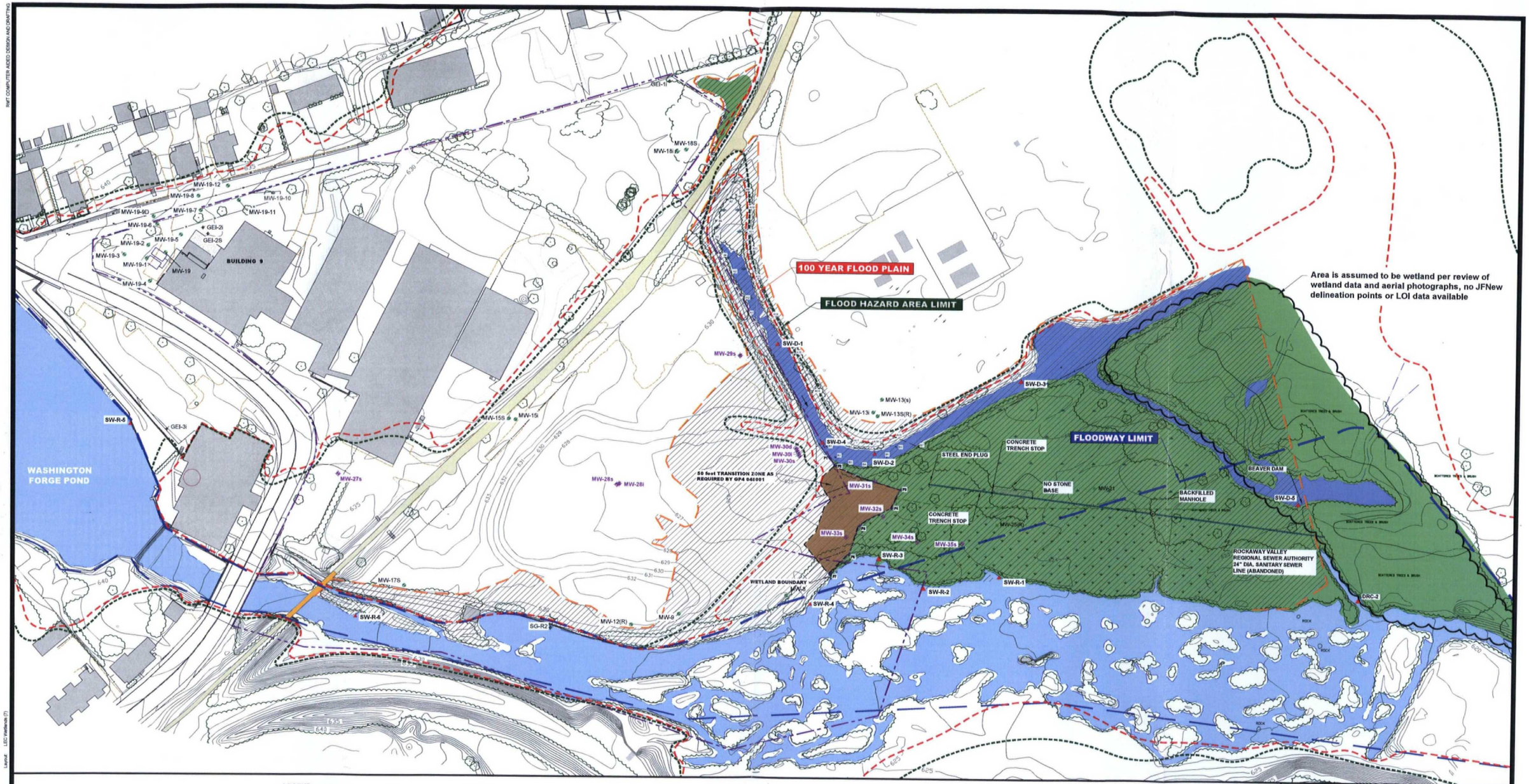
SITE-WIDE SHALLOW GROUNDWATER ELEVATION CONTOURS
3rd QUARTER 2008

DRAWN BY: SL, KW	DRAWING SCALE:	PROJECT NO.	J106527\28
CHECKED BY: JD,EV	SHOWN	FILE NO.	6527.28.16.dwg
APPROVED BY: JD	DATE PRINTED:	**FIGURE 6**	
DATE: November 2008			

RMT

3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022

Drawing Name: J106527\28.16.dwg
Operator Name: SAM LUCIDO
Drawing Plot Scale: 1:40
Dwg Size: 0.21 Mb
Plot Date: April 2008
Plot Time: 4:43 PM
Layout: Well Location Map (3)



LEGEND

- APPROXIMATE PROPERTY LINE
- FENCE LINE
- TREES
- MW-25(R) — GROUNDWATER ELEVATION MONITORING WELL LOCATION AND NUMBER (s = shallow, i = intermediate, d = deep)
- MW-29s — PRMP MONITORING WELL LOCATION AND NUMBER (s = shallow, i = intermediate, d = deep)
- SG-R1 — RIVER POINT SURFACE WATER ELEVATION
- SG-D1 — DRAINAGE CHANNEL POINT SURFACE WATER ELEVATION
- GEI-2I — PIEZOMETER LOCATION
- SW-R-1 — SURFACE WATER SAMPLING LOCATION (D = DITCH, R = RIVER)
- 630 — POST-REMEDIATION GROUND SURFACE ELEVATIONS CONTOUR INTERVAL = 1 ft.
- RAILS TO TRAILS
- REGULATED WETLAND
- TRANSITION ZONE
- STATE OPEN WATERS
- BRIDGE
- (PEM) PALUSTRINE EMERGENT WETLAND
- (PFO/SS) PALUSTRINE FORESTED/ SCRUB-SHRUB
- NJDEP FLOOD HAZARD AREA
- NJDEP FLOOD HAZARD BOUNDARY
- NJDEP 100 YEAR FLOOD PLAIN
- NJDEP FLOOD HAZARD LIMITS
- NJDEP FLOODWAY LIMITS
- F4 — SURVEYED WETLAND DELINEATION FLAG (JFNEW, MARCH, 2004)
- A19 — LETTERS OF INTERPRETATION, LOI 1439-00-0001.1 FLAG NUMBER (JUNE 2000)
- WETLAND BOUNDARY
- WETLAND TYPE BORDER
- ABANDONED SEWER LINE

NOTES

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC SURVEY PROVIDED BY JAMES M.STEWART, INC. LAND SURVEYORS, DRAWING NO 2793-03.DWG, DATED 02-14-02 AS REVISED 04-10-07 (DRAWING NO. 314907REV.DWG).
2. WETLAND BOUNDARIES BASED ON JFNEW DELINEATION (SEPT 2004) AND LETTERS OF INTERPRETATION (LOI) (JUNE 14, 2000), 1439-00-0001.1 REFERENCES THE NEW JERSEY LANDUSE REGULATION PROGRAM FILE NUMBER.
3. ELEVATIONS FOR THE FLOOD HARZARD LINE FROM THE STATE OF NEW JERSERY, DEPARTMENT OF ENVIRONMENTAL PROTECTION, DIVISION OF WATER RESOURCES, DELINEATION OF FLOODWAY AND FLOOD HAZARD AREA (SHEETS B-16 and C-16).

N

0 60' 120' 180' 240'
SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

L.E. CARPENTER
WHARTON, NEW JERSEY

WETLANDS MAP

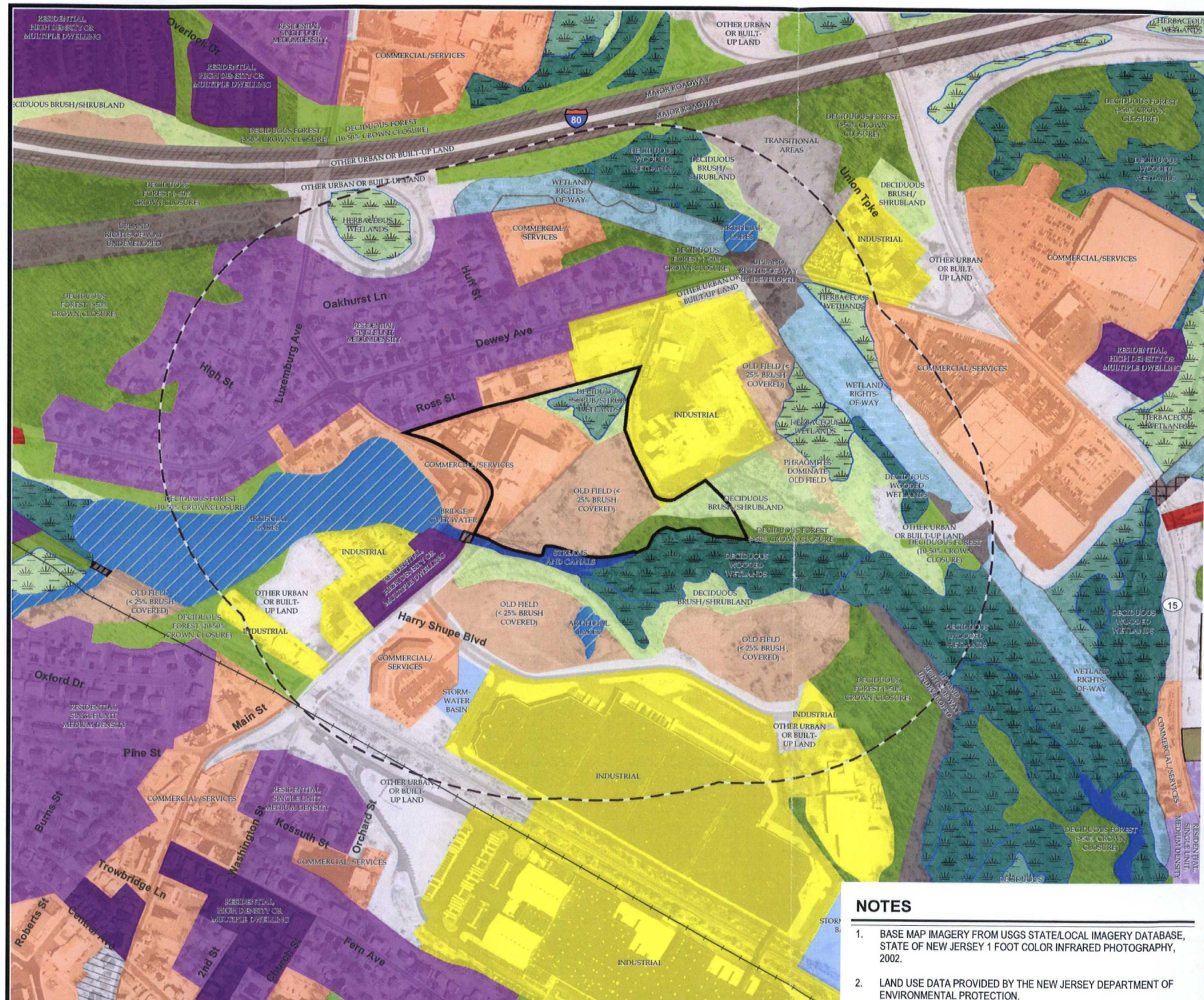
DRAWN BY: SL	DRAWING SCALE:	PROJECT NO.	J:\0652\726
CHECKED BY: SP	SHOWN	FILE NO.	6527.28.17.dwg
APPROVED BY: JD	DATE PRINTED:	**FIGURE 7**	
DATE: November 2008			

RMT

3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022

RMT COMPUTER AIDED DESIGN AND DRAFTING

Drawing Name: J:\0652\726\6527.28.17.dwg
Operator Name: SAM Lizzio/JD
Drawing Set Scale: 1:40
Layout: LEC Wetlands (7)
Dwg Size: 0.24 Mb
Plot Date: April 2008
Plot Time: 4:42 PM



LEGEND

- AREA OF CONCERN BOUNDARY
- 1,000' RADIUS FROM AREA OF CONCERN

LAND-USE CLASSIFICATION

- TRANSPORTATION/COMMUNICATION/UTILITIES
- MILITARY INSTALLATIONS
- DECIDUOUS BRUSH/SHRUBLAND
- DECIDUOUS FOREST (10-50% CROWN CLOSURE)
- DECIDUOUS FOREST (>50% CROWN CLOSURE)
- WETLAND RIGHTS-OF-WAY
- DECIDUOUS SCRUB/SHRUB WETLANDS
- DECIDUOUS WOODED WETLANDS
- HERBACEOUS WETLANDS
- STORMWATER BASIN
- STREAMS AND CANALS
- ARTIFICIAL LAKES
- INDUSTRIAL
- COMMERCIAL/SERVICES
- RESIDENTIAL, SINGLE UNIT, LOW DENSITY
- RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY
- RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING
- PHRAGMITES DOMINATE OLD FIELD
- OLD FIELD (< 25% BRUSH COVERED)
- OTHER URBAN OR BUILT-UP LAND
- MIXED URBAN OR BUILT-UP LAND
- TRANSITIONAL AREAS
- UPLAND RIGHTS-OF-WAY UNDEVELOPED
- UPLAND RIGHTS-OF-WAY DEVELOPED
- MAJOR ROADWAY
- BRIDGE OVER WATER

0 300 600 FEET

1 " = 400 '
1:4,800

N

NOTES

1. BASE MAP IMAGERY FROM USGS STATE/LOCAL IMAGERY DATABASE, STATE OF NEW JERSEY 1 FOOT COLOR INFRARED PHOTOGRAPHY, 2002.
2. LAND USE DATA PROVIDED BY THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION.

PROJECT:

L.E. CARPENTER SITE
WHARTON, NEW JERSEY

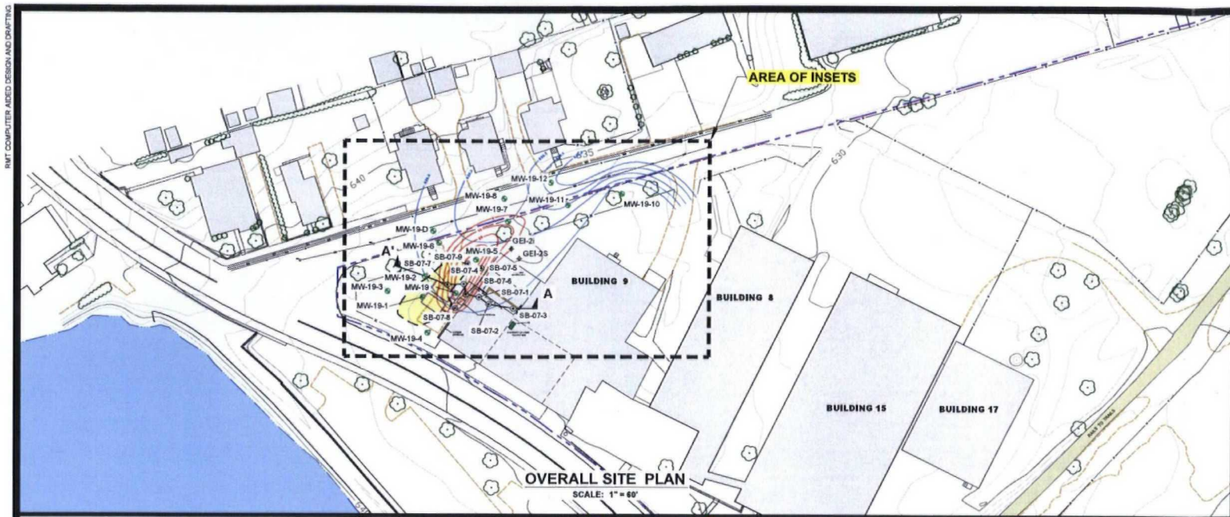
SHEET TITLE:

LOCATION OF ENVIRONMENTAL AND HUMAN RECEPTOR SENSITIVE AREAS

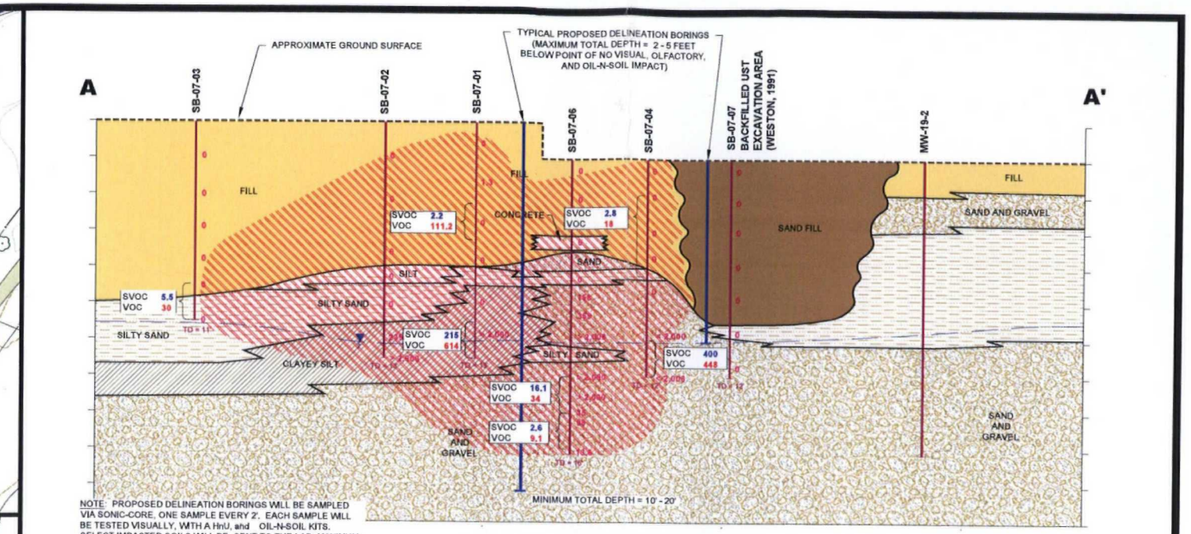
DRAWN BY: PAPEZ J	SCALE:	PROJ. NO.	00-006527.30
CHECKED BY: SP	AS NOTED	FILE NO.	065273001a.mxd
APPROVED BY: NC	DATE PRINTED:	**FIGURE 8**	
DATE: NOVEMBER 2008	11/6/2008		

RMT
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923 53708-8923
Phone: 608-831-4444
Fax: 608-831-3334

D:\06527\30\MXD\065273001a.mxd 11/6/2008 15:13:38

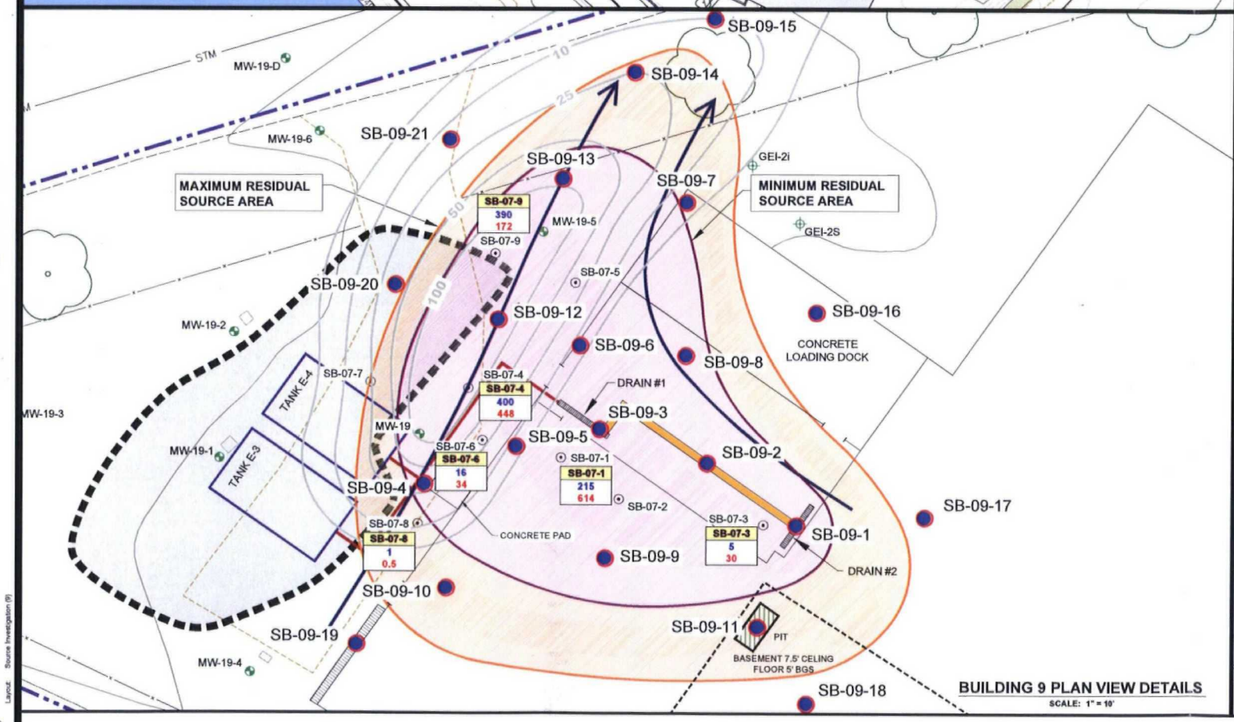


OVERALL SITE PLAN
SCALE: 1" = 60'

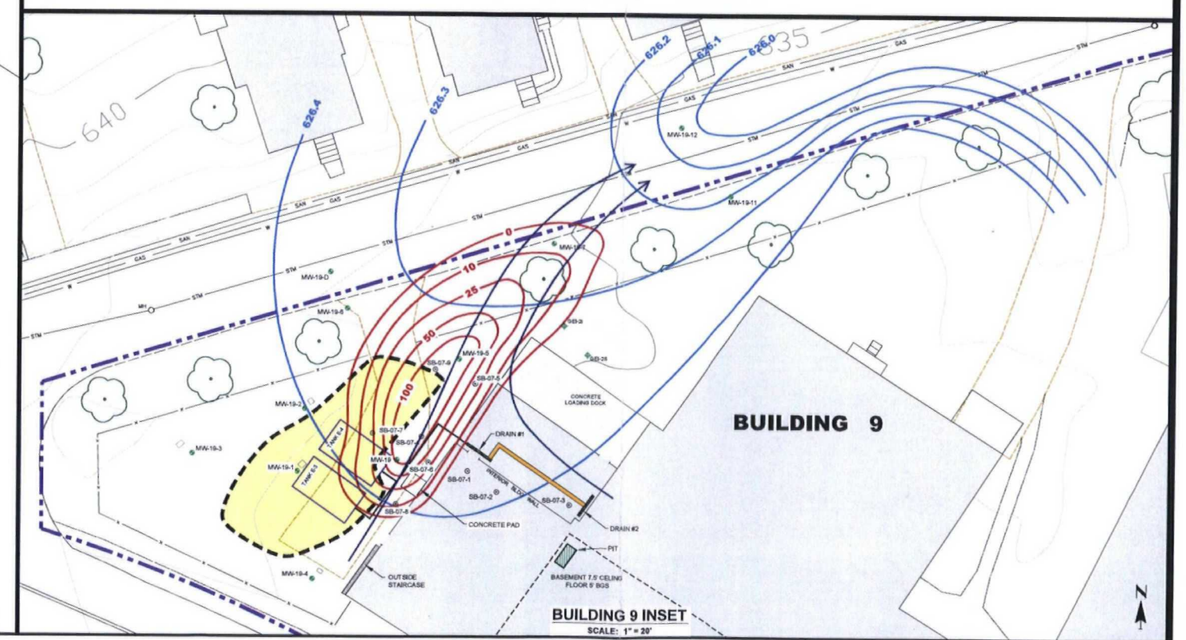


NOTE: PROPOSED DELINEATION BORINGS WILL BE SAMPLED VIA SONIC-CORE, ONE SAMPLE EVERY 2', EACH SAMPLE WILL BE TESTED VISUALLY, WITH A HNU, and OIL-N-SOIL KITS. SELECT IMPACTED SOILS WILL BE SENT TO THE LAB; MAXIMUM NO. OF SAMPLES PER BORING = 6.

GEOLOGIC CROSS SECTION A - A'
HORIZONTAL SCALE: 1" = 8'
VERTICAL SCALE: 1" = 4'



BUILDING 9 PLAN VIEW DETAILS
SCALE: 1" = 10'



BUILDING 9 INSET
SCALE: 1" = 20'

LEGEND

- APPROXIMATE PROPERTY LINE
- FENCE LINE
- TREES
- MW-19 — EXISTING MONITORING WELL LOCATION AND NUMBER
- GEI-2i — PIEZOMETER LOCATION
- SB-07-01 — RASR SOIL BORING (RMT AUGUST 2007)
- 626 — GROUNDWATER ELEVATION CONTOUR (2Q07)
- 10 — ISOCONCENTRATION CONTOUR FOR TOTAL MAXIMUM BTEX (ppm) IN GROUNDWATER (2Q07)
- ABANDONED PIPE FLOOR CONNECTION BETWEEN 2 FLOOR DRAINS (APPROX. 2ft. WIDE)
- 1994 SOIL EXCAVATION (WESTON)
- VERTICAL EXTENT
- FORMER FLOOR DRAIN
- FORMER PRODUCTION PIT (BASE OF PIT NOT IN CONNECTION WITH SUBSURFACE SOILS BUT RATHER IN BUILDING 9 SUBBASEMENT)
- TANK E-3 — FORMER UNDERGROUND STORAGE TANK (WESTON 1990 - 1991)
- SB-09-18 — PROPOSED DELINEATION SOIL BORING LOCATION AND NUMBER
- MAXIMUM RESIDUAL SOURCE AREA
- MINIMUM RESIDUAL SOURCE AREA
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- SB-07-4 — BORING ID
- 400 — TOTAL SVOC's IN SMEAR ZONE SOIL (mg/kg)
- 448 — TOTAL VOC's IN SMEAR ZONE SOIL (mg/kg)

NOTES

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC SURVEY PROVIDED BY JAMES M. STEWART, INC. LAND SURVEYORS, DRAWING NO 2793-03.DWG, DATED 02-14-02 AS REVISED 04-10-07 (DRAWING NO. 314907REV.DWG).
2. FORMER BUILDING OPERATIONS
   - BUILDING 9: RAW MATERIAL, DRUM STORAGE, AND PRINTING
   - BUILDING 8: LAMINATION
   - BUILDING 15 and 17: INSPECTION, STORAGE, AND DISTRIBUTION
3. LOCATION OF 1994 WESTON SOIL EXCAVATION AND FORMER UST E-3 AND E-4 APPROXMATED BASED ON HISTORICAL SCALED DRAWINGS.

NO.	BY	DATE	REVISION	APPD.
5.				
4.				
3.				
2.				
1.				

L.E. CARPENTER
WHARTON, NEW JERSEY

PROPOSED SOIL BORINGS FOR MW-19 HOT SPOT 1
RESIDUAL SOURCE INVESTIGATION

DRAWN BY:	SL	DRAWING SCALE:	PROJECT NO. J:\06527\06
CHECKED BY:	EV, JO	SHOWN	FILE NO. 6527.26.19.dwg
APPROVED BY:	JD	DATE PRINTED:	FIGURE 9
DATE:	November 2008		

RMT
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022

RMT COMPUTER AIDED DESIGN AND DRAFTING

Drawing Name: J:\06527\06\6527.26.19.dwg
Operator Name: SAM LUCIDO
Drawing Plot Scale: 1:40
Layout: Source Investigation (B)
Dwg Size: 5.43 Mb
Plot Date: November 7, 2008
Plot Time: 1:25 PM

Appendix A
NJDEP October 16, 2008 NOD

State of New Jersey

Jon S. Corzine
Governor

Department of Environmental Protection

Lisa P. Jackson
Commissioner

Bureau of Case Management
401 East State Street
P.O. Box 028
Trenton, NJ 08625-0028
Phone #: 609-633-1455
Fax #: 609-633-1439

October 16, 2008

Christopher Anderson, Director
LE Carpenter
33587 Walker Rd
Avon Lake, OH 44012

NOTICE OF DEFICIENCY

Re: Remedial Action Selection Report for:
L E Carpenter
170 North Main St
Wharton, Morris County,
SRP PI# 003017
Activity Number Reference: RPC060001

Dear Mr. Anderson:

The New Jersey Department of Environmental Protection (Department) acknowledges receipt on September 6, 2007 of the Remedial Action Selection Report submitted pursuant to the Administrative Consent Order (ACO) executed on September 26, 1986 and the Technical Requirements for Site Remediation at N.J.A.C. 7:26E (Tech Rule).

Deficiencies

The Department has completed its review of your submittal and identified the following deficiencies:

Description of Deficiency: Pursuant to N.J.A.C. 7:26E-3.6(a)7, failure to collect soil samples in saturated zones.

Description of Deficiency: Pursuant to N.J.A.C. 7:26E-4.1(b), failure to delineate the horizontal and vertical limits of contamination to the applicable unrestricted use remediation standard for all media. Specifically, the delineation of contaminants in soils has not been completed.

Corrective Actions

To correct these deficiencies please take the following actions or make the required submittals within the timeframes indicated:

Submit a Remedial Investigation Workplan within 30 days after receipt of this notice that addresses the deficiencies.

Detailed Explanation

1. *Section 2, page 3*: The brief discussion of a "smear zone" at the top of the water table mentions an apparent secondary source that continues to provide contaminant mass to the aquifer. This is reasonable that this condition exists, therefore, LE Carpenter will be required to delineate deep enough in the saturated zone in order to take account of the fluctuating water table.

2. *Section 4, page 1*: The Department generally agrees with the recommended remedial action, however, the full nature and extent of the contaminated area should be determined so that the proposed remedial action is appropriate, thorough and complete. In order to conduct a comprehensive contaminant delineation the Department recommends that Building #9 be demolished and removed. This will allow the LE Carpenter to investigate areas, such as floor drains, basement areas and footers, that would otherwise be inaccessible if the building remains. However, an alternate method to investigate these areas may be proposed, provided all the areas of concern are addressed.

Note that if deficiencies included herein are not addressed to the Department's satisfaction within the specified time period the Department will consider them to be violations and may assess penalties pursuant to N.J.A.C. 7:26C-10, or pursuant to the terms stipulated in the ACO.

If you require copies of Department Guidance Documents or applications, many of these are available on the internet http://www.state.nj.us/dep/srp. If you have any questions regarding this matter contact Glenn Savary Case Manager, at (609) 633-0835, or at Glenn.Savary@dep.state.nj.us, prior to the date indicated.

Prepared By:

Glenn Savary, Case Manager
Bureau of Case Management

Reviewed By:

Gwen Zervas, P.E., Section Chief
Bureau of Case Management

cc: Nick Clevett, RMT
Patricia Simmons Pierre, EPA
George Blyskun, BGWPA
John Prendergast, BEERA
Health Officer, Wharton
Clerk, Wharton

Appendix B
Report Certification

REPORT CERTIFICATION
PURSUANT TO N.J.A.C. 7:26E-1.5

"I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement, which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties."

Ernie Schaub
PRINTED NAME

Manager, Environmental Services
TITLE

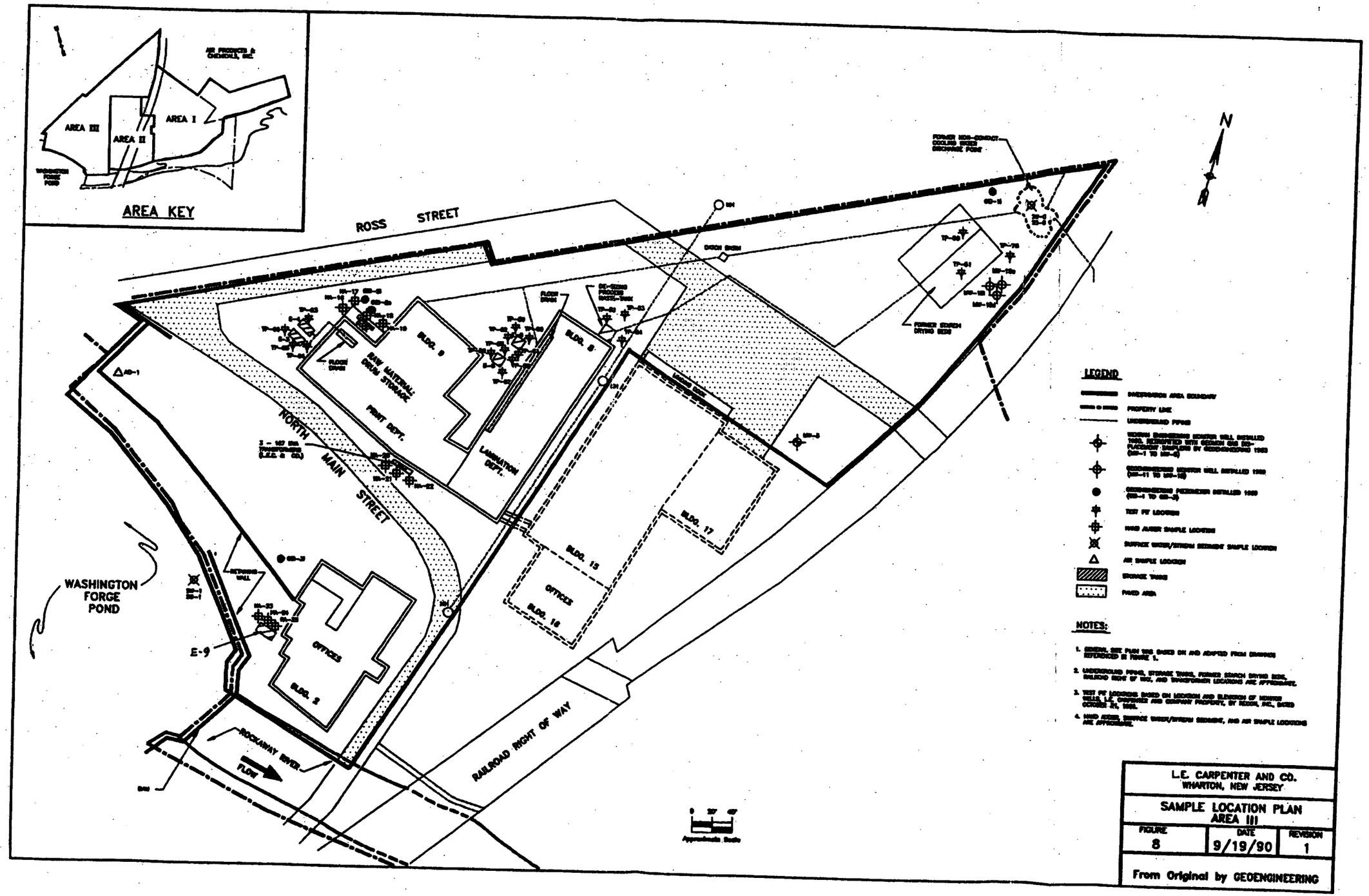
L.E. Carpenter & Company
COMPANY

Ernie Schaub
SIGNATURE

13 November 2008
DATE

Appendix C
Sample Location Plan Area III

WESTON
MANAGERS DESIGNERS/CONSULTANTS



L.E. CARPENTER AND CO.
WHARTON, NEW JERSEY

SAMPLE LOCATION PLAN
AREA III

FIGURE	DATE	REVISION
8	9/19/90	1

From Original by GEOENGINEERING

Appendix D
NJDEP NOD June 20, 2007

State of New Jersey

Jon S. Corzine
Governor

Department of Environmental Protection

Lisa P. Jackson
Commissioner

Bureau of Case Management
401 East State Street
P.O. Box 028
Trenton, NJ 08625-0028
Phone #: 609-633-1455
Fax #: 609-633-1439

June 20, 2007

CERTIFIED MAIL/RRR
7003 3110 0003 5033 8597

CHRISTOPHER ANDERSON, DIRECTOR
LE CARPENTER
33587 WALKER RD
AVON LAKE, OH 44012

NOTICE OF DEFICIENCY

Re: Soil Gas Investigation Report in the MW19/Hot Spot Area and the Response to NJDEP Comments regarding the Post Remedial Monitoring Plan
170 North Main St, Wharton Boro, New Jersey, 07885
SRP PI# 003017
EA ID #: NOD070001 - 003017

Dear Mr. Anderson:

The New Jersey Department of Environmental Protection (Department) acknowledges receipt on May 9, 2006 of the Soil Gas Investigation Report in the MW19/Hot Spot Area and the Response to NJDEP Comments regarding the Post Remedial Monitoring Plan submitted pursuant to the Administrative Consent Order (ACO) executed on September 26, 1986 and the Technical Requirements for Site Remediation at N.J.A.C. 7:26E.

General Comments

The Department has determined that residual BTEX remains in the MW-19 area. Even after the removal of the underground storage tanks and subsequent soil excavation over 15 years ago persistently high levels of BTEX compounds remain in the groundwater.

The groundwater sampling results indicate that a residual long-term source of dissolved BTEX contamination remains in this area.

Deficiencies

The Department has determined that the Soil Gas Investigation Report in the MW19/Hot Spot Area and the Response to NJDEP Comments regarding the Post Remedial Monitoring Plan reflects the following deficiencies:

> Description of Deficiency: Pursuant to the Administrative Consent Order (ACO) executed on September 26, 1986, failure to conduct additional remediation as required, in accordance with N.J.A.C. 7:26E, pursuant to Paragraph 29 of the Administrative Consent Order.

Corrective Actions

You must take the following corrective actions:

> Submit a Remedial Action Selection Report within 30 days after receipt of this notice which is focused on the expedited abatement of residual BTEX product in the MW-19 area. In addition to the RASR, a schedule must be provided to implement the remedy.

Note that if deficiencies included herein are not addressed to the Department's satisfaction within the specified time period the Department may assess penalties pursuant to the provisions of paragraph 40 of the ACO. To determine whether the uncorrected deficiencies will be minor with a period of time to correct or non-minor and subject to penalties, refer to the table at N.J.A.C. 7:26C-10.4(c).

If you require copies of Department Guidance Documents or applications, many of these are available on the internet http://www.state.nj.us/dep/srp. If you have any questions regarding this matter contact Glenn Savary Case Manager, at (609) 633-0835 prior to the date indicated.

Sincerely,

Glenn R. Savary, Case Manager
Bureau of Case Management

cc: Nick Clevett, RMT
Michelle Granger, EPA

George Blyskun, BGWPA
John Prendergast, BEERA
Health Officer, Wharton
Clerk, Wharton

Appendix E
Boring Logs

Client: L.E. Carpenter and Company
Project: L.E. Carpenter Remedial Investigation
Location: Wharton, New Jersey
Drilling Contractor: Moretrench American Corporation
Inspector: JGS
Surface Elev.: 635.92 (ft. MSL) (at GEI-21)

Boring No.: GEI-2 Cluster
Sheet: 1 of 2
File No.: 88072
Date Started: 8/17/89
Date Completed: 8/22/89

SAMPLE NO.	SAMPLE REC.	BLOWS /12"	DEPTH (FT.)	SOIL TYPE	SOIL DESCRIPTION
			0	SM	Brown, very fine to fine SAND, trace Silt, few cobbles and boulder
			5		Same as above.
			10	SP	Brown gray, medium to coarse SAND, some fine Gravel; occasional boulders.
			15		Gray; medium to coarse(+) SAND, some fine Gravel; occasional cobbles.
			20		Same as above.

Sampler Type: ☒ Cuttings

Boring Method: Air Rotary
10"/8"/6" Air Hammer

GeoEngineering, Inc.

MONITOR WELL INSTALLATION

Client: L. E. CARPENTER Job No: 3600-05-67 Date Drilled: 5/20/91 Well No: MW-19

Site: WHARTON, NJ Interval: 7-17 FT Top of Steel Casing:

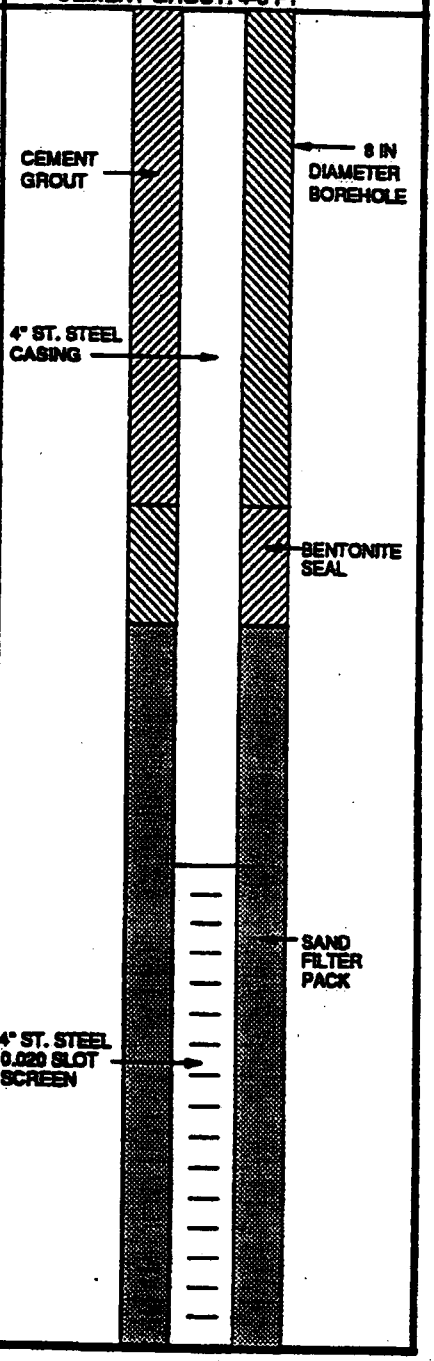
Total Depth: 17.0 FT Casing Size & Type: 4" ST. STEEL Screen Size: 0.020

Comments:

Depth	Blow Count	Sample Description
	2	25% RECOVERY. COARSE SAND FILL LAST 2" IS BLACK SILTY SAND.
1	6	
	10	
2	9	
	13	25% RECOVERY. COARSE SAND FILL OVER SANDY CLAY WITH SMALL PEBBLES
3	14	
	19	
4	27	
	14	25% RECOVERY. YELLOW-BROWN SILTY CLAY.
5	10	
	8	
6	20	COBBLE AND BOULDER ZONE BEGINS
	28	25% RECOVERY. HNU=BG. REDDISH-BROWN CLAY (SAPROLITE) W/ COBBLE FRAGMENTS. SPOON WAS SITTING ON TOP OF COBBLE. REFUSAL ENCOUNTERED.
7	58	
	50/2	
8		
		BOULDERS - DRY HNU=BG NO RECOVERY
9		
10		WATER AT 10 FT

Completion Data

SCREEN: 17-7 FT
SAND FILTER PACK: 17-5 FT
BENTONITE SEAL: 5-4 FT
CEMENT GROUT: 4-0 FT



MONITOR WELL INSTALLATION

Client: L. E. CARPENTER Job No: 3600-05-67 Date Drilled: 5/20/91 Well No: MW-19

Site: WHARTON, NJ Interval: 7-17 FT Top of Steel Casing:

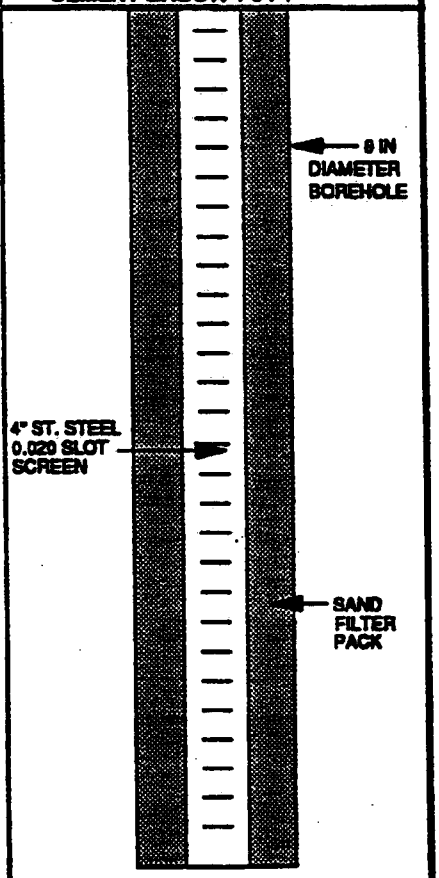
Total Depth: 17.0 FT Casing Size & Type: 4" ST. STEEL Screen Size: 0.020

Comments:

Depth	Blow Count	Sample Description
		HOLE ADVANCED THROUGH COBBLES TO 11 FT
11		
		75% RECOVERY. BROWN COARSE SAND WITH STRONG ODOR OF MEK. HNU=200 UNITS ON SPOON, 100 UNITS IN BREATHING ZONE. CREW UPGRADED TO LEVEL C.
12		
	23	
	18	
13		
	52	
		100% RECOVERY. LIGHT BROWN SANDY GRAVEL WITH STAINING FROM 14-15 FT. HNU=50 UNITS
	73	
14		
15		
		CUTTINGS - AS ABOVE
16		
17		TD = 17.0 FT
		MATERIALS: 10 FT 0.020 SLOT ST. STEEL 4" SCREEN 10 FT ST. STEEL 4" CASING 1 BUCKET BENTONITE PELLETS
18		
19		
20		

Completion Data

SCREEN: 17-7 FT
SAND FILTER PACK: 17-5 FT
BENTONITE SEAL: 5-4 FT
CEMENT GROUT: 4-0 FT



MW19 / Hot Spot 1 Area of Concern

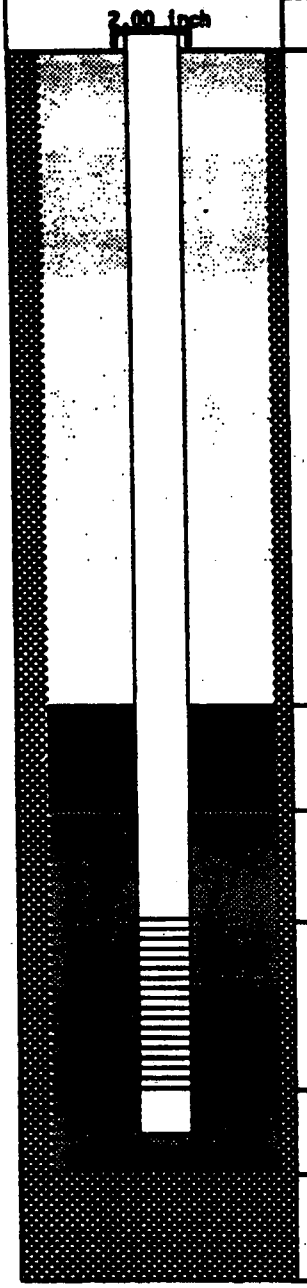
Well Completion Summary

Temp Wellpoints & Boring Logs.

Roy F. WESTON, Inc.

CLIENT	LECARPENTER	DRILLING FIRM	SUMMIT DRILLING, INC.
SITE NAME	MW-19 DELINEATION	INSPECTOR	BURNS/HACKETT

WELL ID	B-1-MW19	WATER LEVELS	
START DATE	05/10/96	9.85 FT (TOC) ON 05/10/96	
COMPLETION DATE	05/10/96		



DEPTH		ELEV.
0.05	TC	0.05
0.00	GS	0.00
0.00	BN	0.00
0.00	SP	0.00
9.83	SC	-9.83
14.83	BS	-14.83
14.83	TD	-14.83

DRILLING SUMMARY

Driller: DECORSO
Drilling Fluid: NOT APPLICABLE
Well Type: SINGLE CASED SCREENED

WELL DESIGN CONSTRUCTION

Casing #1 Diameter: 2.00 inch Interval: 0.00 to 14.83 ft.
Type : PVC SCH 40

Stick Up Inner Casing: 0.05 ft. Protective Casing: 0.00 ft.

Casing Grout: OTHER Interval: 0.00 to 0.00 ft.

Seal Type: NONE Interval: 0.00 to 0.00 ft.

Sand Pack Type: NONE Interval: 0.00 to 0.00 ft.
Grain Size: Median Diameter:
Screen Diameter: 2.00 Interval: 9.83 to 14.83 ft.
Type : PVC Slots: 0.02 inches

Silt Trap Interval: 0.00 to 0.00 ft.
Backfill Type: NATURAL Interval: 0.00 to 14.83 ft.

WELL DEVELOPMENT

Date: / /
Method:
Yield: Purged Volume:

COMMENTS

TC = Top of Casing SP = Top Sand Pack = Grout
GS = Ground Surface SC = Top Screen = Seal
BN = Top Seal BS = Bottom Screen = Sand Pack
TD = Total Depth = Formation

Additional Comments:
Temporary well installed for the collection of groundwater screening samples.

NOTE: Well Diagram not to Scale Elevations are feet above mean sea level

GEOLIS Copyright (c) 1990, Roy F. WESTON, Inc. 06/19/96

LOG OF TEST BORING

RMT

PROJECT NAME	L. E. Carpenter	BORING NO.	MW19-1
LOCATION	Warton, NJ	SHEET NO.	1 OF 1
CONTRACTOR	Aquifer Testing & Drilling	PROJECT NO.	3868.03
DRILLING METHOD	Air Rotary Hammer	INSTALLATION	2/17/98
		SURFACE ELEV.	---
		BOREHOLE DIA.	10 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS	WELL CONSTR
INTERVAL NO.	INTERVAL TYPE	RECOVERY N	RECOVERY IN	PID ppm	DEPTH		
						GRASS/TOPSOIL	
A	SS	27-20 12-8	14	1.0		WELL GRADED SAND WITH SILT AND GRAVEL (SP-SM), brown, moist.	
B	SS	22-12 12-8	6	1.7	5	SAME AS ABOVE	
C	SS	14 100/4	4	0.4		SAME AS ABOVE, cobble in spoon tip.	
D	SS	100/2	3	1.2	▽ 10	SAME AS ABOVE, cobble in spoon tip, moist to wet.	
E	SS	50/0	0	---		NO RECOVERY	
F	SS	100/1	2	23		WELL GRADED SAND WITH GRAVEL (SW), brown, wet, hydrocarbon odor.	
G	SS	11-11 5-3	12	0.2	15	POORLY GRADED SAND (SP), very fine grained, red-brown and black lamina in light brown matrix.	
						END OF BORING AT 16 FEET	

GENERAL NOTES

DATE STARTED	2-17-98
DATE COMPLETED	2-17-98
RIG	Reach Drill T650W
CREW CHIEF	Jeff Jaworski
LOGGED	E.M.V.
CHECKED	S.C.

WATER LEVEL OBSERVATIONS

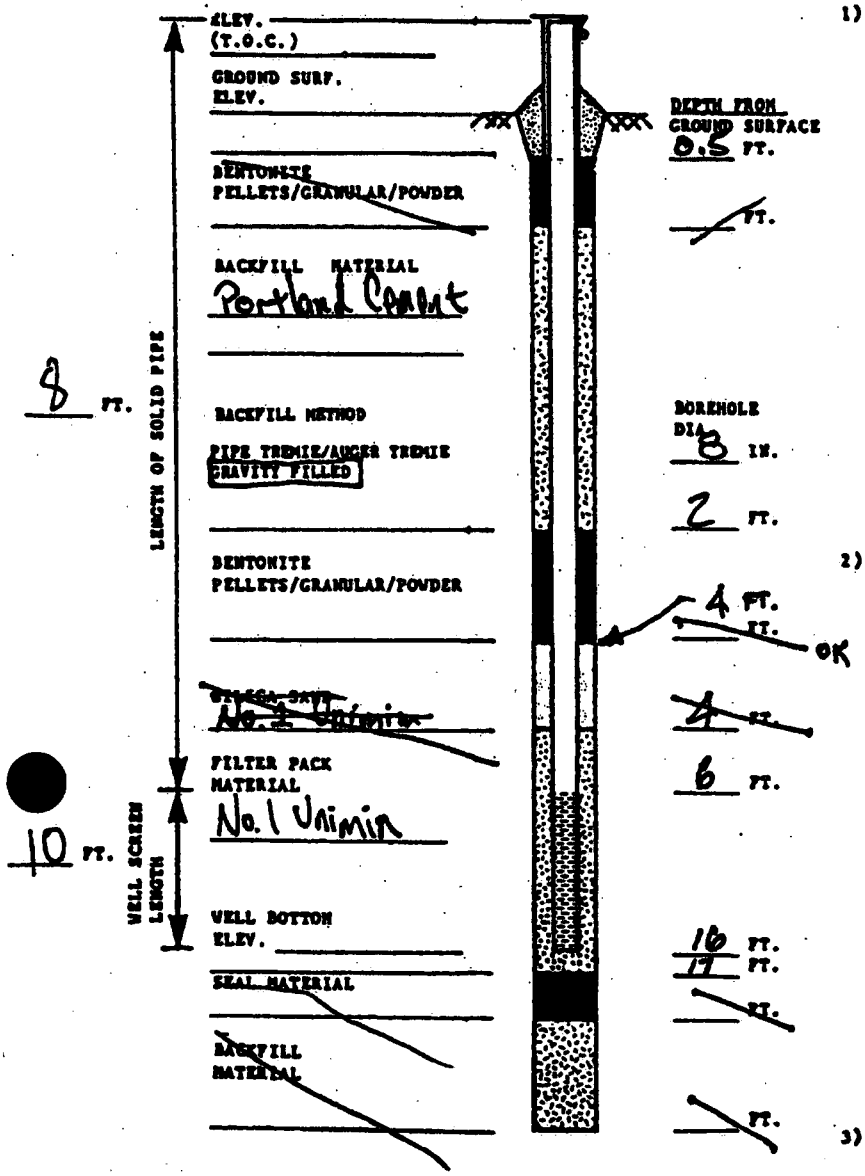
WHILE DRILLING	▽	9.4 feet
AT COMPLETION	▼	
AFTER DRILLING		
CAVE-IN: DATE/TIME		DEPTH
WATER: DATE/TIME		DEPTH

N3LBW 38683 4-10-98

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: LE Carpenter NO. _____
WELL NO. MW-19-1
DATE INSTALLED 2/17/98



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE _____

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER _____

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER _____

E) WELL SCREEN SLOT SIZE _____

F) PIPE DIA: ID IN. 4 OD IN. ____

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. ____ IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER _____

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? _____

C) APPROXIMATE WATER VOLUME: REMOVED _____

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME _____ FT.

DATE/TIME _____ FT.

DATE/TIME _____ FT.

ADDITIONAL COMMENTS: Six-inch sump in well bottom. Therefore Actual screen @ 6-15.5 ft BGL

LOG OF TEST BORING

RMT

PROJECT NAME	L. E. Carpenter	BORING NO.	MW19-2
LOCATION	Warton, NJ	SHEET NO.	1 OF 1
CONTRACTOR	Aquifer Testing & Drilling	PROJECT NO.	3868.03
DRILLING METHOD	Air Rotary Hammer	INSTALLATION	2/17/98
		SURFACE ELEV.	---
		BOREHOLE DIA.	10 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL NO.	INTERVAL TYPE	RECOVERY N	RECOVERY IN	PID ppm	DEPTH	
A	SS	9-8 7-8	12	0.0		GRASS TOP SOIL WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), red-brown.
B	SS	7-9 13-37	4	0.0		WELL GRADED SAND WITH GRAVEL (SW), light brown, red-brown at about 3.8 ft, moist.
C	SS	3-5 5-4	16	0.0	5	WELL GRADED SAND WITH SILT AND GRAVEL (SW SM), red-brown, moist, with rootlets.
D	SS	6-5 7-9	14	2.6		SAME AS ABOVE
E	SS	7-9 14-16	6	0.0	10	SAME AS ABOVE, moist to wet, cobble in spoon tip.
F	SS	19 50/5	2	0.0		WELL GRADED SAND WITH GRAVEL (SW), red-brown, wet.
G	SS	6-7 8-9	0	---		NO RECOVERY
H		11-12 15-17	6	71	15	SAME AS ABOVE, gray to black.
						END OF BORING AT 16 FEET

WELL CONSTR

GENERAL NOTES

DATE STARTED	2-17-98
DATE COMPLETED	2-17-98
RIG	Reach Drill T650W
CREW CHIEF	Jeff Jaworski
LOGGED	E.M.V.
CHECKED	S.C.

WATER LEVEL OBSERVATIONS

WHILE DRILLING	▽	
AT COMPLETION	▼	9.7 feet
AFTER DRILLING		
CAVE-IN: DATE/TIME		DEPTH
WATER: DATE/TIME		DEPTH

N3LBW 38683 4-10-98

RMT

Well Diagram
F-17 (8 11-85)

PROJECT NAME: LE Carpenter NO. _____
WELL NO. MW-19-2
DATE INSTALLED 2/17/98

ELEV. (T.O.C.) _____

GROUND SURF. ELEV. _____

DEPTH FROM GROUND SURFACE _____ FT.

BENTONITE PELLETS/~~GRANULAR~~/POWDER _____ ~~FT.~~

BACKFILL MATERIAL: Portland Cement

8 FT. — LENGTH OF SOLID PIPE

BACKFILL METHOD: PIPE TREMIE/AUGER TREMIE / GRAVITY FILLED

BOREHOLE DIA. 8 IN.

2 FT.

BENTONITE PELLETS/GRANULAR/POWDER

4 FT.

~~SILICA SAND~~ _____ ~~4 FT.~~

FILTER PACK MATERIAL: #1 Unimin Sand

6 FT.

10 FT. — WELL SCREEN LENGTH

WELL BOTTOM ELEV. _____

16 FT.
16 FT.

SEAL MATERIAL _____ ~~FT.~~

BACKFILL MATERIAL _____ ~~FT.~~

1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE _____

B) TYPE OF PIPE JOINTS:

COUPLINGS, THREADED (W/TAPE), OTHER _____

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER _____

E) WELL SCREEN SLOT SIZE 0.01

F) PIPE DIA: ID IN. 4 OD IN. _____

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 6 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER _____

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? _____

C) APPROXIMATE WATER VOLUME: REMOVED _____

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME _____ FT

DATE/TIME _____ FT

DATE/TIME _____ FT

ADDITIONAL COMMENTS: No Sump.

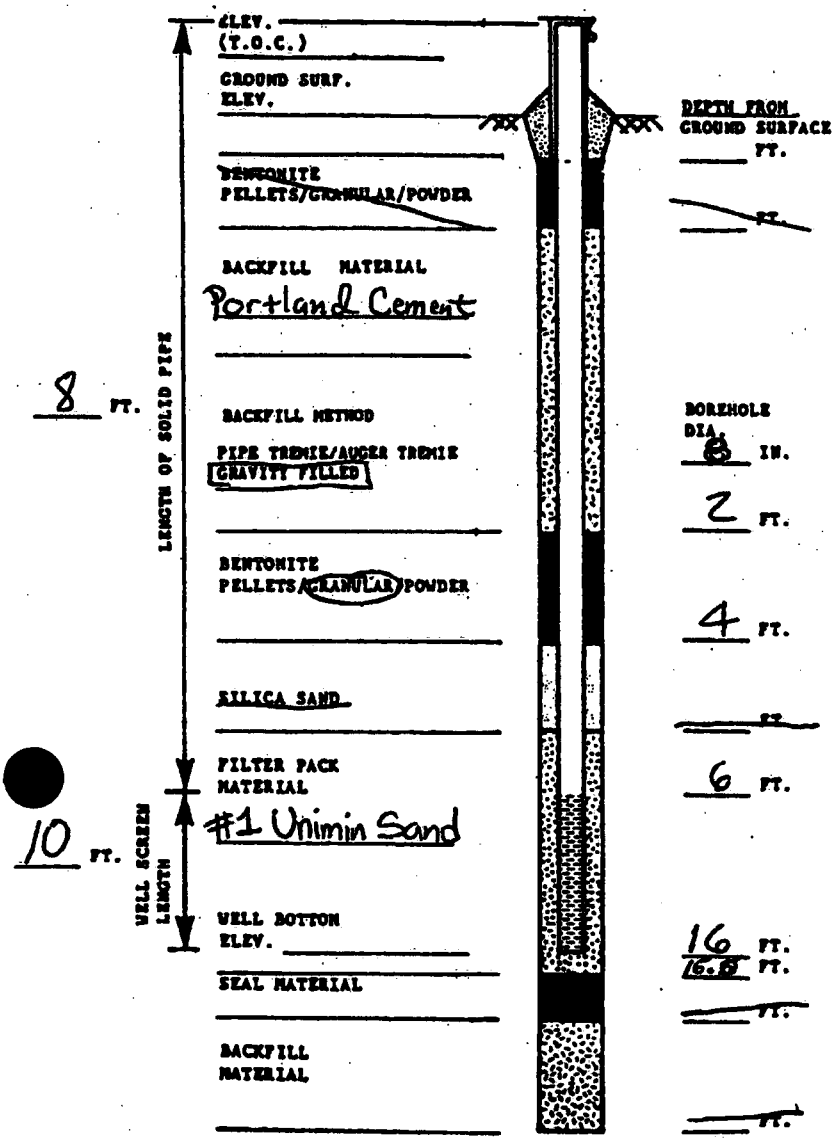
RMT

Well Diagram
F-17 (8 11-85)

PROJECT NAME: LE Carpenter NO. _____

WELL NO. MW-19-3

DATE INSTALLED 2-18-98



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE _____

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER _____

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER _____

E) WELL SCREEN SLOT SIZE 0.01

F) PIPE DIA: ID IN. 4 OD IN. _____

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 6 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER _____

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? _____

C) APPROXIMATE WATER VOLUME: REMOVED _____

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME _____ FT

DATE/TIME _____ FT

DATE/TIME _____ FT

ADDITIONAL COMMENTS: 6" Sump in well bottom. Therefore Actual Screen @ 6-15.5 ft BGL

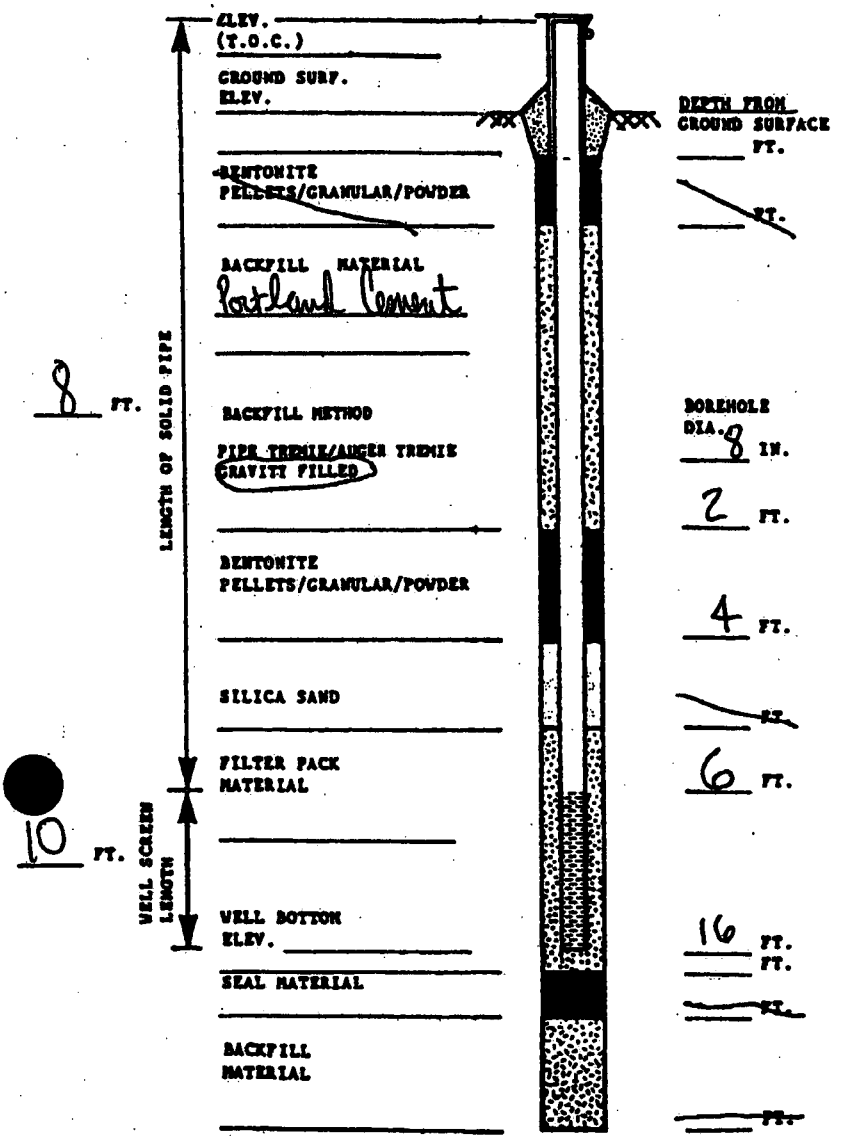
RMT

Well Diagram
P-17 (R 11-85)

PROJECT NAME: LE CARVENDER MW-19-4 NO. _____

WELL NO. _____

DATE INSTALLED 2-18-98



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER _____

PIPE SCHEDULE _____

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (M/FEMALE?), OTHER _____

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER _____

E) WELL SCREEN SLOT SIZE 0.01

F) PIPE DIA: ID IN. 4 OD IN. _____

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO

PROTECTOR PIPE DIA. 6 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER _____

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? _____

C) APPROXIMATE WATER VOLUME: REMOVED _____

ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME _____ FT

DATE/TIME _____ FT

DATE/TIME _____ FT

ADDITIONAL COMMENTS: 6" Sump @ well bottom. Therefore actual screen is @ 6-15.5 ft bgl.

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: LE Carpenter NO. _____
WELL NO. MW-19-5
DATE INSTALLED 2/18/98

ELEV. (T.O.C.) _____

GROUND SURF. ELEV. _____

DEPTH FROM GROUND SURFACE _____ FT.

BENTONITE PELLETS/GRANULAR/POWDER _____ FT.

BACKFILL MATERIAL: Portland Cement

8 FT. — LENGTH OF SOLID PIPE

BACKFILL METHOD: PIPE TREMIE/AUGER TREMIE / GRAVITY FILLED

BOREHOLE DIA. 8 IN.

2 FT.

BENTONITE PELLETS/GRANULAR/POWDER 4 FT.

SILICA SAND _____ FT.

FILTER PACK MATERIAL: #1 Unimin Sand 6 FT.

10 FT. — WELL SCREEN LENGTH

WELL BOTTOM ELEV. _____ 16 FT.

16 FT.

SEAL MATERIAL _____ FT.

BACKFILL MATERIAL _____ FT.

1) CASING DETAILS

A) TYPE OF PIPE:
PVC, STAINLESS, TEFLON, OTHER _____
PIPE SCHEDULE _____

B) TYPE OF PIPE JOINTS:
COUPLINGS, THREADED (W/TAPE?), OTHER _____

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:
PVC, STAINLESS, TEFLON, OTHER _____

E) WELL SCREEN SLOT SIZE 0.01

F) PIPE DIA: ID IN. 2 OD IN. _____

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 6 IN.

2) WELL DEVELOPMENT

A) METHOD
BAILING, PUMPING, SURGING, COMPRESSED AIR
OTHER _____
(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? _____

C) APPROXIMATE WATER VOLUME: REMOVED _____
ADDED _____

D) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?
_____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):
DATE/TIME _____ FT.
DATE/TIME _____ FT.
DATE/TIME _____ FT.

ADDITIONAL COMMENTS: 6" sump in well bottom, therefore actual screen @ 6-15.5 ft BGL.

MW19/Hot Spot 1
MW19-6, MW19-7 & MW19-8
JC

SUMMIT DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

Chimney Rock Road, Bldg. 9W
Bound Brook, NJ 08805
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (732) 356-1009
http://www.summitdrilling.com
email: info@summitdrilling.com

WELL LOG

WELL: MW19-6 DATE DRILLED: 10/28/1999 COORD #1: 25.02.394 PERMIT #1: 25-55284
COORD #2: PERMIT #2:
COUNTY: Morris
SITE: L. E. Carpenter & Co., 170 North Main St., , Wharton, NJ 07885 XSTREET: Ross Street
OWNER: L. E. Carpenter, 170 North Main Street, , Wharton, NJ 07885 USE: Monitoring

INNER CASING: S. Steel
DIAMETER: 2"
LENGTH: 10'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: S. Steel
SCREEN TYPE 2:
DIAMETER: 2"
LENGTH 1: 10"
LENGTH 2:
SLOT SIZE: .020

DRILLING METHOD: Air Rotary
SAMPLING METHOD:
HOLE DIA: 6", 6"
TOTAL DEPTH: 20'

SET WELL: 20'
GRAVEL PK SZ: Morie #2
DRILLER: Steve Yotcoski
SURFACE COMPLETION: M

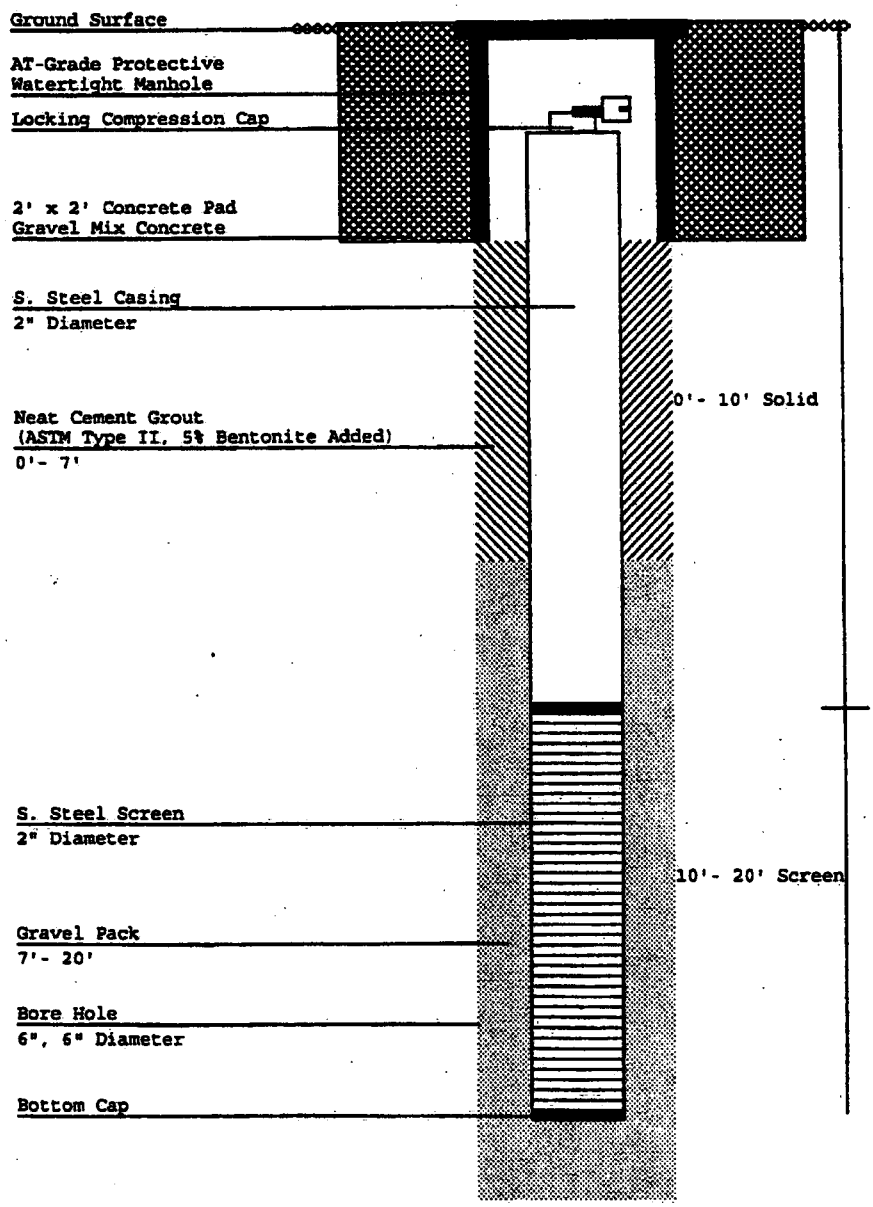
GAL PER MIN: 3
STAT H2O LVL: 11'
DEVELOPMENT METHOD: Pump
DEVELOPMENT TIME: 1/2 Hour

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
-	

REMARKS / SOILS IDENTIFICATION

0'- 2' Asphalt & stone.
2'- 14' Yellow-brown mdium sand & gravel some cobbles.
14'- 20' Grey m/c sand & gravel some silt trace cobbles.



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http://www.summitdrilling.com
email: info@summitdrilling.com

WELL LOG

WELL: MW19-7 DATE DRILLED: 10/28/1999 COORD #1: 25.02.394 PERMIT #1: 25-55285
COORD #2: PERMIT #2: COUNTY: Morris
SITE: L. E. Carpenter & Co., 170 North Main St., , Wharton, NJ 07885 XSTREET: Ross Street
OWNER: L. E. Carpenter, 170 North Main Street, , Wharton, NJ 07885 USE: Monitoring

INNER CASING: S. Steel
DIAMETER: 2"
LENGTH: 10'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: S. Steel
SCREEN TYPE 2:
DIAMETER: 2"
LENGTH 1: 10"
LENGTH 2:
SLOT SIZE: .020

DRILLING METHOD: Air Rotary
SAMPLING METHOD:
HOLE DIA: 6", 6"
TOTAL DEPTH: 20'

SET WELL: 20'
GRAVEL PK SZ: Morie #2
DRILLER: Steve Yotcoski
SURFACE COMPLETION: M

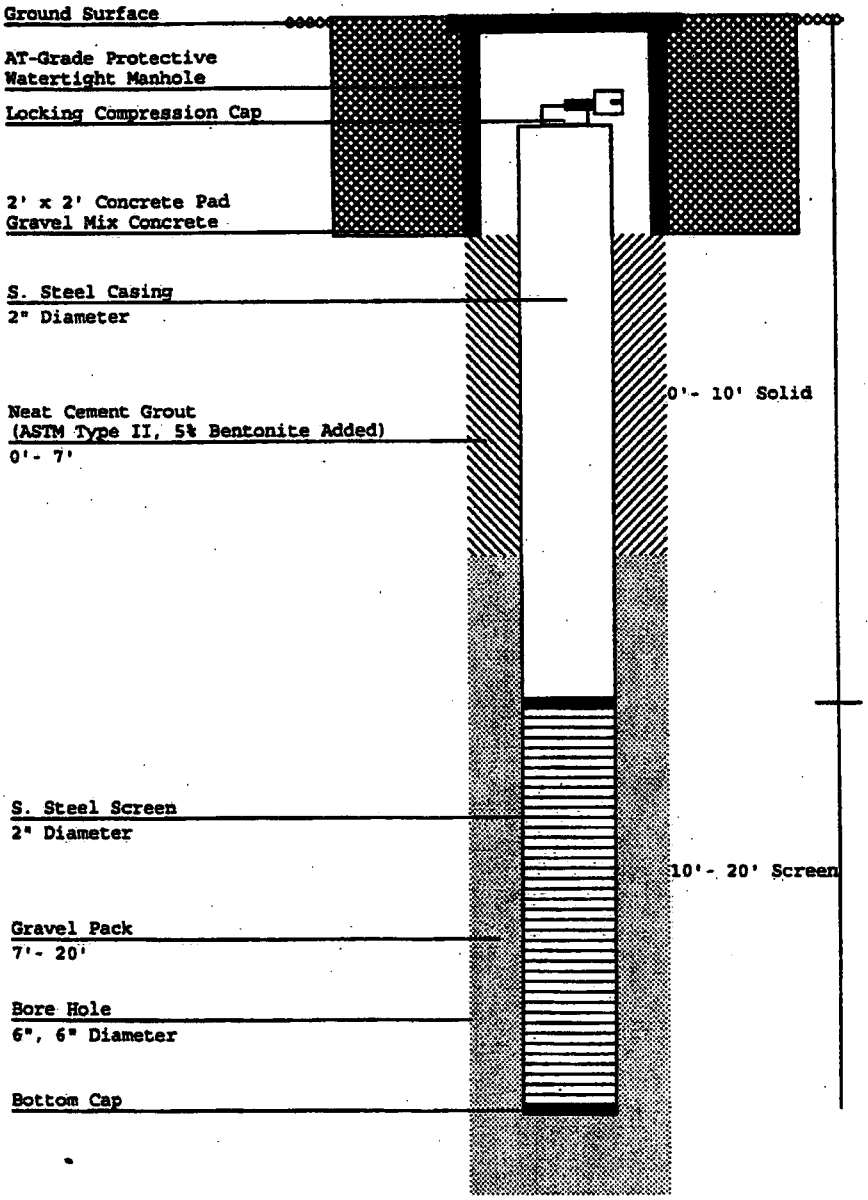
GAL PER MIN: 3
STAT H2O LVL: 11'
DEVELOPMENT METHOD: Pump
DEVELOPMENT TIME: 1/2 Hour

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
-	

REMARKS / SOILS IDENTIFICATION

0'- 2' Asphalt & stone.
2'- 15' Yellow-brown mdium sand & gravel some cobbles.
15'- 20' Grey m/c sand & gravel some silt trace cobbles.



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WELL LOG

WELL: MW19-8 DATE DRILLED: 10/29/1999 COORD #1: 25.02.394 PERMIT #1: 25-55286
COORD #2: PERMIT #2: COUNTY: Morris
SITE: L. E. Carpenter & Co., 170 North Main St., , Wharton, NJ 07885 XSTREET: Ross Street
OWNER: L. E. Carpenter, 170 North Main Street, , Wharton, NJ 07885 USE: Monitoring

INNER CASING: S. Steel
DIAMETER: 2"
LENGTH: 11'

SET WELL: 21'
GRAVEL PK SZ: Morie #2
DRILLER: Carmine DeCorso
SURFACE COMPLETION: M

OUTER CASING:
DIAMETER:
LENGTH:

GAL PER MIN: 3
STAT H2O LVL: 11'
DEVELOPMENT METHOD: Pump
DEVELOPMENT TIME: 1/2 Hour

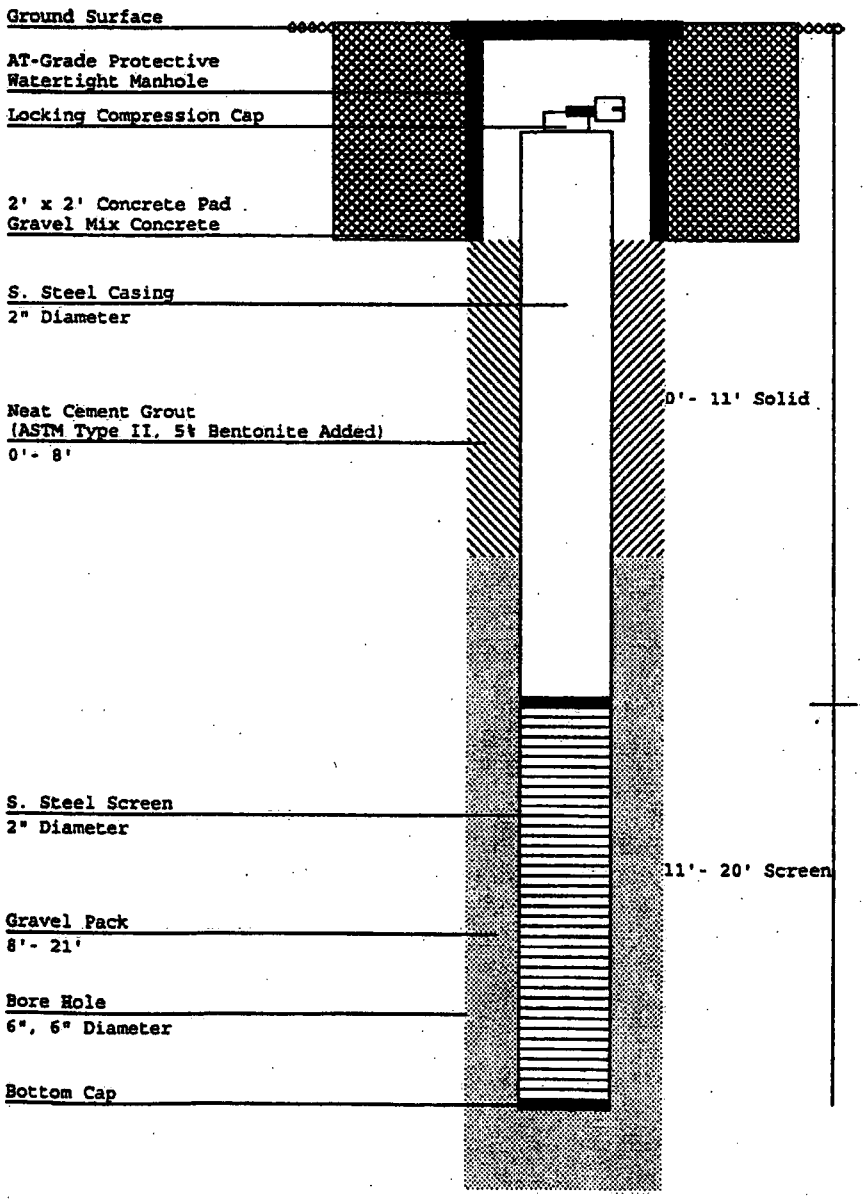
SCREEN TYPE 1: S. Steel
SCREEN TYPE 2:
DIAMETER: 2"
LENGTH 1: 9'
LENGTH 2:
SLOT SIZE: .020
CASING SEAL: Portland
OPEN HOLE:

DRILLING METHOD: Air Rotary
SAMPLING METHOD:
HOLE DIA: 6", 6"
TOTAL DEPTH: 21'

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
-	

REMARKS / SOILS IDENTIFICATION

0'- 2' Asphalt & stone.
2'- 21' Glacial till.



LOG OF TEST BORING

RMT

PROJECT NAME	LEC	BORING NO.	MW19-9D
LOCATION	MW-19-9D, LEC	SHEET NO.	1 OF 1
CONTRACTOR	Summit Drilling Company	PROJECT NO.	3868.25
DRILLING METHOD	Air rotary	INSTALLATION	7/10/01
		SURFACE ELEV.	
		BOREHOLE DIA.	6 IN.

SAMPLING NOTES						VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
INTERVAL		RECOVERY		MOISTURE		
NO.	TYPE	PID (ppm)			DEPTH	
						BLACKTOP & GRAVEL.
1	SS	26/14/11/10	12	NR		SAND (SP), medium grained, few coarse sand, cobbles, medium brown.
2	SS	12/22/10/9	6	NR	5	
3	SS	10/7/11/12	1	NR		
4	SS	2/10/11/16	4	NR		SAND AND GRAVEL (SP-GP), medium sand and gravel, medium brown.
5	SS	10/9/9/18	0	NR	∇ 10	SAND AND GRAVEL (SP-GP), as above, wet.
					15	GRAVEL (GP), with silt, sand and cobbles,
					20	SAND AND GRAVEL (SP-GP). yellowish brown, running.
					25	
					30	
					35	End of boring at 35 feet below ground surface.

GENERAL NOTES				WATER LEVEL OBSERVATIONS			
DATE STARTED	7-10-01			WHILE DRILLING	∇ 10.0		
DATE COMPLETED	7-10-01			AT COMPLETION	▼		
RIG				AFTER DRILLING			
CREW CHIEF	Rich			CAVE-IN: DATE/TIME	NA	DEPTH	NA
LOGGED	JPM	CHECKED		WATER: DATE/TIME	7/10/01	DEPTH	NA

N:\LBH-NO WELL 3868-25.GPJ 10-9-01

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email: info@summitdrilling.com

WELL LOG

WELL: MW19-9D DATE DRILLED: 07/10/2001 COORD #1: 25.02.397 PERMIT #1: 25-58293
COORD #2: PERMIT #2: COUNTY: Morris
SITE: L. E. Carpenter & Co., 107 North Main St., , Wharton, NJ 07885 XSTREET: Ross Street
OWNER: L. E. Carpenter, 107 North Main Street, , Wharton, NJ 07885 USE: Monitor

INNER CASING: S. Steel
DIAMETER: 2"
LENGTH: 25'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: S.Steel
SCREEN TYPE 2:
DIAMETER: 2"
LENGTH 1: 10'
LENGTH 2:
SLOT SIZE: .020

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIA: 8", 8"
TOTAL DEPTH: 35'

SET WELL: 35'
GRAVEL PK SZ: Morie #2
DRILLER: Jeff Segreaves
SURFACE COMPLETION: M

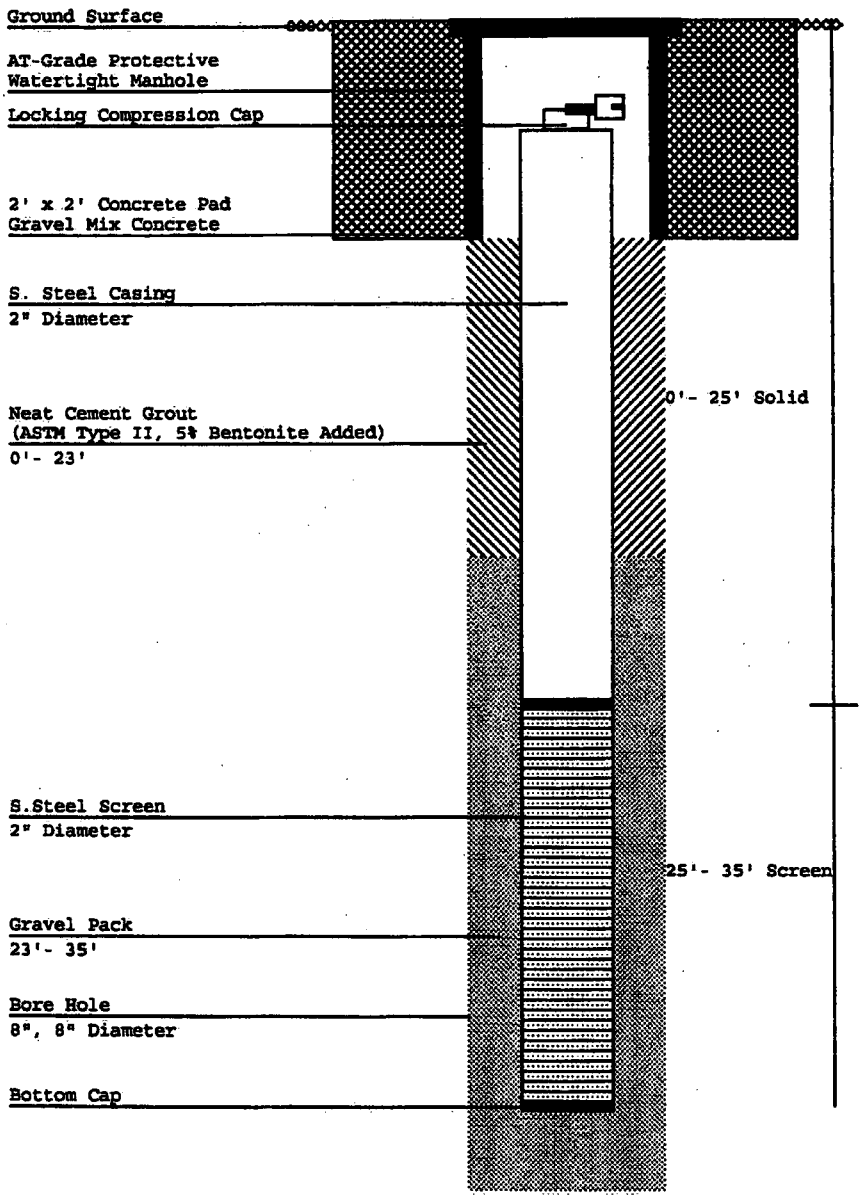
GAL PER MIN: 1/2
STAT H2O LVL: 10'
DEVELOPMENT METHOD: pump
DEVELOPMENT TIME: 1/2

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
0' - 2'	client
2' - 4'	client
4' - 6'	client
6' - 8'	client
8' - 10'	client

REMARKS / SOILS IDENTIFICATION

1" Asphalt.
35' Brown m/f sand boulders cobbles gravel.



WELL CONSTRUCTION LOG

RMT INC.

WELL NO. MW-19-12

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
L.E. Carpenter	6/7/06	6/7/06	6527.23

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Boart Longyear	Rotosonic		—	17.0	6

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - J. Drabek	Minisonic

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton	Morris	NJ	While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 6/8/06 00:00 ▼ Depth (ft bgs) 7.25

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	PID (PPM)	COMMENTS
				Asphalt					
1 CS	39		5	**Sand**- mostly fine sand, some medium sand, little coarse sand, and gravel, loose, moist, no odor, very dark gray brown (10YR3/2).	SW			0	
2 CS	65			▼ **Sand**- mostly medium sand, some fine and coarse sand, little gravel, loose, moist grading to wet, no odor, dark yellow brown (10YR4/4).				0	
3 CS	95		10		SW			0	
4	29		15	**Sand**- mostly medium sand, some fine sand, little coarse sand, trace gravel and cobble, loose, wet, no odor, deark gray (10YR4/1).	SW			0	
				End of Boring 17.0'.					
			20						
			25						

SOIL BORING WELL CONSTRUCTION LOG 6-6-06.GPJ RMT_CORP.GDT 8/6/08

Signature:	Firm: Grand Rapids 2025 E. Beltline Ave. Ste 402 Grand Rapids, MI	616-975-5415 Fax 616-975-1098

Checked By: J. Dexter

RMT	WELL CONSTRUCTION DIAGRAM BELOW GROUND		SHEET of
			DATE: 6/7/06
PROJECT: L.E. Carpenter			PROJECT NO: 6527.23
LOCATION: North side of Ross St.		WELL NUMBER: MW- 19-12	DATE INSTALLED: June 7, 2006
OBSV. BY: E. Vincke		CHECKED BY:	SIGNED:

ELEVATION (BENCHMARK: USGS)	DISTANCE BELOW OR ABOVE GROUND (FT.)	
	0	GROUND
0.25		TOP OF CASING
	1	CEMENT SURFACE PLUG
		Grout / Backfill Material: ***Neat Cement/ Grout***
		Grout / Backfill Method: ***Trimmie***
	4	GROUT
		Bentonite Seal Material: ***Pure Gold Medium Chips***
	6	BENTONITE SEAL
6.75	7	TOP OF SCREEN
10		*Filter Pack Material:* ***Superior Quartz Filtraion Media***
	17	BOTTOM OF SCREEN
	17	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		Backfill Material: ***NA***
	17	HOLE BOTTOM

RISER PIPE LENGTH

SCREEN LENGTH

NOTES:

Sand- 2 bags

Holeplug- 0.5 bags

3" sump on bottom of screen

1. CASING AND SCREEN DETAILS:

A) Type of pipe: SS Type 304 Pipe Schedule: 10s

B) Pipe Joints: Threaded O-Ring

C) Solvent Used? None

D) Screen Type: SS Screen Slot Size: 0.01

E) Borehole Diameter:
6 In. from 0 To 17 Ft.
___ In. from ___ To ___ Ft.

F) Surf. Casing Diameter
8 In. from 0 To 1 Ft.
2nd Surf. Casing:
___ In. from ___ To ___ Ft.

G) Installed Protective Cover w/Lock? Yes

2. WELL DEVELOPMENT:

A) Method: Purge and Surge

B) Time spent developing: 0.8 Hrs.

C) Water: Removed: 35
Added: 30

D) Water Clarity Before / After Development:
Before: V. Trub., Dark Gray Brown
After: Clear, Clear

F) Odor (Describe if present): None

3. WATER LEVEL SUMMARY:

A) After Developing: 7.5 Ft. Below Top of Casing

B) Other Date / Time: 6/19/06 7.82 Ft.
Other Date / Time: ___ Ft.

SOIL BORING LOG

RMT INC.

BORING NO. SG-06-1

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
L.E. Carpenter Soil Gas	3/1/06	3/1/06	6527.21

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Enviroprobe	Macro Sample		---	6.0	2

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller -	Geoprobe

Civil Town/City/or Village:	County:	State:	Water Level Observations:		
Wharton	Morris	New Jersey	While Drilling:	Date/Time	Depth (ft bgs)
			After Drilling:	Date/Time	Depth (ft bgs)

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				Sand- mostly very fine sand, few coarse sand, trace medium sand, trace subangular gravels, loose, no odor, dry, very dark gray (7.5YR3/1), timber present.	SW			
				Sand- mostly fine sand, little silt, trace gravel, moist, no odor, compact, dark brown (7.5YR3/2).	SP-SM		0	
1 GP	69			**Sand**- mostly fine sand, trace cobbles, moist, loose, no odor, brown (7.5YR4/3).	SP		0	
			5				0	
				End of boring 6.0'.				Soil gas sample collected.

SOIL BORING WELL CONSTRUCTION LOG 3-01-06.GPJ RMT_CORP.GDT 5/3/06

Signature:	Firm: Grand Rapids 2025 E. Beltline Ave. Ste 402 Grand Rapids	616-975-5415 Fax 616-975-1098

Checked By: JJD

RMT INC.

SOIL BORING LOG

BORING NO. SG-06-2

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
L.E. Carpenter Soil Gas	3/1/06	3/1/06	6527.21

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Enviroprobe	Macro Sample		—	6.0	2

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller -	Geoprobe

Civil Town/City/or Village:	County:	State:	Water Level Observations:		
Wharton	Morris	New Jersey	While Drilling:	Date/Time	Depth (ft bgs)
			After Drilling:	Date/Time	Depth (ft bgs)

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
1 GP	67			**Sand**- mostly very fine sand, few coarse sand, trace medium sand, trace subangular gravels, loose, no odor, dry, very dark gray (7.5YR3/1).	SW		0	
				Sand- mostly fine sand, little silt, trace gravel, moist, no odor, compact, dark brown (7.5YR3/2).	SP-SM		0	
			5	**Sand**- mostly fine sand, little cobbles, moist, loose, no odor, brown (7.5YR4/3).	SP		0	
				End of boring 6.0'.				Soil gas sample collected.

SOIL BORING WELL CONSTRUCTION LOG 3-01-06.GPJ RMT_CORP.GDT 5/3/06

Signature:	Firm: Grand Rapids 2025 E. Beltline Ave. Ste 402 Grand Rapids	616-975-5415 Fax 616-975-1098

Checked By: JJD

RMT INC.

SOIL BORING LOG

BORING NO. SG-06-3

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
L.E. Carpenter Soil Gas	3/1/06	3/1/06	6527.21

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Enviroprobe	Macro Sample		---	6.0	2

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller -	Geoprobe

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton	Morris	New Jersey	While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
1 GP	61			**Sand**- mostly very fine sand, trace medium sand, loose, no odor, wet (snow), very dark gray (7.5YR3/1).	SP			
				Sand- mostly fine sand, loose, no odor, dry, strong brown (7.5YR4/6).	SP		0	
				Silt- mostly silt, soft, no odor, dry, nonplastic, dark brown (7.5YR3/2).	ML		0	
			5	**Sand**- mostly fine sand, little coarse sand, few cobbles, dry, slight odor, loose, brown (7.5YR4/3).	SP		4.5	
				End of boring 6.0'.				Soil gas sample collected.

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SOIL BORING WELL CONSTRUCTION LOG 3-01-06.GPJ RMT_CORP.GDT 5/3/06

RMT INC.

SOIL BORING LOG

BORING NO. SG-06-4

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
L.E. Carpenter Soil Gas	3/1/06	3/1/06	6527.21

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Enviroprobe	Macro Sample		---	6.0	2

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller -	Geoprobe

Civil Town/City/or Village:	County:	State:	Water Level Observations:		
Wharton	Morris	New Jersey	While Drilling:	Date/Time	Depth (ft bgs)
			After Drilling:	Date/Time	Depth (ft bgs)

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
1 GP	56			**Sand**- mostly very fine sand, trace medium sand, loose, no odor, dry, very dark gray (7.5YR3/1).	SP			
				Sand- mostly fine sand, loose, no odor, dry, strong brown (7.5YR4/6).	SP		0	
				Sand- mostly very fine sand, trace fine sand, dry, loose, no odor, very dark gray (7.5YR3/1).	SP		0	
			5	**Sand**- mostly fine sand, little coarse sand, few cobbles, dry, no odor, loose, brown (7.5YR4/3).	SP		0	
				End of boring 6.0'.				Soil gas sample collected.

SOIL BORING WELL CONSTRUCTION LOG 3-01-06.GPJ RMT CORP.GDT 5/3/06

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SOIL BORING LOG

RMT INC.

BORING NO. SG-06-5

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
L.E. Carpenter Soil Gas	3/1/06	3/1/06	6527.21

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Enviroprobe	Macro Sample		---	6.0	2

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller -	Geoprobe

Civil Town/City/or Village:	County:	State:	Water Level Observations:		
Wharton	Morris	New Jersey	While Drilling:	Date/Time	Depth (ft bgs)
			After Drilling:	Date/Time	Depth (ft bgs)

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
1 GP	63			**Sand**- mostly very fine sand, trace medium sand, loose, no odor, dry, very dark gray (7.5YR3/1).	SP		0	
				Sand- mostly fine sand, little coarse sand, few cobbles, dry, no odor, nonplastic, dark brown (7.5YR3/2), timber present.	SP		0	
				Sand- mostly fine sand, little coarse sand, few cobbles, dry, loose, no odor, brown (7.5YR4/3).	SP		0	
			5					
				End of boring 6.0'.				Soil gas sample collected.

SOIL BORING WELL CONSTRUCTION LOG 3-01-06.GPJ RMT_CORP.GDT 5/3/06

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SOIL BORING LOG

RMT INC.

BORING NO. SG-06-6

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
L.E. Carpenter Soil Gas	3/1/06	3/1/06	6527.21

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Enviroprobe	Macro Sample		---	6.5	2

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller -	Geoprobe

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton	Morris	New Jersey	While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				Topsoil				
				Sand- mostly fine sand, loose, dry, slight odor, brown (7.5YR4/4).	SP		5.7	
				Coal- shiny black (7.5YR2.5/1), medium to coarse grain, dry, loose, no odor.			0	
1 GP	62		5	**Sand-** mostly very fine sand, some silt, trace cobbles, nonplastic, no odor, dry, compact, dark brown (7.5YR3/2).	SP-SM		0	
				Silt- mostly silt, trace cobbles and gravel, dry, stiff, no odor, nonplastic, brown (7.5YR4/3).	ML			
				End of boring 6.5'.				Soil gas sample collected.

SOIL BORING WELL CONSTRUCTION LOG 3-01-06.GPJ RMT_CORP.GDT 5/3/06

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SOIL BORING LOG

RMT INC.

BORING NO. SG-06-7

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
L.E. Carpenter Soil Gas	3/1/06	3/1/06	6527.21

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Enviroprobe	Macro Sample		---	6.0	2

Boring Location:	Personnel Logged By - E. Vincke Driller -	Drilling Equipment:
		Geoprobe

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton	Morris	New Jersey	While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
1 GP	64			**Sand**- mostly fine sand, little coarse sand, few cobbles, dry, no odor, dark brown (7.5YR3/2).	SP		0 0	
				Sand- mostly very fine sand, some silt, little cobbles, nonplastic, no odor, dry, compact, dark brown (7.5YR3/2).	SP-SM			
			5	**Silt**- mostly silt, trace cobble, gravel and very fine sand, dry, stiff, slight odor, nonplastic, brown (7.5YR4/3).	ML		2.9	
				End of boring 6.0'.				Soil gas sample collected.

SOIL BORING WELL CONSTRUCTION LOG 3-01-06.GPJ RMT_CORP.GDT 5/3/06

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-01

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/17/07	8/17/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Casing		---	12.5	4

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Dave	Acker Electric Stringray

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/17/07 00:00 ∇ Depth (ft bgs) 12 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
				Concrete.				
1 SS	40	3 2 1 1	2	**Fill,** mostly find sand, some medium sand, trace coarse sand, slag material present, 10YR 3/2 to 10YR 2/1 very dark grayish brown to black, dry, loose, no odor.	SW		0 0	
2 SS	8	1 2 3 8	4	Slight odor dectected at 3.5'.			1.3	Sample collected 4.5-6.5'.
3 SS	29	7 7 14 22	6				0 0	
4 SS	29	18 16 7 26	8				0 0	
				Silty Sand, mostly fine sand, some silt, 10YR 4/4 dark yellowish brown, moist, compact, no odor.	SP-SM			
5 SS	8	126 18 100 119	10	**Sandy Silt,** mostly silt, some fine sand, 10YR 4/4 dark yellowish brown, moist, compact, no odor.	ML		0	
6 SS	50	16 17 40 64	12 ∇	**Sandy Silt,** mostly silt, little fine sand, gray clay mixed throughout, 10YR 4/4 dark yellowish brown, moist, stiff, very strong odor. Very tip of split-spoon contains coarse sand and gravel.	ML		> 2,000 > 2,000	Sample collected 11-13'.
			14	End of boring 13.0' bgs.				
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-02

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/17/07	8/17/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Casing		---	13.0	4

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Dave	Acker Electric Stringray

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/17/07 00:00 ▽ Depth (ft bgs) 12 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
				Concrete.				
1 SS	17	2 2 2 2	2	**Fill,** well sorted, mostly medium sand, some coarse sand, little fine sand, slag, 10YR 2/1 black, dry, loose, no odor.	SP		0 0	
2 SS	38	1 4 12 14	4				0 0	
3 SS	42	3 3 3 14	6				0 0	
4 SS	21	9 10 12 35	8				0 0	
				Sandy Silt, mostly silt, some fine sand, cobbles, 10YR 4/4 dark yellowish brown, dry, soft, no odor.	ML		0	
5 SS	46	25 9 12 22	10	**Silty Sand,** mostly fine sand, some medium sand, little coarse sand, some silt, 10YR 4/4 dark yellowish brown, moist, compact, no odor. Silt increases with depth.	SW-SM		0 0	Sample collected 9-11'.
6 SS	33	22 24 15 23	12	**Clayey Silt,** gray	MH		239	Sample collected 11-13'.
				▽ **Sandy Silt,** with trace clay, wet, very hard, strong odor.	ML		> 2,000	
				End of boring 13.0' bgs.				
			14					
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-03

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/17/07	8/17/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Casing		—	11.0	4

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Dave	Acker Electric Stringray

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/17/07 00:00 ∇ Depth (ft bgs) 11 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
				Concrete.				
			2	No recovery. Slag material in tip of spoon.				
1 SS	38	NM	4	**Slag.**				
2 SS	33	3 3 3 4	6				0	
3 SS	50	5 4 5 6	8	Some brick fragments.			0 0 0	
4 SS	25	20 12 15 29	10	**Sandy Slag,** mixture of slag and sand.			0	Sample collected 9-11'.
				Well Graded Sand, mostly sand, some silt, 10YR 4/3 brown, wet, loose, no odor. ∇	SW		0	
5 SS	33	100		End of boring 11.3' bgs.			0	
			12					
			14					
			16					
			18					

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-04

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	12.0	4.875

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 10 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
				Topsoil.				
1 SS	50	6 8 5 6		**Fill,** well graded, mostly fine sand, little medium sand, trace coarse sand, 10YR 4/4 dark yellowish brown, dry, loose, no odor.	SW		0 0	
2 SS	25	12 14 15 10	2	**Fill,** well graded, mostly medium sand, some coarse sand, few find sand, alternating layers of 10YR 2/1 to 10YR 4/4 black and dark yellowish brown, dry, loose, no odor.			0 0	Sample collected 2-6.5'.
3 SS	25	11 7 8 8	4		SW		0 0	
4 SS	33	16 35/0	6	Soils grade to contain some silt and become moist.			0	
				No Recovery, drill through cobble layer.				
5 SS	25	15 30 47 92	8	**Sand,** ground cobble.	SW		0 0	
			10	▽ **Sand,** mostly fine sand, little medium sand, trace silt, trace cobble, 10YR 4/4 dark yellowish brown, compact, moist, no odor.	SP			Sample collected 10-12'.
6 SS	75	18 38 55 63		**Sand with Gravel,** mostly find sand, some medium sand, trace gravel, dense, wet, very strong odor.	SW		> 2,000 > 2,000 > 2,000	Odor smells of aerosol spray paint.
			12	End of boring 12.0' bgs.				
			14					
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-05

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	9.0	4.875

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 8.5 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
1 SS	54	5 8 12 10		**Fill,** well graded, mostly fine sand, little medium sand, trace coarse sand, 7.5YR 2.5/3 very dark brown, dry, loose, no odor.	SW		0	
				Brick Fragments.			0	
		10 7 7 10	2	**Well Graded Sand,** mostly medium sand, little coarse sand, trace fine sand, 7.5YR 3/1 very dark gray, dry, loose, no odor.	SW		0	
2 SS	25			**Silt with Gravel,** mostly silt, trace gravel, 7.5YR 3/3 dark brown, soft, moist, no odor.	ML		0	
3 SS	0	3 6 25/0	4	**No Recovery,** brick and cobble in spoon tip.				
			6	**Cobbles,** rotary drill through cobble layer.				
4 SS	94	7 15 50/5	8	**Well Graded Sand,** mostly find sand, some medium sand, trace coarse sand, 10YR 3/2 very dark grayish brown, moist, loose, no odor.	SW		0	Sample collected 7.5-9'.
				Silty Sand, mostly find sand, some silt, trace coarse sand and gravel, cobble, wet, loose, no odor.	SP-SM		0	
			10	End of boring 9.0' bgs.				
			12					
			14					
			16					
			18					

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-06

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		—	16.0	4.875

Boring Location:

Personnel
Logged By - E. Vincke
Driller - Robert

Drilling Equipment: Mobile B57

Civil Town/City/or Village: Wharton
County:
State: New Jersey

Water Level Observations:
While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 8
After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
1 SS	54	2, 2, 2, 3	2	**Fill,** mostly fine sand, little medium sand, trace coarse sand, 10YR 4/4 dark yellowish brown, dry, loose, no odor.	SW		0, 0	
2 SS	44	10, 12, 34, 37/0	4	**Fill,** mostly fine sand, trace medium and coarse sand, trace gravel, layers of 10YR 3/4 with 10YR 2/1 dark yellowish brown with black, dry, loose, no odor.	SP		0, 0	
				Cobbles, possible concrete layer.				
3 SS	38	10, 12, 12, 17	6	**Poorly Graded Sand,** mostly fine sand, trace medium and coarse sand, trace gravel, layers of 10YR 3/4 with 10YR 2/1 dark yellowish brown with black, dry, loose, no odor.	SP		0	Sample collected 5-7'.
				Silty Sand, mostly fine sand, some silt, trace medium sand, 10YR 3/4 dark yellowish brown, dry grading to moist, loose, no odor.	SP-SM		0	
4 SS	21	11, 15, 22, 62	8	▽ **Well Graded Sand,** mostly fine sand, some medium sand, trace coarse sand, loose, moist to wet, strong odor. Silt and coarse sand increase with depth.	SW		158, 359	
5 SS	92	27, 55, 42, 67	10	Soils become compact.			> 2,000, > 2,000, > 2,000	Sample collected 9-11'.
6 SS	54	13, 16, 16, 14	12				> 2,000	Sample collected 12-14'.
				Poorly Graded Sand, mostly fine sand, 10YR 2/1 black, loose, wet, some odor.	SP		35.3	
7 SS	63	11, 18, 15, 22	14				98	Sample collected 14-16'.
			16	**Well Graded Sand,** mostly fine sand, some medium sand, little coarse sand, 10YR 5/4 yellowish brown, loose, wet, slight odor.	SW		13.6	
				End of boring 16.0' bgs.				
			18					

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-07

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	12.0	4.875

Boring Location:

Personnel
Logged By - E. Vincke
Driller - Robert

Drilling Equipment: Mobile B57

Civil Town/City/or Village:	County:	State:
Wharton		New Jersey

Water Level Observations:
While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 9.5
After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
		10		**Topsoil.**				
1 SS	83	9 9 9		**Fill,** well graded, mostly fine sand, few medium sand, trace coarse sand, 10YR 4/4 dark yellowish brown, loose dry, no odor.			0 0 0	
			2					
2 SS	58	7 5 6 11					0 0	
			4					
3 SS	54	11 13 15 15			SW		0 0	Sample collected 4-6'.
			6					
4 SS	71	14 13 13 11		Soil grades to moist.			0 0	Sample collected 7-9'.
			8					
5 SS	75	9 7 7 8		▽ Soil grades to wet.			0 0	
			10	**Silty Sand,** mostly fine sand, some silt, few medium sand, trace coarse sand and gravel, 7.5YR 5/8 strong brown, loose, wet, no odor.	SW-SM		0	Sample collected 10-12'.
6 SS	38	12 14 21 24		**Well Graded Sand,** mostly medium sand, some fine sand, trace coarse sand, shale and black sand intervals, 10YR 4/4 dark yellowish brown, loose, wet, no odor.	SW		0	
			12	End of boring 12.0' bgs.				
			14					
			16					
			18					

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-08

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	14.0	4.875

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ∇ Depth (ft bgs) 11.0 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
1 SS	8	5 2 2 1	2	**Fill**, poorly graded, mostly fine sand, trace medium sand, 7.5YR 4/6 strong brown, dry, loose, no odor.	SP		0	
2 SS	8	2 3 3 6					0	
3 SS	0	7 6 6 3	4	**No Recovery.**			NA	
4 SS	42	7 8 24 48	6	**Fill**, poorly graded, mostly fine sand, trace medium sand, 7.5YR 4/6 strong brown, dry, loose, no odor.	SP		0	
				Slag, and cobble, black.			0	
5 SS	29	18 18 20 21	8	**Elastic Silt**, mostly silt, little clay, few fine sand, trace coarse sand, 10YR 4/6 dark yellowish brown, moist, soft, no odor.	MH		0	Sample collected 8-10'.
6 SS	54	14 24 28 50	10 ∇	**Silty Sand**, mostly fine sand, little silt, few medium sand, cobbles, moist to wet, dense, no odor.	SM		0	Sample collected 10-12'.
7 SS	83	24 36 48 45	12				0	Sample collected 12-14'.
				Well Graded Sand, mostly medium sand, some fine sand, trace coarse sand, 10YR 4/2 dark grayish brown, wet, compact, no odor.	SW		0	
			14	Color grades to 10YR 2/1 black.			0	
				End of boring 14.0' bgs.				
			16					
			18					

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SOIL BORING LOG

RMT INC.

BORING NO. SB-07-09

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
RASR Investigation Soil Borings	8/16/07	8/16/07	6527.28

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Warren George	Roller Bit/Casing		---	14.0	4.875

Boring Location:	Personnel	Drilling Equipment:
	Logged By - E. Vincke Driller - Robert	Mobile B57

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Wharton		New Jersey	While Drilling: Date/Time 8/16/07 00:00 ▽ Depth (ft bgs) 10 After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	FID (PPM)	COMMENTS
		5		**Topsoil.**				
1 SS	58	4 2 2		**Fill**, well graded, mostly fine sand, few medium sand, trace coarse sand, 10YR 4/4 dark yellowish brown, dry, loose, no odor.			0 0	
2 SS	67	4 2 3 2	2				0 0	Sample collected 2-4'.
3 SS	50	6 7 6 7	4	Soils grade to moist.	SW		0 0	
4 SS	46	7 7 10 10	6				0 0	
5 SS	33	22 41	8	**Silty Sand with Cobbles**, mostly sand, some silt, 10YR 5/6 yellowish brown, moist, soft, no odor.	SM		0	
		89/5	10	▽ **Cobbles**, rotor through cobble layer, no odor in wash water.			0	
6 SS	50	24 51 48 55	12	**Poorly Graded Sand**, mostly fine sand, little medium sand, gravel, 10YR 5/4 yellowish brown, wet, compact grading to very dense, strong odor.	SP		463 886 864	Sample collected 12-14'.
			14	End of boring 14.0' bgs.				
			16					
			18					

SOIL BORING WELL CONSTRUCTION LOG RASR BORINGS.GPJ RMT_CORP.GDT 8/24/07

Signature: [signature]

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Appendix F
Quality Assurance Project Plan (QAPP)

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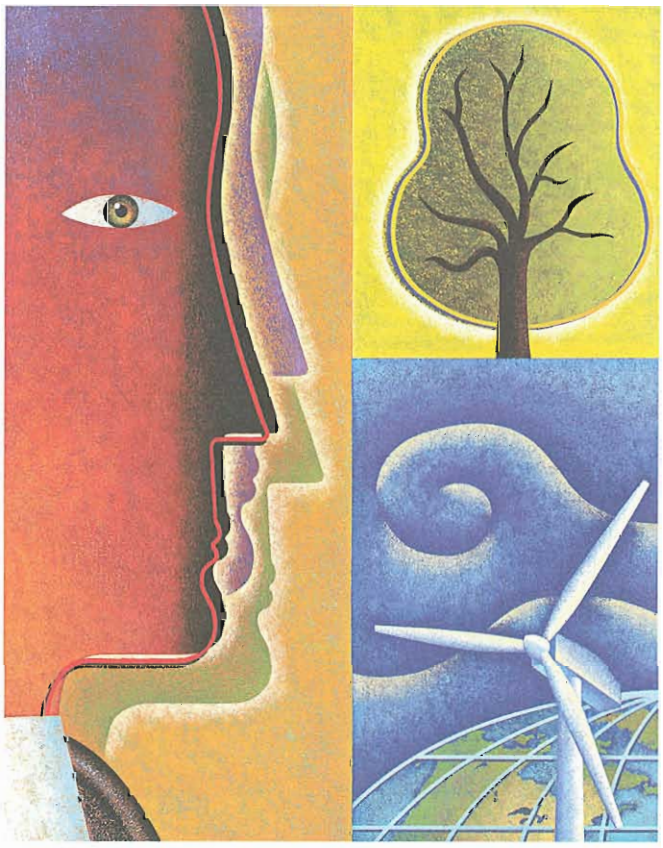
Quality Assurance Project Plan (QAPP)

L.E. Carpenter & Company
Wharton, Morris County, New Jersey

USEPA ID No. NJ002168748

August 2008, Revised [Rev 1] November 2008



RMT

• ENVIRONMENT • ENERGY • ENGINEERING

Quality Assurance Project Plan (QAPP)

L.E. Carpenter & Company
Wharton, Morris County, New Jersey

USEPA ID No. NJ002168748

August 2008, Revised [Rev 1] November 2008

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Acronyms

AA	Atomic Absorption Spectrophotometer
AOC	Administrative Order of Consent
ASTM	American Standards for Testing Materials
BNA	Base-neutral/acid extractable (semivolatile organic compounds)
BETX	Benzene, ethylbenzene, toluene, xylene
CCB	Continuing calibration blank
CCV	Continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund), as amended by the Superfund Amendments and Reauthorization Act (SARA)
CLP	Contract Laboratory Program
COPC	Constituent of potential concern
CRA	Contract Required Atomic Absorption Spectrophotometer Standard
CRDL	Contract Required Detection Limit
CRI	Contract Required Inductively Coupled Plasma Spectrophotometer Standard
CRQL	Contract Required Quantization Limit
CRL	Central Regional Laboratory
CVAA	Cold vapor atomic absorption spectrophotometer
DEHP	di(2-ethylhexyl)phthalate
DO	Dissolved oxygen
DQO	Data Quality Objective

Eh	Redox potential
FSP	Field Sampling Plan
GC	Gas chromatograph
GFAA	Graphite furnace atomic absorption spectrophotometer
HSR	Health and Safety Representative
ICB	Initial calibration blank
ICP	Inductively coupled plasma emission spectrophotometer
ICS	Interference check sample
ICV	Initial calibration verification
LRA	Linear range analysis
MDL	Method detection limit
MS/MSD	Matrix spike/matrix spike duplicate
NCP	National Contingency Plan
NIST	National Institute for Standards and Technology
NJDEP	New Jersey Department of Environmental Protection
NTU	Nephelometric turbidity unit
O&M	Operation and Maintenance
ORP	Oxidation reduction potential
OSC	On-site Coordinator
PCB	Polychlorinated biphenyl
PRMP	Post Remedial Monitoring Plan
QA	Quality Assurance

QAM	Quality Assurance Manager
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAS	Routine analytical services
RI/FS	Remedial Investigation and a Feasibility Study
RMT	RMT, Inc.
ROD	Record of decision
RPD	Relative percent difference
RPM	Remedial Project Manager
SAS	Special analytical services
SOP	Standard Operating Procedure
TDS	Total dissolved solids
TSS	Total suspended solids
TOC	Total organic carbon
USEPA	United States Environmental Protection Agency
VOA	Volatile organic analysis
VOC	Volatile organic compound

Section 1
Project Description

1.1 Introduction

This Quality Assurance Project Plan (QAPP) presents the organization, objectives, planned activities, and specific QAPP procedures associated with the Remedial Investigation Workplan (RIW) for the L.E. Carpenter (LEC) site located in Wharton, New Jersey. Specific protocols for data collection, sampling, sample handling and storage, chain-of-custody, and laboratory and field analysis will be described.

The USEPA requires all environmental monitoring and measurement efforts mandated or supported by the USEPA be centrally managed by a QA program to ensure that the precision, accuracy, completeness, and representativeness of the RI/FS data are known and documented. This QAPP describes the protocols that will be followed for collecting and handling samples, sample storage, chain-of-custody procedures, and laboratory and field analyses.

This QAPP was prepared in general accordance with the following guidance documents:

- EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, EPA /QA/R-5. (Draft), October 1997.
- Data Quality Objectives Process for Superfund, Interim Final Guidance, OSWER Directive 9355.9-01, September 1993.
- EPA NEIC Policies and Procedures Manual, EPA 330/978-001-R, May 1986.
- USEPA Contract laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99-008, October 1999.
- USEPA Contract laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 540/R-94/013.

1.2 Site Description and Background

A description and background of the site is presented in Sections 2 and 3 of the RIW.

1.3 Investigative Objectives

The primary objective of the RIW, as described in Section 1.1 of that document, is to further investigate the MW-19/Hot Spot 1 (MW19HS1) Area of Concern (AOC) in order to delineate both laterally and vertically the nature and extent of residual source material contributing

contaminant mass to the shallow groundwater aquifer causing exceedances of applicable New Jersey Groundwater Quality Criteria (NJGWQC).

This section presents the specific objectives of the RIW and outlines their associated tasks, which are primarily field data and sample collection and analysis. This section also presents the target laboratory parameters (target parameters) for which samples will be analyzed, and the intended uses of the generated data. A data quality objectives (DQO) table for the project is presented as Table 1 to this QAPP.

The purpose of this QAPP is to describe the project objectives and organization, functional activities and quality assurance and quality control protocols that will be used to achieve the desired DQOs at the L.E. Carpenter Site. The general investigative objectives of the remedial investigation have been described in the RIW.

Although this QAPP has been developed to be as specific as possible, some information on investigation activities and methods is more fully developed in the RIW and the site Health and Safety Plan (HASP; Appendix G of RIW).

Where appropriate, these documents have been cross-referenced within this QAPP.

1.3.1 Field Parameters and Uses

Representative soil samples will be field screened for volatile organic compounds (VOCs) using a PID and analyzed in the field for the presence of NAPL using OIL-in-SOIL test kits. These in-field test results will aid the selection of soil samples to be analyzed in the laboratory for benzene, toluene, ethylbenzene, and xylenes (BTEX), DEHP, and grain size analyses. These samples will help quantify the potential distribution of LNAPL.

Sampling procedures specific to low-flow groundwater sampling are described in detail in Appendix A. Other field instrument calibration and analytical procedures are presented within the O&M manuals provided by the manufacturer of the equipment being used.

Temperature, specific conductance, dissolved oxygen (DO), pH, oxidation reduction potential (ORP), and turbidity will be measured from all groundwater samples and be used as indicators of well purging stability as well as in natural attenuation evaluations.

1.3.2 Laboratory Parameters and Uses

All laboratory analyses will be performed by Lancaster Laboratories of Lancaster, Pennsylvania (Lancaster) [State of New Jersey Laboratory Certification No. PA011].

The lists of target parameters for the soil and groundwater investigations are provided in Table 2 and summarized below.

BTEX compounds will be analyzed in groundwater and soils using USEPA Methods 624 and 8260, or equivalents, respectively. DEHP will be analyzed in groundwater and soils using Methods 625 and 8270, or equivalents, respectively. These organic compounds constitute the contaminants of concern (COCs) in the groundwater and soils.

1.3.3 Intended Data Uses

The RIW details the intended data uses, which are summarized briefly here. The RIW has been developed to provide the following information:

1. A delineation both laterally and vertically the nature and extent of residual source material contributing contaminant mass to the shallow groundwater aquifer;
2. Collection of sufficient information to support further design of the remedial approach presented in the 2007 Remedial Action Selection Report [RASR].

1.4 Sample Network Design and Rationale

The sample locations and rationale for selected sample locations are described in Table 1 of this QAPP and in Section 5 of the RIW. Figure 9 of the RIW presents sampling locations. The sample analytical parameters are indicated in Table 2.

1.5 Data Quality Objectives

Data Quality Objectives are qualitative and quantitative statements which specify the quality of the data required to support decisions made during evaluation activities and are based on the end uses of the data to be collected. As such, different data uses may require different levels of data quality. There are two analytical levels, which address various data uses and the QA/QC effort and methods required to achieve the desired level of quality. For this remediation evaluation these are as follows:

1.5.1 Screening Data

These data are generated by less precise analytical methods with less rigorous sample preparation than those with definitive level methods. Sample preparation steps may be restricted to simple procedures, such as dilution with a solvent, instead of elaborate

extraction/digestion and cleanup. Screening data provide analyte identification and quantification, although the quantification may be relatively imprecise. A portion of screening data may be confirmed using analytical methods and QA/QC procedures and criteria associated with definitive data. Screening data without associated confirmation data are not considered to be data of known quality.

Screening quality data will be used for field-measured parameters such as oil-in soil, pH, temperature, specific conductance, dissolved oxygen, redox potential (ORP; Eh), turbidity, depth to groundwater, and health and safety monitoring. These data will be used for determining the progress of the temporary monitoring well purge process, general groundwater quality, rate of natural attenuation, and possibly as input to computer fate and transport models.

1.5.2 Definitive Data

These data are generated using rigorous analytical methods, such as approved USEPA methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce tangible raw data (*e.g.*, chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files. Data may be generated at the site or at an off-site location as long as QA/QC requirements are satisfied. For the data to be definitive, either analytical or total measurement error or precision of the analytical method must be determined.

Soil and groundwater samples will be collected and analyzed for BTEX and DEHP in accordance with USEPA analytical protocols and data validation procedures to meet definitive data quality objectives.

Section 2
Project Organization and Responsibilities

The RIW project will be completed by RMT, Inc., on behalf of L.E. Carpenter and Company [LEC]. A comprehensive Project Contact List is presented as Table 1 in the RIW and is briefly outlined below.

2.1 Identification of Key Project Personnel

The key management and technical staff responsible for the execution of the RIW are:

- Nicholas J. Clevett, **Senior Project Manager**
- James J. Dexter, CPG, **Senior Hydrogeologist and Project Coordinator**
- Kenneth Quinn and Jennifer Overvoorde, **Senior Technical and Field Coordinators**
- Scot Middlebrook and Scott Pawlukiewicz, **Environmental Scientist (Field Personnel)**
- Gretchen Rahn, **QA/QC Officer and Data Validation Coordinator**

Personnel involved in the investigation, and in the generation of data as a result of investigation activities, become a part of the overall Project Quality Assurance program. Within that program, the following individuals have specific responsibilities: The Project Coordinator, the Technical Coordinator and field personnel. Specific laboratory personnel with Quality Assurance/Quality Control responsibilities include the Laboratory Quality Assurance Officer and the Laboratory Scientists and Technicians.

2.2 USEPA Region II and NJDEP Remedial Project Managers (RPMs)

The USEPA Region II Project Manager and NJDEP Project Manager are Ms. Patricia Simmons Pierre and Mr. Glenn Savary respectively. These two individuals are the primary project points of contact for their respective agencies and have the responsibility for coordinating regulatory status and issues within/between the USEPA Region II and the NJDEP, and ensuring that all natural attenuation activities comply with applicable standards and technical guidance.

2.3 RMT Project Manager

Nicholas Clevett will provide overall management of all project initiatives, and will establish and communicate schedules and budgets to both technical staff and the technical coordinator. He will aid the project coordinator with all USEPA and NJDEP initiatives, and will also assist both the project and technical coordinators with overall technical direction.

2.4 RMT Project Coordinator

James Dexter will provide technical direction, review RMT's performance on this project, and will provide overall senior QA/QC. He will also provide input concerning Superfund procedures and conformance with the National Contingency Plan (NCP). He will also coordinate activities with the USEPA and the NJDEP as appropriate.

2.5 RMT Technical Coordinators

Kenneth Quinn & Jennifer Overvoorde will be responsible for implementation of the RIW and will coordinate technical staff assignments both in-house and in the field, and as necessary, will assist the project manager with USEPA and NJDEP contact regarding status, technical and regulatory issues.

2.6 RMT Field Coordinator

The Field Coordinator will be the principal field team member primarily responsible for project field coordination and in-field Quality Assurance activities. The Field Coordinator will guide the field personnel in achieving a thorough understanding of the project Quality Assurance Plan and their respective roles relative to one another within the established project framework. The Field Coordinator will also act as the site Health and Safety Representative (HSR).

The Field Coordinator is also responsible for the day-to-day activities of contractor field personnel. In this capacity, the Field Coordinator is responsible for the Quality Assurance of daily project activities and the maintenance of the Quality Assurance Project Plan. Further responsibilities include the review of field notebooks, driller's logs, and other field-related documentation.

2.7 RMT Field Personnel

These environmental staff will be responsible for measuring and recording field parameters; installing monitoring points, collecting, labeling, and transporting samples; and conducting in-field measurements, in accordance with the RIW and QAPP. They will report to the Field Coordinator.

2.8 RMT Laboratory Coordinator

The Laboratory QA/QC Coordinator will be responsible for ensuring that applicable QA/QC procedures are followed. This will include reviewing QA/QC procedures and documentation, and directing the data validation and assessment activities, also is responsible for internal performance and system audits.

Section 3
Quality Assurance Objectives for Measurement Data

Data quality requirements are based on the intended use of the data, the measurement process, and the availability of resources. Data quality requirements include detection limits, accuracy, and precision Quality Assurance protocols for the analytical methods to be used and the analyses to be conducted. Specific guidelines for accuracy, precision, completeness, representativeness, and comparability are discussed in the following subsections. Field blank, trip blank, decontamination evaluation (*i.e.*, "rinsate" or "equipment") blanks, atmospheric blanks, and field duplicates described in Section 10 of this QAPP will be subjected to the same Quality Assurance objectives as samples.

3.1 Accuracy

3.1.1 Definition

Accuracy is defined as the degree of agreement of a measurement or average of measurements with an accepted reference or true value.

3.1.2 Field Accuracy Objectives

The achievement of acceptable accuracy for data in the field will be addressed through the use of sampling procedures that minimize bias, the regular and appropriate calibration of field instruments, and adherence to sample holding times. Accuracy objectives for field measurement instruments are expressed as the allowable difference from a known standard.

3.1.3 Laboratory Accuracy Objectives

Laboratory accuracy will be assessed through the use of method blanks, standard reference material samples, and matrix spike samples, all of which are described below. These samples will be used to assess the effect of laboratory procedures on the true values of the sample results. In addition, matrix spike samples will be used to provide information regarding the effect of the sample matrix on the laboratory methods. The percent of recovery will be calculated for each sample. The accuracy equations and control limits are provided in the Lancaster Laboratory QA/QC, provided as Appendix B.

3.2 Precision

3.2.1 Definition

Precision is a measure of the scatter of a group of measurements around their average value. Provided that the measurements are made under the same specified conditions, the precision value will demonstrate the reproducibility of the measurement process. In relation to the RFI, precision deals primarily with field sampling and laboratory analytical procedures.

3.2.2 Field Precision Objectives

Field precision will be assessed through the collection and measurement of field duplicates at a rate of 1 duplicate per 10 analytical samples. Duplicates will measure the effect of field procedures on data reproducibility.

3.2.3 Laboratory Precision Objectives

Laboratory precision will be assessed through the calculation of Relative Percent Differences (RPD) and Relative Standard Deviations (RSD) for three or more replicate samples. Replicates will measure the effect of laboratory procedures on data reproducibility.

Comparing analytical results between MSs/MSDs for organic analysis, and laboratory duplicate analyses for inorganic analysis will assess precision of laboratory analyses. The project QA objectives established for precision are expressed in the following parameters.

Analysis of Standards

One of the QA objectives for this project is that each initial calibration curve and subsequent (*i.e.,* "continuing") calibration standards meet or exceed the minimum QA criteria established in the USEPA-approved methods and laboratory SOPs.

Analysis of Spiked Samples

A second QA objective for this project is that the results of spiked samples (*i.e.,* matrix spikes) and spiked sample duplicates (*i.e.,* matrix spike duplicates) be within the advisable recovery and Relative Percent Difference (RPD) limits specified in the USEPA-approved methods and laboratory SOPs.

Analysis of Duplicate Samples

A third QA objective for this project is that analyte concentrations be comparable between duplicate samples. This includes 1) duplicate samples collected in the field, 2) duplicate analyses resulting from matrix spike and matrix spike duplicate samples, and 3) results generated from multiple analyses of a sample performed at the laboratory.

A measure of precision is RPD of two analyses of the same sample. This measure is applied as a quality control criterion to the recovery of organic matrix spike compounds. Splitting of the sample allows the determination of the precision of the preparation and analytical techniques associated with the duplicate sample. The RPD will be calculated using the equation:

$$\% \, RPD = \frac{S - D}{(S + D)/2} \, x \, 100\%$$

RPD criteria for organic matrix spike compounds are given in the USEPA-approved methods and laboratory SOPs.

3.3 Completeness

3.3.1 Definition

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan were implemented exactly as planned.

3.3.2 Field Completeness Objectives

Field completeness will be assessed, on an individual task basis, as the amount of valid samples obtained from all the samples collected. Field completeness objective for the project will be 90 percent or greater.

3.3.3 Laboratory Completeness Objectives

It is expected that 95 percent or more of all samples tested via USEPA and SOP methods will provide data meeting QC acceptance criteria. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\% \, Completeness = \frac{Number \, of \; valid \; results}{Number \, of \; possible \, results} \, x \, 100\%$$

3.4 Representativeness

3.4.1 Definition

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is a qualitative parameter that is dependent on the proper design of the sampling program and the proper laboratory protocol.

3.4.2 Measures to Ensure Representativeness of Field Data

The sampling program described in the Remedial Investigation Work Plan (RIW) was designed to provide data that is representative of site conditions. Design of the proposed sampling networks is discussed above in Section 1.3 and implementation of the sampling program is discussed in Section 5 of the November 2008 RIW. Specifically, the following considerations have been accounted for during development of the sampling program:

- physical and chemical properties of the medium to be sampled;
- relative and absolute concentrations of hazardous constituents of concern;
- relative importance of various hazardous constituents to RIW objectives;
- method performance characteristics; and
- potential interferences at the site.

Other procedures such as sample preservation, appropriate sample containers, sample hold times, and analytical procedures are addressed in this QAPP.

3.4.3 Measures to Ensure Representativeness of Laboratory Data

The representativeness of laboratory data depends on the proper implementation of the analysis program, meeting sample holding times, and analyzing and assessing field duplicate samples. The RIW was designed to provide data representative of site conditions. During development of this RIW, consideration was given to site history, existing analytical data, and physical setting. Lancaster holds high representativeness through strict adherence to the specific analytical procedures, and the QC requirements in their QA/QC, provided as Appendix B.

3.5 Comparability

3.5.1 Definition

Comparability expresses the confidence with which one data set can be compared with another.

3.5.2 Measures to Ensure Comparability of Field Data

The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as documented in this QAPP, are expected to provide comparable data.

The data from previous collection activities will likely be comparable to data collected during the planned investigation since previous collection activities performed at LEC were completed under similar sampling and analytical methods to those described in this QAPP.

3.5.3 Measures to Ensure Comparability of Laboratory Data

The comparability of laboratory data depends on the standardization of the analysis program. The procedures used to obtain the planned analytical data, as documented in this QAPP, are expected to provide comparable results.

However, there may be instances where data was acquired for different purposes using different analytical methods, or different DQOs. Such data may not be directly comparable.

3.6 Level of Quality Control Effort

As noted in Section 3.1 and Section 3.2, the quality of the data resulting from the field sampling and laboratory analysis will be assessed through the use of field duplicates, equipment rinsate blanks, laboratory replicates, method blanks, standard reference material samples, and matrix spikes.

3.6.1 Field Data

Field QC samples will include field duplicates, equipment rinsate blanks and/or field (atmospheric) blanks, as appropriate, for soil and aqueous samples. These samples are further described in Section 10 of this QAPP.

Field Duplicates

Field duplicate samples will be collected for both soil and aqueous matrix to evaluate field sample collection procedures. Field duplicate samples are pairs of samples collected from the same location, at the same time, and employing consistent sampling methods, but sent to the laboratory with different sample numbers. Differences in the results between the original and duplicate samples represent loss of precision. Differences in analyses results will be used to identify and correct errors in the sample collection procedures.

Equipment Rinsate Blanks

Equipment rinsate blanks are analyzed to assess procedural contamination that may cause sample contamination. Sample collection procedures are presented in Section 4.5 of this document.

Field (Atmospheric) Blanks

Field (Atmospheric) Blanks (aqueous samples) will be collected to evaluate potential analysis interferences. Field blanks are samples of distilled water that are prepared in the field. The containers are left open during sample collection at one well so that they are exposed to the same environment as the actual samples. The field blank samples will be analyzed in the same manner as the actual samples. If contaminants are identified in the analysis, the results will be used to identify potential site-specific interferences.

3.6.2 Laboratory Data

Accuracy of laboratory results will be assessed for compliance with the established QC criteria using the analytical results of method blanks, matrix spike/matrix spike duplicate samples, reagent/preparation blanks, field blanks (as described above), and trip blanks.

Method Blanks

Method blank samples are generated within the laboratory and used to assess possible laboratory contamination of samples associated with all stages of preparation and analysis of sample extracts. Method blank results will not be used to modify the sample results by the laboratory reporting the data. For organic analyses, a minimum of 1 method blank will be analyzed for every extraction batch, or 1 for every 20 samples, whichever is more frequent. For

metals and conventional analyses, 1 method blank will be analyzed for every digestion batch, or 1 for every 20 samples, whichever is more frequent.

Recovery of Analyte Spikes

To ensure the accuracy of the analytical procedures, an environmental sample will be randomly selected and spiked with a known amount of the analyte or analytes to be evaluated. In general, a sample spike is included in every set of 20 samples tested on each instrument. The spike sample will then be analyzed. An increase in the analyte concentration due to the spike addition, compared to the concentration in the un-spiked sample, determines the percent recovery. The percent recovery (%R) of matrix spike samples will be calculated as follows:

$$Spike\ Recovery\ (\%) = \left(\frac{ug\ X\ \ found\ in\ spiked\ sample - ug\ X\ in\ native\ sample}{ug\ X\ added\ to\ sample} \right) x\ 100\%$$

Spike recovery data is used to check for possible sample matrix interference and analytical bias. The objectives for the spike recovery from aqueous matrices are given in the USEPA-approved methods and laboratory SOPs.

Reference Materials

Reference materials used as calibration standards or surrogate compounds will be certified, commercially available materials.

Instrument Performance

Instruments used in this project will be checked each day that samples are analyzed to demonstrate instrument performance. The QA objectives for instrument sensitivity, calibration, and performance are established in the USEPA-approved analytical methods and laboratory SOPs. These methods are listed in Section 8 of this QAPP.

Recovery of Surrogates

Surrogate compound recovery is utilized to evaluate proper performance of the analytical method and/or possible matrix interference to the analytical method for organic compounds.

The recovery of a surrogate compound (S) added to a sample will be defined as follows:

$$Recovery\ \% = \frac{ug\ S\ \ found\ in\ sample}{ug\ S\ added\ to\ sample}\ x\ 100\%$$

This equation assumes that the surrogate is not present in the sample. The objectives for recovery of surrogates from aqueous matrices are given in the USEPA-approved methods and laboratory SOPs.

Trip Blanks

Trip blanks (*i.e.*, "shipping blanks") are used to assess the potential for contamination of aqueous samples due to contaminant migration during sample shipment and storage. Trip blanks are required at a frequency of one per cooler in which aqueous matrix VOC samples are shipped. Trip blanks will be prepared in the laboratory by filling sets of 40 ml VOA vials with laboratory distilled/deionized water, sealing the vials with septum-lined caps (allowing no headspace), and shipping at least one set of two vials from the laboratory with each sample shipment. The vials remain in the shipping container from the time they leave the laboratory until the time they return to the laboratory along with field samples.

Section 4
Sampling Procedure

4.1 OIL-in-SOIL Test Kits

The recovered soils from the mini-sonic drill rig will be evaluated in the field using additional qualitative field testing of soil samples, including flame ionization detector (FID) readings of soil samples and soil testing using "OIL-in-SOIL" test kits (see picture below).

OIL-in-SOIL Test Kit (vial is 3.8 inches long)

Soil samples will be collected and placed into "OIL-in-SOIL" test kits similar to the one shown on above. The test kits consist of a plastic vial with a small cube of dye glued to the bottom of the cap. Once soil and water is added and thoroughly mixed per the instructions on the sample vials, the cube will dissolve, activating the green dye. The red dye is only activated if some hydrocarbon product is present. The activation of the red dye cannot be used to estimate concentrations, and also cannot be used to determine whether or not LNAPL product is mobile in the subsurface. Thus, pink/red staining of soil simply indicates that LNAPL product is present in the sample (although not necessarily mobile as free product in the formation), while green staining only indicates a lack of oil, as demonstrated by the two examples shown in Appendix C of this document.

4.2 Borehole Logging Methods

Continuous soil/fill samples will be collected at all new well locations where feasible given the subsurface conditions and drilling equipment used. Soil sample materials will then be logged by denoting pertinent information on a borehole log form. An example borehole log form is included in Appendix D. Information that will be collected and recorded on this form includes:

- Name of drilling contractor
- Boring location
- Date started / completed
- Geologists name
- Drilling method
- Borehole diameter
- Water level observations

A description of the number of sampling runs, length of sampling runs, and the percent recovery of each sampling run will be collected and recorded from each sampling run. A geologic description will be provided for each major material type to include the following data:

- Material name
- Unified Soil Classification System (USCS) classification
- Particle or grain size ranges
- Plasticity
- Color
- Odor or Photoionization Detector (PID) reading
- Moisture content
- Density or consistency
- Geologic origin, formation name, or stratigraphic unit

Materials collected from each boring will not be sampled or retained after the completion of the boring unless otherwise specified. Materials will be containerized in 55-galloon drums, staged in an appropriate on-site location, and properly disposed of at an approved off-site facility following characterization approval.

4.3 Temporary Shallow Monitoring Well Installation Procedures

Each boring will be supervised and the geology logged by an RMT field geologist. The monitoring wells will be advanced utilizing sonic drilling technology. A sonic drill rig operates by advancing an outer steel casing down-hole, providing a relatively tight seal between the drill string and the formation being drilled. This minimizes the potential for drag-down of upper native soils and fill materials, as well as any associated potential contamination. At the same time, this drilling method will alleviate problems of adequate formation penetration experienced by other drilling methods in the bouldery material that occurs at this site, and maximizes the recovery of subsurface soils/fill for purposes of geologic logging. Temporary monitoring well casing and screens will arrive at the site in the original factory packaging and remain in the packaging until the casing and screen materials are installed in the borehole. Temporary groundwater monitoring wells will be constructed with 2-inch–diameter PVC screens with 0.01-inch slots, and 2-inch–diameter PVC riser pipe threaded together.

4.3.1 Temporary Monitoring Well Development

Temporary monitoring wells will be purged until specific conductance, pH, turbidity, and temperature are stabilized.

4.3.2 Temporary Well Identification

Each soil boring or temporary well installed during the investigative activities will be identified with a unique label relevant to the previous soil boring and temporary wells installed at the facility.

4.3.3 Professional Surveying

A New Jersey (NJ) licensed professional surveyor will locate each temporary well to within one tenth of a foot (0.1) from the centerline of the PVC well casing referencing North American Datum (NAD 83). In addition, the surveyor will shoot a reference elevation to the nearest one-hundredth of one-foot (0.01) at the ground surface, and at a notched point on the PVC casing referencing National Geodetic Vertical Datum (NGVD).

4.4 Soil Sampling Procedures and Protocols

Representative soil samples will be collected at selected locations for soil analysis by field screening with hydrophobic dye, and laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), DEHP, and grain size analyses. These samples will be collected at locations to quantify the potential distribution and nature of any residual LNAPL that is present. Where BTEX are potential contaminants of concern, soil samples will be split

lengthwise and collected simultaneously in an airtight zipping bag for PID analysis and in sample containers for laboratory analysis. Samples being submitted for BTEX analysis will be collected and preserved in the field using USEPA Method 5035, O2SI sample kits with methanol preservation.

Soil boring locations and sampling intervals will be consistent with the RIW and will be selected on the basis of historical site knowledge and the specific target of each soil boring. Modifications may be made in the field on the basis of OIL-in-SOIL results, PID results, visual/olfactory senses, accessibility, and drilling limitations.

Soil samples would be analyzed in the field for the presence of NAPL using an OIL-in-SOIL test kit, as described above in Section 4.1.

A split sample from each location will be collected for potential BTEX and DEHP analysis. Following completion of the initial soil core survey with hydrophobic dye, oil-N-soil, and PID screening, representative samples will be collected at approximately 4-foot intervals and submitted to the laboratory for analysis of BTEX and DEHP. These data will be used following the investigation for comparison to the oil-in-soil and hydrophobic dye field data. The final depths and frequency for collecting these representative samples will ultimately be selected based on the visual observations, geologic logging results, and oil-N-soil and hydrophobic dye results. All of these data will in general provide:

- Complete vertical profiles at all soil boring locations where NAPL residuum and/or free phase product is detected by the field methods, to show results above the peak observable NAPL, at the peak NAPL concentration, and below the peak.
- Sufficient sample from the peak NAPL concentration in at least 3 soil boring locations, anticipated to be located within the central part of the residual source area underneath the location of the former floor drains and/or connector pipe.

Two representative soil samples from each permeable soil unit (anticipated to be 4 samples) will also be submitted for total organic carbon (TOC) analyses.

4.5 Groundwater Sampling Procedures and Protocols

Standard field sampling protocol will be followed for all grab groundwater sampling events. Sampling personnel will be familiar with procedures and requirements of the QAPP, and the samplers will have a copy of the current sampling procedures in their possession, readily available for reference during groundwater sampling events.

The grab groundwater sample collection activities will be performed in accordance with the procedures listed below in order to obtain representative groundwater samples, avoid potential sources of cross-contamination, and limit the potential for erroneous data.

4.5.1 Static Water Elevation

To determine the static water elevation (SWE), the static water level (SWL) will be measured prior to purging and sampling at each grab groundwater sampling location. The measurement will be obtained prior to purging the groundwater monitoring well. Each well will have a permanent reference point on the top of the well casing, designated top-of-casing (TOC), from which water level measurements will be taken. The reference point will be surveyed to the nearest 0.01 ft. and referenced to National Geodetic Vertical Datum (NGVD) or a local datum.

The measurement will be taken using an electronic water level meter capable of an accuracy of +/– 0.01 feet. The meter will be decontaminated prior to each measurement. Minimum contact of the tape and probe/sounder and the water in the well is required to decrease the potential for cross contamination. Disposable gloves of appropriate materials will be used while determining the SWL.

Prior to collecting the measurement, field personnel will verify the location of the measuring point on the well casing. The probe will be slowly lowered into the well until the sounder beeps or the LED becomes illuminated. The measurement will be read from the tape to the nearest 0.01-foot increment and recorded on the field notes. This measurement is the SWL as measured in feet below the TOC measuring point.

The static water elevation (SWE) will then be calculated using the following equation:

$$SWE = TOC - SWL,$$

where

SWE = static water elevation (ft NGVD),
TOC = top of casing elevation (ft NGVD),
SWL = static water level, depth to water below TOC (ft).

4.5.2 Field Instrument Calibration

All field instrumentation will be calibrated twice daily. Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications.

Equipment to be used during the field sampling will be examined to confirm that it is in good operating condition. This includes checking the manufacturer's operating manual and the instructions for each instrument to ensure that maintenance requirements are

being observed. Field notes from previous sampling trips will be reviewed so notations on prior equipment problems are not overlooked, and those necessary repairs to equipment have been completed. A spare pH electrode and a thermometer will be sent to sampling locations where pH and temperature measurements are required, including those locations where a specific conductivity probe/thermometer is required.

Field instruments will include a water level indicator and a multi-function flow through cell and meter such as the QED-MP 20 that has multiple sondes for specific conductivity, dissolved oxygen (DO), pH, oxidation reduction potential (ORP), temperature and turbidity. In the event an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be removed from service.

The equipment will be checked for any mechanical or electrical failures, weak batteries, and cracked or fouled electrodes before mobilizing for field activities. The equipment will also be checked post shipment to the site. Calibrations and repairs will be recorded in a bound notebook with the date and the name of the person making repairs/calibrations. The equipment will be calibrated before use and at least once for every half day of use. In the event that a multiple sonde meter is not available, single sonde meters such as those listed below will be used for field measurements.

Field instrument calibration procedures will be performed according to manufacturers' specifications. Field readings will be documented in accordance with standard RMT field sampling forms. Examples of field data sheets, meter calibration logs, and field note forms are given in Appendix D.

4.5.3 Low Flow Groundwater Sampling Methods

This section summarizes methods and techniques that will be used to collect representative groundwater samples utilizing low flow sampling techniques. Low flow sampling techniques differ from the traditional purge and sample techniques and have been shown to both reduce sampling time, IDW generation, and improve sample quality. These techniques are accepted and recommended by several state and federal agencies, including the USEPA. The low flow techniques described in this document are adapted and are in agreement with methods described in the NJDEP document entitled "Low Flow Purging and Sampling Guidance" (Appendix A) which, in turn, was developed in accordance with the USEPA document entitled "Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures" (EPA/540/S-95/504).

To consistently obtain a high quality groundwater monitoring data, site monitoring wells will be purged and sampled at flow rates no greater than 0.5 L/min (500 mL/min).

Purging will be performed for the purpose of removing water from the sample tubing and monitor indicator parameters in a closed flow-through cell until their stability is reached. Sample stability values are presented in Table 3. The techniques described in this document were developed for use with a specific suite of sampling equipment and instrumentation. Alternative techniques can be used if other equipment is used at the site. The suite of equipment applicable to this set of procedures includes:

- Portable peristaltic pump
- Inline water quality flow cell
- Water level meter

Sample collection will proceed in the following stepwise manner:

- Measure static water level and leave water level meter in well
- Insert tubing and connect to peristaltic pump
- Purge well until water quality parameters stabilize (Ref. Table 3)
- Collect sample after removing flow cell
- Label sample and place on ice
- Remove tubing

4.5.4 Collection of Field Parameters during Sampling

Wells will be purged until at least three consecutive readings, spaced 3 minutes or more apart, are within the indicator parameter ranges outlined in Table 3.

Purge water rates and volumes will be recorded frequently (*i.e.*, every 3-5 minutes). The frequency for collecting field readings is contingent upon the actual flow rate at which the well is being purged and will decrease as purge rates decrease. Also, observations regarding odor, color, turbidity, *etc.* will be recorded. Field forms for these measurements are included in Appendix D.

Stable dissolved oxygen, specific conductance and turbidity readings are considered the most reliable parameters for indicating whether stagnant water has been replaced by formation water. Due to the difficulty often experienced in stabilizing turbidity, an independent turbidity meter separate from the flow cell will be used. Water will be sampled directly from the flow cell discharge for use in the turbidity meter.

A final set of water quality readings will be recorded on the sample collection form (and/or chain of custody).

4.5.5 Field Sample Filtration Method

Field filtration will take place for any location specifying a field filtered sample. Typically filtration will only take place for samples collected for metals analyses. A filtered sample is also referred to as a "dissolved" sample, while an unfiltered sample may be referred to as a "total" sample. Filtration of a sample will take place after the water quality parameters have stabilized and other non-filtered samples have been collected. Collection of a filtered sample will be performed by momentarily shutting off the pump, removing the flow cell device (if used) from the sampling line coming from the pump and attaching an inline 0.45 μm filter by pushing the filter barbette into the sample tubing. A sample will be collected directly from the filter outfall after three filter volumes have passed through the filter. The 0.45 μm inline filter will be constructed of inert materials. If a unidirectional filter is used, the filter will be installed so that water will flow in the designed direction only.

4.5.6 Water Quality Sample Collection

During sampling, primary objectives and considerations include minimizing sample disturbance, avoiding sample exposure to air and extraneous contamination, and preserving sample integrity throughout collection.

Sample labels will be prepared by writing the project name and number, the sample location, the type of analysis requested, the time and date, and the sampler's initials on the label prior to placement on to the sample bottle. Sample bottles will be filled with the sample following the application of the sample label. Bottle labels will be filled in with waterproof ink.

Sample parameter collection will progress in the following order:

1. Unfiltered samples for in-field water quality measurements (not necessary if down well or flow-through cell measurements are taken).
2. Volatile organic compounds (*e.g.*, VOCs, methane).
3. Non-filtered, non-preserved (*e.g.*, sulfate, semivolatile organic compounds (SVOCs) and non-volatiles, phosphorous).
4. Non-filtered, preserved (*e.g.*, nitrogen series [ammonia, nitrates, nitrites, *etc*.]).
5. Miscellaneous parameters.

Sulfate samples will be collected before sulfuric acid preserved samples (*e.g.*, nitrogen series). Nitrogen series samples will be collected before nitric acid preserved samples (*e.g.*, dissolved metals). This will prevent accidental contamination of a sample with a

preservative intended for another sample (*e.g.,* sulfuric acid preservation contaminating an unpreserved sulfate sample).

Before opening and filling sample containers the sampling area will be checked for potential sources of extraneous contamination. The area around the well will be clean and contaminated equipment or materials (such as cuttings) will be kept away from the well. Samples will be protected from airborne contaminants such as engine exhaust, blowing dust and organic fumes (*e.g.,* gas cans) by sampling upwind of these contaminants or removing them before sampling. Gloves appropriate for the contaminants encountered will be utilized. New, clean gloves will be used every time a new well is sampled or if current gloves show evidence of contamination. Only disposable gloves will be used.

Sample containers will not be opened until it is time to fill them. Any required preservative will be added immediately after filling a sample container if it has not been pre-added to the container by the lab. Sample containers will be slightly overfilled so that a positive meniscus is formed before adding the cap to prevent the inclusion of any air bubble or headspace in the sample container. Sample containers will not be overfilled so that sample preservative is washed out. Sample containers will be inverted against a hard surface and tapped to check for air bubbles. If air bubbles are present, the sample will be discarded and a new sample collected in a new container. After satisfactory sample is collected, the sample container will be placed in a protective plastic bag. The bag will be sealed with tape and the sample container placed on ice in a clean sample cooler. Following these procedures will help minimize sample turbulence, agitation, volatilization, degassing, atmospheric exposure, biodegradation, and exposure to extraneous contamination and heating of samples.

4.6 Field QC Sampling Collection

The collection of QC blanks, duplicate samples, and spike samples will be discussed in Section 10 of this QAPP.

4.7 Preparation and Identification Procedures

4.7.1 Obtaining Contaminant Free Sample Containers

Pre-cleaned sample containers for all soil, groundwater, and air samples will be obtained from Lancaster Laboratories, Lancaster, Pennsylvania. The preparation of sample bottles (*e.g.,* preservative added) will be documented.

4.7.2 Sample Preservation Methods/Containers/Holding Times

The approved contract laboratory will provide the sample preservation methods, containers, and holding times for the parameters to be analyzed. Sample preservation requirements are presented in Table 4.

After sample collection, the container will be dried using a paper towel, placed inside a shock protective sleeve (bubble wrap), and placed inside a new Ziploc bag to protect against moisture damage. Forty (40) mL VOC vial may be placed within a foam sleeve instead of bubble wrap. If more than one 40 mL VOC vial is collected as part of a single "sample", then these three vials may be packaged together.

Samples must be chilled from ambient temperature to below 4 degrees C after collection and during shipment to the laboratory. To insure that samples do not exceed this temperature, samples will remain in a sample cooler at all times up until removal at the analytical lab. The sample coolers must be filled with new ice regularly and meltwater must be removed. Due to the potential for sample cross contamination, only water ice will be used as a cooling media (*e.g.* no "blue ice" or gel ice packets will be used). All items placed in a sample cooler must be sealed within plastic bags to prevent water wetting. Under no circumstances will samples be placed directly in a sample cooler without protection from meltwater. Samples received at the analytical lab with unreadable labels due to water saturation, breakage, abrasion, or label soak-off will be discarded and the samples will be recollected.

4.7.3 Sample Bottle Labels

Each sample bottle will be labeled so that the analytical laboratory has the following information:

- Site identification
- Sampling date and time
- Sample identification or location
- Sampling crew
- Sample preservation method.

4.7.4 Method of Transport

The method of transport used should be one that will ensure that the samples will be delivered to the laboratory by overnight delivery service or transported by the laboratory courier.

4.7.5 Transport Container and Packaging

The samples will be transported in a cooler. Sample packaging procedures are as follows:

- Place cushioning (bubble pack) in the bottom of the cooler.
- Place cushioning material around all glass bottles.
- Fill a plastic garbage bag with ice and place on top of the samples. Place the completed Chain-of-Custody Record in a Ziploc® bag (or equivalent watertight plastic bag), and tape it to the inside cover of the cooler.
- Tape shut the drain on the cooler, and wrap tape around the cooler completely in two locations.
- Attach Chain-of-Custody seals to each cooler, to ensure that tampering has not occurred during its shipment.

The sample will be transported in a cooler of sufficient size to maintain an internal temperature at or below 4°C. through receipt of the sample at the laboratory. Ice sealed in a plastic bag will be placed in the cooler to cool and maintain the sample's temperature at 4°C. through receipt at the laboratory. Upon receipt of the coolers at the contract laboratory, the temperature in the cooler will be recorded on the Chain-of-Custody Record or sample log. In the event that the internal cooler temperature exceeds the recorded groundwater sampling temperature, a data qualifier will be placed in the report table and corrective measures in sample cooling procedures will be made to ensure that subsequent sampling events meet the temperature performance standard.

4.7.6 Laboratory Sample Processing Time

The laboratory will process the samples using a standard turn around time (TAT) of approximately 14 days.

4.8 Sampling Equipment Decontamination

4.8.1 Soil Boring Equipment Decontamination

Drilling equipment will be steam-cleaned prior to arrival at the site and between each soil boring. The equipment will be scrubbed to remove all gross contamination using a plastic bristle brush. The equipment will then be clean water rinsed using a high-powered pressure washer. All decontamination waters, personal protective equipment (PPE) and cleaning materials (*e.g.*, brushes) will be containerized in the on-site poly tank

and 55-galloon drums, as appropriate, staged in an appropriate on-site location, and properly disposed of at an approved off-site facility following characterization approval.

Soil sampling tools (*e.g.*, trowels, spoons, and knives), which contact sample material, will be scrubbed to remove all gross contamination using a plastic bristle brush, cleaned with a solution of laboratory-grade soap prior to each sample and rinsed with distilled water.

4.8.2 Groundwater Sampling Equipment Decontamination

Static water level meters will be cleaned with a solution of laboratory-grade soap and rinsed with deionized water between monitoring wells.

Temporary monitoring wells sampled with dedicated bladder pumps or a peristaltic pump with dedicated tubing will not require decontamination. However, if a single bladder pump is used to sample more than one monitoring well, that bladder pump will be cleaned with a solution of laboratory-grade soap prior to each sample and rinsed with distilled water.

4.9 Investigation Derived Waste Management

Investigation derived wastes (IDWs) include drill cuttings, well development water, decontamination water and PPE. This material will be disposed of based on the type and presence of contamination detected at the sampling point or decontamination process. Development water and decontamination water collected during well installation activities will be containerized in the on-site poly tank pending characterization for appropriate management. Drill cuttings, spent personal protective equipment and other solid waste materials will be placed in 55-gallon drums and staged at an appropriate on-site waste collection point pending characterization and off-site disposal.

Section 5
Sample Custody

Chain-of-custody documentation enables possession of a sample to be traced from sample collection through analysis and disposal. A sample is considered under custody if:

- the item is in a person's possession;
- the item is in that person's view after being in his or her possession;
- the item was in that person's possession and then placed in a secured location; or
- the item is in a designated and identified secure area.

The field technician performing sample collection activities will be responsible for sample custody in the field. The laboratory sample custodian and analysts will be responsible for custody of the sample at the laboratory.

5.1 Field Chain-of-Custody

Prior to collecting samples in the field, the Field Personnel will obtain the sample bottles necessary for the field operation. Field Personnel will label each sample collected, filling in the appropriate information in waterproof ink. The field sampler will be responsible for collecting the samples and for logging the samples into assigned field notebooks. The field samplers will complete and verify the Chain-of-Custody forms. A sample Chain-of-Custody form can be found in Appendix E. A copy of the Chain-of-Custody will be placed in the project files and the original will accompany the samples to the laboratory. The identity of field duplicate samples will not be disclosed to the analytical laboratory. Sample analysis request forms will be prepared by the RMT Laboratory Coordinator, or prepared by Field Personnel and reviewed by the RMT Laboratory Coordinator. The analytical request forms will accompany samples, or precede delivery of samples, to the laboratory.

5.2 Transfer of Custody and Sample Shipment

Shipping containers will be sealed and accompanied by the Chain-of-Custody record, with appropriate signatures. The transfer of custody is the responsibility of the Field Personnel and the laboratory staff. The procedures to be implemented are as follows:

- Place completed chain-of-custody forms in a plastic bag, seal the bag, and tape it to the inside cover of the shipping container. After the samples are iced, seal the coolers with strapping tape and custody seals, add the date to the custody form, and ship the coolers to Lancaster using an overnight delivery service. Identify common carriers or intermediate

individuals on the chain-of-custody form, and retain copies of all bills-of-lading. When the samples are received in the laboratory, handle and process them in accordance with the procedures in laboratory SOPs, or specified analytical methods.

5.3 Laboratory Custody Procedures

In the laboratory, a sample custodian will be assigned to receive the samples. Upon receipt of a sample, the custodian will inspect the condition of the samples, reconcile the sample(s) received against the Chain-of-Custody record, log in the sample(s) in the laboratory log book, and store the sample(s) in a secured sample storage room or cabinet maintained at an appropriate temperature until assigned to an analyst for analysis. Custody will be maintained until the sample is discarded.

The sample custodian will inspect the sample for any leakage from the container. A leaky multi-phase sample will not be accepted for analysis as this sample would no longer be a representative sample.

The custodian will examine whether the sample bottle seal is intact or broken, since a broken seal may mean sample tampering and may make analytical results inadmissible in court as evidence. The RMT Laboratory QA/QC Coordinator will be promptly notified of broken seals so that appropriate action may be taken (*e.g.,* collect another sample).

When samples requiring preservation by either acid (except samples for volatile organic compound analysis) or base are received at the laboratory, the pH will be measured and documented. The Laboratory sample custodian will adjust the pH, if necessary, and the RMT Laboratory QA/QC Coordinator will be promptly notified of the pH adjustment so that sample collection procedures can be reviewed to determine if a modification is necessary.

Discrepancies observed between the samples received, the information that is on the Chain-of-Custody record, and the sample analysis request sheet will be resolved before the sample is assigned for analysis. The RMT Laboratory QA/QC Coordinator will be informed of any such discrepancy as well as its resolution. Results of the inspection will be documented in the laboratory sample logbook. Discrepancies will be documented in the analytical case narrative, as appropriate.

5.4 Sample Labels and Seals

Sample labels as shown in Appendix F will be affixed to each sample bottle before sample collection. At a minimum, the sample label will contain the following:

- Client - Job Name/Project Number,
- Sample Identification,
- Date and Time Collected (except for duplicate samples),
- Sampler's Signature (or initials), and
- Preservatives Added.

Section 6
Sampling Site Location and Sampling Activity Identification

Field activities will be documented in a field notebook, by the use of field forms, and through digital photography.

6.1 Field Logbooks

Generally the field logbooks will be used to document general activities and tasks including the dates, times, locations and personnel involved in specific activities. The field logbook will also be used to document deviations from workplans, errors, and other unforeseen circumstances. Finally the field logbook will be used to document miscellaneous information or data that does not fall under the scope of one of the field forms. Field forms will be used to document specific field data such as well construction details, well development details, instrument calibration water level elevations, water quality sampling parameters, and other routine data collection activities.

Information pertinent to investigations and monitoring events will be recorded in field logbooks. Field logbooks will be bound with consecutively numbered pages. Each entry in the field logbook will be preceded by the time which the activity took place. At a minimum, the field logbook will record the time the field team arrived at the site and left the site, and the time major activities were initiated and ended. The field logbook will also record the time subcontractors arrived and left the site and major activities performed. All subcontractors' names and affiliations will be noted in the logbook. The field logbook will also be used to document phone and personal conversations of a business nature with clients, regulators and subcontractors that take place while on-site. The pages will be dated and signed by the person who is recording the information. Work sketches or phrases that are recorded but deemed incorrect will be marked through in such a way as to still be legible, yet obviously struck from the text. Mark-throughs will be initialed and dated by the person striking the item.

Persons leading a sampling team or performing a distinct task will be issued a field logbook by the RMT Field Coordinator. That person will maintain the logbook throughout the investigation/monitoring event. At the conclusion of the various phases of the investigation, the field books will be collected and reviewed by the Field Coordinator.

Field forms will be used to document specific data collection activities as described above. Field forms to be used as part of activities at the L.E. Carpenter, Wharton, New Jersey facility are included in Appendix D. These forms include:

1. Title page
2. General notes form
3. Borehole logging form
4. Well construction diagram
5. Water level measurement form
6. Low flow water quality parameter stabilization form
7. Water quality sample collection form
8. Field instrument summary form
9. Field instrument calibration forms

6.2 Photographs

Photographs of the sampling site location and the activities occurring at a specific location will be made to document site wide and sample location specific conditions at the time of sampling/field activities. Photographs will be cross-referenced with an identification/explanation narrative in the field notebook.

Section 7
Calibration Procedures

7.1 Laboratory Calibration

The calibration procedures to be used for this project are summarized below, and will follow the analytical methods specified in Section 8 of this QAPP.

7.1.1 Instrument Performance and Tune

Prior to analysis of each set of samples and on a daily basis during the analysis, it will be demonstrated that the instruments meet the operating performance standards established in the applicable analytical methods. If an instrument does not meet the performance standards it will be tuned, repaired, or replaced until the performance criteria are achieved.

7.1.2 Calibration Curve

For analyses of analytes listed in Section 8 of this QAPP, instruments will be calibrated or standardized, as appropriate for the analytical method being used, prior to the analysis of each batch of samples. Instrument calibration will be verified on the frequency as prescribed in the applicable protocols (*e.g.*, every 12 hours for volatile and semi-volatile organic compounds). A new calibration curve will be established if the response observed in the analysis of the continuing calibration check standard varies outside of prescribed protocol limits. The details to the calibration procedures are described in the analytical methods and laboratory SOPs.

7.2 Field Calibration

In addition to the laboratory analyses conducted during the course of this investigation, field measurements of pH, specific conductance, temperature, dissolved oxygen, Eh, and turbidity will be taken for ground water samples. The following is a brief discussion on field instrument calibration.

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications.

Equipment to be used during the field sampling will be examined to confirm that it is in good operating condition. This includes checking the manufacturer's operating manual and the

instructions for each instrument to ensure that maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so notations on prior equipment problems are not overlooked, and those necessary repairs to equipment have been completed. A spare pH electrode and a thermometer will be sent to sampling locations where pH and temperature measurements are required, including those locations where a specific conductivity probe/thermometer is required.

Field instruments will include a water level indicator and a multi-function flow through cell and meter such as the QED MP-20 or YSI 556 that has multiple sondes for specific conductivity, DO, pH, Eh, Temperature and turbidity. In the event that an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be removed from service.

The equipment will be checked for any mechanical or electrical failures, weak batteries, and cracked or fouled electrodes before mobilizing for field activities. Calibrations and repairs will be recorded in a bound notebook with the date and the name of the person making repairs/calibrations. The equipment will be calibrated before use and at least once for every half day of use. In the event that a multiple sonde meter is not available, single sonde meters such as those listed below will be used for field measurements.

7.2.1 pH

The pH measurements will be made using a Geotech Model P3 flow-through cell (or equivalent). During use, the pH probe will be calibrated utilizing pH 4 and pH 7 buffer solutions. The pH of each sample will be measured in the flow-through cell. The pH measurements will be recorded to the nearest 0.1 pH unit.

7.2.2 Specific Conductance

The specific conductance probe will be calibrated to a stock calibration solution. The calibration must be within 10 percent of the calibration value of the solution. Specific conductance measurements will be made in the flow-through cell, and are automatically corrected by the instrument to 25°C. Measurements will be reported in μmhos/cm.

7.2.3 Temperature

Temperature will be measured to the nearest 0.1°C within the flow-through cell. Temperature measurements are utilized directly by the instrument to correct the specific conductance reading.

7.2.4 Turbidity

To assess monitoring well development and the representative nature of groundwater samples, the groundwater will be field-analyzed for turbidity using an in-field nephelometer (Hach Model 2100P, or equivalent). The meter will be calibrated before use according to procedures outlined in the operations manual.

7.2.5 Dissolved Oxygen

The dissolved oxygen measurements will be made using an YSI Model 95 or Geotech Model P3 Dissolved Oxygen Meter (or equivalent). Calibration consists of exposing the probe to a known oxygen concentration such as air at 100 percent relative humidity or water of known oxygen content, and then adjusting the O_2 CALIB control so the display shows a reading that matches the O_2 concentration of the known sample. The instrument is automatically temperature compensated to an accuracy of ± 1 percent of the dissolved oxygen reading between 5° and 45°C; and to an accuracy of ± 1.5- 2 percent between 0° and 5°C.

Section 8
Analytical Procedures

8.1 Laboratory Analysis

The laboratory will follow analytical procedures detailed in USEPA-approved methods and laboratory SOPs. Samples will be analyzed for the site-specific constituents of interest as listed in Table 2 of this QAPP.

The reporting limits for the analyses are listed in Table 2.

8.2 Field Analyses

To ensure that the analytical data gathered in the field are both valid and unbiased, the following steps will be taken:

- Field samplers will be trained in the use of each piece of equipment.
- Operating manuals will accompany each piece of equipment in the field.
- Preventive maintenance programs will be carried out on a scheduled basis.
- Spare components will be taken into the field in case of equipment failure or damage.
- Instruments will be calibrated on a daily basis and rechecked as specified in the SOPs.
- Readings and calibrations will be documented.

The accuracy, sensitivity, and precision of the field analytical techniques for measuring water levels, temperature, specific conductivity, turbidity, DO, redox potential (Eh), and pH are dependent upon the specifications for the instruments used, as well as on the QC techniques employed during their use. Field analytical procedures to be used for this project are described in the attached SOPs and manufacturers O&M Manuals.

Section 9
Data Reporting, Validation, and Reduction

9.1 Field Data

Data validation practices will be followed to assure that raw data are not altered and that an audit trail is developed for data that require reduction. Field data, such as those generated during field measurements, will be entered directly into a bound field notebook. Only direct-reading instrumentation will be employed in the field. With the exception of the temperature correction for specific conductance, no calculation will be involved in field data reduction. Procedures to evaluate field data will primarily include checking for transcription errors and reviewing field notebooks, by field staff. This task is the responsibility of the Field Coordinator. The Field Coordinator will review field measurements recorded in the field books and field chain-of-custody forms to determine that procedures specified in the Monitoring Plan have been followed. Project team members will be responsible for proofing data transfers.

9.2 Laboratory Data

Lancaster Laboratory, Lancaster, Pennsylvania will perform in-house analytical data reduction under the direction of the Laboratory QA Manager. The Laboratory QA Manager will be responsible for assessing data quality and advising of any data that were rated "preliminary" or "unacceptable" or of other notations that would caution the data user of possible unreliability. Data reduction procedures for the analytical methods are included in the associated laboratory SOPs.

The analytical laboratories will prepare and retain full analytical and QC documentation. Such retained documentation need not be hard (paper) copy, but may be in other storage media (*e.g.*, computer diskette or magnetic tape). As needed, the laboratory will supply a hard copy of the retained information.

For analytical results generated using GC/MS (BETX and DEHP), the laboratory will provide full data packages. The electronic data deliverable will be in the format specified by RMT so that the data can be readily incorporated into a relational database.

For the indicator parameters (*i.e.*, ammonia, nitrate, phosphorus, dissolved lead, sulfate, methane, TSS, and TDS) used for natural attenuation assessments, the laboratories will provide the following information in each analytical data package submitted:

1. Cover sheet listing the samples included in the report and narrative comments describing problems encountered in analysis.
2. Tabulated analytical results.
3. Summaries of applicable QC sample analysis (spikes, duplicates, laboratory control samples and blanks).

Analytical Data Reports will be available from the laboratory within four weeks following the receipt of the samples.

Upon receipt of the laboratory data reports, the RMT Laboratory QA/QC Coordinator or designated data reviewer will validate the data. Data validation consists of a review of the data for compliance with the established QC criteria based on the spike, duplicate, and blank results provided by the laboratory. Data validation will determine whether the procedures specified in the QAPP were implemented, the DQOs specified in this QAPP were attained, the specified reporting limits were achieved, and the sample holding times were met. The GC/MS instrument performance check sample results will be evaluated. An evaluation of data accuracy, precision, sensitivity, and completeness, based on method-specific criteria, will be performed according to the following guidance documents:

- National Functional Guidelines for Inorganic Data Review. USEPA, February 1994.
- National Functional Guidelines for Organic Data Review. USEPA, October 1999.

Method specifications provided in the laboratory SOPs will be used as guidance for validating data for non-CLP analytes listed in this QAPP.

- The data validation report will address the following items:
  - Overall quality and usability of the data
  - Evaluation of QC data, including precision, accuracy, and completeness of the data
  - Potential sample contamination due to blank contributions
  - Assessment of laboratory and field records
  - Actions regarding specific QC criteria exceedences.

RMT anticipates that data reporting for this phase of the investigation will consist of tabulating analytical results from Analytical Data Reports into summary tables through the use of computerized relational database and spreadsheet software. Reduced data will be placed in the central file maintained by the RMT Technical Coordinator.

9.3 Data Archival

The records management program will track investigation documentation so that it is available when the remedial design has been completed. Accountable documentation include items such as logbooks, field data records, correspondence, Chain-of-Custody records, analytical reports, photographs, computer disks, and final reports. The RMT Technical Coordinator is responsible for maintaining a file in which all accountable documents will be inventoried. Raw data generated during field operations will be filed to eliminate or correct errors arising from the transfer of data. In order to avoid errors in the transfer of data, copies of raw data from the field notebooks and the data as received from the laboratory will be entered into a data file. The data file will serve as the ultimate archive for information and data generated during this remedial investigation monitoring.

Section 10
Internal Quality Control Checks

Quality Control procedures for field analyses such as pH, specific conductivity, dissolved oxygen, Eh, turbidity, and temperature measurements consist of proper instrument calibration.

Internal Quality Control Checks used to assess field sampling precision and bias include the collection of the following blanks and samples:

- **Atmospheric Blanks** – These blanks consist of organic free, deionized water contained in each sample container with any preservatives required for that analysis. These will serve as a QC check on the field sampling methods for the analytes, container cleanliness, and external contamination. An atmospheric blank will be submitted for each sampling event.
- **Trip Blanks** – These blanks consists of organic free, deionized water contained in volatile organic compound (VOC) sample containers and preserved similar to VOC samples. These samples serve as a QC check on potential external contamination and/or cross-contamination between VOC samples during shipping and storage. A trip blank will accompany each cooler of VOC samples sent to the laboratory.
- **Rinsate Blanks** – These are samples of organic free, deionized water, which have been in contact with decontaminated sampling, and/or drilling equipment. These samples serve as a QC check on the decontamination procedure. One Rinsate Blank will be collected for every twenty field samples collected only when non-dedicated equipment is used. The rinsate blank should be collected after pouring analyte-free water over/through appropriate sampling equipment (*e.g.,* bailers, tubing, and pumps).
- **Field Duplicate Samples** – Duplicate samples will be collected to allow determination of analytical repeatability and sample homogeneity. At a minimum, one duplicate sample for every twenty ground and/or surface water samples, and one duplicate for every twenty soil and/or sediment samples, will be collected and submitted for analysis. Duplicate samples will be labeled in a manner such that their sampling point location is not disclosed to the laboratory. The duplicate sample number (*e.g.* DU-1) and its corresponding sample location will be recorded in the field notebook. Sampling date and time will ***not*** be filled out on the label of the duplicate sample nor on the Chain-of-Custody form in order to not to disclose the duplicate's sample point location.

Matrix Spike/Matrix Spike Duplicate Samples – The laboratory will analyze a matrix spike/matrix spike duplicate (MS/MSD, organic compounds) and sample spike/sample duplicate (inorganic analytes) sample pairs for as QC checks for accuracy and precision. MS/MSD sample pairs are actually laboratory analytical QC items, which are discussed here

because sufficient sample must be collected in the field if these analyses are performed using the samples from the L.E. Carpenter site. Sufficient volume for one MS/MSD sample pair will be collected for every 20 groundwater samples. These samples will allow the amount of recovery of spike constituents to be determined for matrix effects specific to the study site, through the addition of known concentrations of compounds into the sample at the laboratory and then performing the analysis. The spike concentrations added into QC samples will be consistent with the analytical methods and laboratory SOPs.

Section 11
Performance and System Audits

11.1 Field Performance Audits

11.1.1 Internal Field Audits

On-site audits may be performed to review field-related Quality Assurance activities. The Field Coordinator, the Technical Coordinator, or a senior technical scientist may conduct internal audits.

Specific elements of the on-site audit may include, but are not limited to, verification of the following items:

- Completeness and accuracy of sample Chain-of-Custody forms, including documentation of times, dates, transaction descriptions and signatures;
- Completeness and accuracy of sample identification labels, including notation of time, date, location, type of sample, person(s) collecting sample, preservation method used, and type of testing required;
- Completeness and accuracy of field notebooks, including documentation of times, dates, drillers' names, sampling method used, sampling locations, number of samples taken, name of person(s) collecting samples, types of samples, results of field measurements, soil logs and problems encountered during sampling;
- Adherence to health and safety guidelines including wearing of proper protective clothing. Level D protective clothing will be worn at a minimum and will be upgraded, if necessary, as specified in the Health and Safety Plan;
- Adherence to decontamination procedures as outlined in the site Health and Safety Plan, including proper washing or steam cleaning of pumps and pump tubing, bailers, and soil sampling equipment;
- Proper calibration and maintenance of field instruments;
- Adherence to sample collection, preparation, preservation, and storage procedures as outlined in the Monitoring Plan.

11.1.2 External Field Audits

The USEPA Region II and/or the NJDEP may conduct external field audits.

11.2 Laboratory Performance and System Audits

11.2.1 Internal Laboratory Audits

Laboratory audits consist of random data reviews, continuous trend analysis of laboratory QA data, and periodic analysis of performance evaluation samples. Systems audits are performed to verify the continuity of personnel, instrumentation, and quality control requirements contained in the SOPs. Each analytical laboratory is responsible for its own audits.

11.2.2 External Laboratory Audits

USEPA Region II and/or the NJDEP may conduct external laboratory system audits.

Section 12
Preventative Maintenance

The maintenance procedures discussed in the following subsections will be performed to maximize efficiency and minimize downtime in the laboratory and while working on the L.E. Carpenter Site.

12.1 Laboratory Maintenance

As part of their QA/QC program, the analytical laboratory to minimize the occurrence of instrument failure and other system malfunctions conducts a routine preventive maintenance program. Each team in the laboratory performs routine scheduled maintenance and repair or coordinate with the vendor for the repair of all instruments. All laboratory instruments are maintained in accordance with manufacturer's specifications or as appropriate for the instrument. The preventive maintenance procedures for the test instruments will follow established by the laboratory's SOPs. All maintenance activities will be documented in the record books to provide a history of maintenance records.

12.2 Field Maintenance

Routine daily maintenance procedures conducted in the field will include the following:

- Removal of surface dirt and debris from exposed surfaces of the sampling equipment measurement systems.
- Storage of equipment away from the elements.
- Daily inspections of sampling equipment and measurement systems for possible problems (*e.g.,* cracked or clogged lines or tubing; weak batteries).

Spare and replacement parts stored in the field to minimize downtime include the following:

- Appropriately sized batteries
- Extra precleaned sample bottles
- Locks
- Calibration solutions for each meter

Backup instruments and equipment should be available on-site or within 1 day via shipment to avoid delays in the field schedule.

Section 13
Specific Routine Procedures Used to Assess Data Precision Accuracy and Completeness

13.1 Laboratory Data Quality Assessment

The RMT Laboratory Coordinator and QA/QC Coordinator will oversee data validation.

The quality of the laboratory data will be assessed by the Laboratory Coordinator using CLP protocol-specific criteria, validation methods described in Section 9 of this QAPP. Data qualifiers described in the document, if applied to the data, may be added as lower case letters to distinguish them from upper case qualifiers added by the laboratory. The Laboratory Coordinator will check that data packages include a narrative to document variations from the analytical protocol and actions taken by the laboratory to address those variations. The Laboratory QA/QC Coordinator will advise the Project Team of data having questionable or unacceptable quality and procedural deviations noted in the laboratory report narrative.

13.2 Field Data Quality Assessment

To assist in collecting field data accurately and correctly, the Field Coordinator will issue specific instructions to personnel involved in field data acquisition. At the end of each field event the Field Coordinator will review the field books used by project personnel to check that tasks were performed as specified in the instructions. Field books will be reviewed periodically throughout the entire project.

Raw data and reduced data will be submitted by project personnel to the RMT Technical Coordinator for review. Equations, calculations, data transfers, consistent units, and significant figures will be subject to this Quality Assurance review.

Section 14
Corrective Action

Corrective actions may be required for two classes of problems: 1) analytical and equipment problems, and, 2) nonconformance problems. Analytical and equipment problems may occur during sampling and sample handling, sample preparation, laboratory instrumental analysis, and data review.

If a nonconformance with the established quality control procedures in this QAPP is identified, it will be noted in the logbooks, and corrected in accordance with the QAPP. For noncompliance problems, a corrective action program will be determined and implemented at the time the problem is identified and reported. The person who identifies the problem is responsible for notifying the appropriate field or laboratory personnel. The laboratories will communicate analytical problems to the RMT Technical Coordinator or the RMT Laboratory QA/QC Coordinator. Implementation of corrective action will be confirmed in writing through the same personnel. Field corrective actions will be reported to the RMT Technical Coordinator, implemented, and documented in the field logbook. The RMT Technical Coordinator will report any corrective action that directly impacts project data quality objectives to the USEPA Region II and NJDEP Project Managers.

14.1 Field Measurement Corrective Action

Technical staff and project personnel will be responsible for reporting technical or QA nonconformance or suspected deficiencies of an activity or issued document by reporting the situation to the RMT Field Coordinator or designee. If it is determined that the situation has impacted the quality of the data, a nonconformance report will be completed by the RMT Field Coordinator and distributed to the appropriate personnel. The field staff, in conjunction with the RMT Field Coordinator, will recommend a corrective action. The RMT Field Coordinator will be responsible for ensuring that corrective action for nonconformance has been implemented. The RMT Field Coordinator will be responsible for the following:

- Evaluating all reported nonconformance
- Controlling additional work on nonconforming items
- Determining future action to be taken
- Noting nonconformance in the field logbook
- Reviewing nonconformance reports and corrective actions taken
- Ensuring that nonconformance reports are included in the final project files

If appropriate, the RMT Field Coordinator will ensure that no additional work that is dependent on the nonconforming activity is performed until the corrective actions are completed.

14.2 Laboratory Corrective Action

Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The investigative action taken is somewhat dependent on the analysis and the event. Corrective action in the laboratory may occur prior to, during, and after the initial analysis.

A number of conditions, such as broken sample containers, multiple sample phases, low/high pH readings, or potentially high-concentration samples may be identified during sample login or just prior to analysis. The corrective action program is under the supervision of the Lancaster Laboratory QA Manager. Following a consultation with laboratory scientists and technicians and team leaders, it may be necessary for the Lancaster Laboratory QA Manager to approve the implementation of corrective action. Some conditions during or after analysis may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain quality control criteria are not met, etc. Corrective actions may be necessary if any of the following occur:

- QC data are outside the warning or acceptable windows for precision and accuracy.
- Blanks contain target analytes above acceptable levels.
- Undesirable trends are detected in spike recoveries or the RPD between duplicates.
- There are unusual changes in detection limits.
- Deficiencies are detected by the Laboratory during internal or external audits or from the results of performance evaluation samples.
- Inquiries concerning data quality are received.

Corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure that was used for possible errors, and checks the instrument calibration, spike, and calibration mixes, and the instrument sensitivity. If the problem persists or cannot be identified, the matter may be referred to the laboratory team leader, and/or the Laboratory QA Officer for further investigation. Documentation of the corrective action procedure, whether resolved or not, is placed in the Laboratories project file. The laboratory will provide documentation as to what, if any, corrective actions were initiated concerning this study and report them to the RMT Laboratory QA/QC Coordinator and/or include descriptions of the corrective action(s) in the analytical report narrative.

14.3 Corrective Action during Data Validation and Data Assessment

Data validation corrective actions typically consist of requesting corrections to laboratory reports. The RMT Laboratory QA/QC Coordinator will notify the respective laboratory of incomplete or erroneous reports and will request the issuance of corrected versions. Final summary data tables will not be issued until all data have been validated and all corrections have been made.

The Laboratory QA/QC Coordinator will review the data from the analysis of field, trip, rinsate, and analytical method blanks. If excessive contamination (*i.e.*, levels above allowable limits set within the applicable analytical protocols) is found in the blanks, corrective action will be taken, including requesting that the analytical laboratory:

- Check raw data and calculations, and
- If the contaminating analyte is also present at high levels in field samples, repeat the analysis of the laboratory stored sample or sample extract.

If the contamination does not appear to originate at the laboratory, the Laboratory QA/QC Coordinator, in conjunction with the RMT Technical Coordinator, will review field sampling procedures to determine if a change in field sampling protocol is necessary.

The objective for completeness is 95 percent. If samples or data are lost during sampling and analysis activities, corrective actions will be taken, including:

- Requesting that the analytical laboratory reanalyze stored samples or extracts, if available, and
- Repeating collection and analysis of ground water samples.

Section 15
Quality Assurance Documentation to USEPA

The RMT Technical Coordinator, in conjunction with the Field Coordinator and Laboratory QA/QC Coordinator, will submit a project status report each month. This report may include the following types of information relating to Quality Assurance Activities:

- Significant irregularities noted in the field notebook during the sampling procedure.
- Results of performance and system audits, if conducted.

QA/QC data generated by the laboratory and a case narrative will be included in the CLP data packages.

Pertinent quality assurance documentation will be submitted to the following person at USEPA and NJDEP:

Addressees:

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Section 16
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Tables

TABLE 1
DATA QUALITY OBJECTIVES (DQOs)
L.E. CARPENTER & COMPANY (LEC) - Borough of Wharton, Morris County, New Jersey

Area of Concern Specific DQOs	
Remaining Source(s) Area	
SB-09-01 through SB-09-07	Complete the delineation of the vertical and horizontal extent of residual sources under Building 9. Determine the distribution of potential LNAPL by collecting representative soil samples and analyzing them for BTEX and DEHP.
SB-09-08 through SB-09-14	Additional horizontal and vertical delineation borings located based on the extrapolated area of impact as defined by the April 2007 investigation. Determine the distribution of potential LNAPL by collecting representative soil samples and analyzing them for BTEX and DEHP.
Up to 4 representative samples	Conduct grain size analysis and determine concentrations of total organic carbon in soil samples collected from permeable soil units
Groundwater	
SB-09-01, SB-09-03, SB-09-12, SB-09-13, and SB-09-18	Assess the potential viability of the use of biodegradaton or chemical oxidation polishing methods to achieve remedial action objectives for any remaining dissoved phase contaminants in groundwater

Table 2
Field and Laboratory Target Analyte List
L.E. Carpenter & Company – Borough of Wharton, Morris County, New Jersey

FIELD PARAMETERS	METHOD/EQUIPMENT	REPORTING LIMIT
Dissolved oxygen (DO)	360.1[2]/Probe/Hach Kit	0.01 mg/L
Redox potential (Eh)	[4]Redox electrode	Not Applicable
pH	150.1[2]/pH electrode	Not Applicable
Temperature	From conductivity probe	Not Applicable
Turbidity	Turbidimeter	0.1 NTU
Specific Conductance	120.1[2]/Electrical conductivity meter	1 µmhos/cm
Depth to water [5]	Electric tape/Water Level Indicator	0.01′
LABORATORY PARAMETERS	**METHOD**	**REPORTING LIMIT**
Benzene	624 [1]	0.9 µg/L
Toluene	624 [1]	0.8 µg/L
Ethylbenzene	624 [1]	0.8 µg/L
Xylenes	624 [1]	0.9 µg/L
DEHP	625 [1]	1.0 µg/L

Notes:
[1] Federal Register 40 CFR Part 136, Appendix A (Current Edition), Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater.
[2] USEPA 300/4-79-020 Methods for Chemical Analysis of Water and Waste.
[3] SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, U.S. EPA, 3rd Edition, 1986.
[4] Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998.
[5] All wells listed on Table 1 will be measured before sampling begins.

Table 3
Stabilization Criteria for Low-Flow Groundwater Sampling Field Parameters
L.E. Carpenter & Company – Borough of Wharton, Morris County, New Jersey

Parameter	Stabilization Criteria
Dissolved Oxygen	±0.3 mg/L
Specific Conductance	±5.0 µmhos/cm for values < 1000 µmhos/cm ±20.0 µmhos/cm for values > 1000 µmhos/cm
pH	± 0.1 pH units
Temperature	± 0.5°C or 5%
Turbidity	± 10% NTU or below 10 NTU

Table 4
Soil & Water Sample Containers, Preservatives, and Holding Times
L.E. CARPENTER & COMPANY (LEC) - Borough of Wharton, Morris County, New Jersey

SOIL PARAMETERS	CONTAINER(S)*	MINIMUM SAMPLE VOLUME	FIELD PRESERVATION METHOD	HOLDING TIME(1)
Volatile organics (*i.e.,* BTEX)	O2SI Kit	10 grams	O2SI Kit/Cool to 4°C	14 days
Semivolatile organics (*i.e.,* DEHP)	2 x 4 oz glass jar	30 grams	Cool to 4°C	14 days
WATER PARAMETERS	**CONTAINER(S)***	**MINIMUM SAMPLE VOLUME**	**FIELD PRESERVATION METHOD**	**HOLDING TIME(1)**
Volatile organics (*i.e.,* BTEX)	3 x 40 mL glass VOA vials with Teflon® (2) septum	1 x 40 mL VOA vial	Cool to 4°C, add HCl to pH < 2; protect from light	14 days (sample should remain on-site less than 24 hours)
Semivolatile organics (*i.e.,* DEHP)	2 x 1,000 mL amber bottle(4)	1,000 mL	Cool to 4°C	7 days to extraction 40 days from extraction to analysis
Temperature, Eh, pH, Specific Conductivity, DO, Turbidity	--	--	--	Immediately before sample collected

Appendix A
Low-Flow Sampling Methods

United States Environmental Protection Agency | Office of Research and Development | Office of Solid Waste and Emergency Response | EPA/540/S-95/504 April 1996

Ground Water Issue

LOW-FLOW (MINIMAL DRAWDOWN) GROUND-WATER SAMPLING PROCEDURES

by Robert W. Puls[1] and Michael J. Barcelona[2]

Background

The Regional Superfund Ground Water Forum is a group of ground-water scientists, representing EPA's Regional Superfund Offices, organized to exchange information related to ground-water remediation at Superfund sites. One of the major concerns of the Forum is the sampling of ground water to support site assessment and remedial performance monitoring objectives. This paper is intended to provide background information on the development of low-flow sampling procedures and its application under a variety of hydrogeologic settings. It is hoped that the paper will support the production of standard operating procedures for use by EPA Regional personnel and other environmental professionals engaged in ground-water sampling.

For further information contact: Robert Puls, 405-436-8543, Subsurface Remediation and Protection Division, NRMRL, Ada, Oklahoma.

I. Introduction

The methods and objectives of ground-water sampling to assess water quality have evolved over time. Initially the emphasis was on the assessment of water quality of aquifers as sources of drinking water. Large water-bearing units were identified and sampled in keeping with that objective. These were highly productive aquifers that supplied drinking water via private wells or through public water supply systems. Gradually, with the increasing awareness of subsurface pollution of these water resources, the understanding of complex hydrogeochemical processes which govern the fate and transport of contaminants in the subsurface increased. This increase in understanding was also due to advances in a number of scientific disciplines and improvements in tools used for site characterization and ground-water sampling. Ground-water quality investigations where pollution was detected initially borrowed ideas, methods, and materials for site characterization from the water supply field and water analysis from public health practices. This included the materials and manner in which monitoring wells were installed and the way in which water was brought to the surface, treated, preserved and analyzed. The prevailing conceptual ideas included convenient generalizations of ground-water resources in terms of large and relatively homogeneous hydrologic *units*. With time it became apparent that conventional water supply generalizations of *homogeneity* did not adequately represent field data regarding pollution of these subsurface resources. The important role of *heterogeneity* became increasingly clear not only in geologic terms, but also in terms of complex physical,

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Director

chemical and biological subsurface processes. With greater appreciation of the role of heterogeneity, it became evident that subsurface pollution was ubiquitous and encompassed the unsaturated zone to the deep subsurface and included unconsolidated sediments, fractured rock, and *aquitards* or low-yielding or impermeable formations. Small-scale processes and heterogeneities were shown to be important in identifying contaminant distributions and in controlling water and contaminant flow paths.

It is beyond the scope of this paper to summarize all the advances in the field of ground-water quality investigations and remediation, but two particular issues have bearing on ground-water sampling today: aquifer heterogeneity and colloidal transport. Aquifer heterogeneities affect contaminant flow paths and include variations in geology, geochemistry, hydrology and microbiology. As methods and the tools available for subsurface investigations have become increasingly sophisticated and understanding of the subsurface environment has advanced, there is an awareness that in most cases a primary concern for site investigations is characterization of contaminant flow paths rather than entire aquifers. In fact, in many cases, plume thickness can be less than well screen lengths (e.g., 3-6 m) typically installed at hazardous waste sites to detect and monitor plume movement over time. Small-scale differences have increasingly been shown to be important and there is a general trend toward smaller diameter wells and shorter screens.

The hydrogeochemical significance of colloidal-size particles in subsurface systems has been realized during the past several years (Gschwend and Reynolds, 1987; McCarthy and Zachara, 1989; Puls, 1990; Ryan and Gschwend, 1990). This realization resulted from both field and laboratory studies that showed faster contaminant migration over greater distances and at higher concentrations than flow and transport model predictions would suggest (Buddemeier and Hunt, 1988; Enfield and Bengtsson, 1988; Penrose et al., 1990). Such models typically account for interaction between the mobile aqueous and immobile solid phases, but do not allow for a mobile, reactive solid phase. It is recognition of this third *phase* as a possible means of contaminant transport that has brought increasing attention to the manner in which samples are collected and processed for analysis (Puls et al., 1990; McCarthy and Degueldre, 1993; Backhus et al., 1993; U. S. EPA, 1995). If such a phase is present in sufficient mass, possesses high sorption reactivity, large surface area, and remains stable in suspension, it can serve as an important mechanism to facilitate contaminant transport in many types of subsurface systems.

Colloids are particles that are sufficiently small so that the surface free energy of the particle dominates the bulk free energy. Typically, in ground water, this includes particles with diameters between 1 and 1000 nm. The most commonly observed mobile particles include: secondary clay minerals; hydrous iron, aluminum, and manganese oxides; dissolved and particulate organic materials, and viruses and bacteria. These reactive particles have been shown to be mobile under a variety of conditions in both field studies and laboratory column experiments, and as such need to be included in monitoring programs where identification of the *total* mobile contaminant loading (dissolved + naturally suspended particles) at a site is an objective. To that end, sampling methodologies must be used which do not artificially bias *naturally* suspended particle concentrations.

Currently the most common ground-water purging and sampling methodology is to purge a well using bailers or high speed pumps to remove 3 to 5 casing volumes followed by sample collection. This method can cause adverse impacts on sample quality through collection of samples with high levels of turbidity. This results in the inclusion of otherwise immobile artifactual particles which produce an overestimation of certain analytes of interest (e.g., metals or hydrophobic organic compounds). Numerous documented problems associated with filtration (Danielsson, 1982; Laxen and Chandler, 1982; Horowitz et al., 1992) make this an undesirable method of rectifying the turbidity problem, and include the removal of potentially mobile (contaminant-associated) particles during filtration, thus artificially biasing contaminant concentrations low. Sampling-induced turbidity problems can often be mitigated by using low-flow purging and sampling techniques.

Current subsurface conceptual models have undergone considerable refinement due to the recent development and increased use of field screening tools. So-called hydraulic *push* technologies (e.g., cone penetrometer, Geoprobe®, QED HydroPunch®) enable relatively fast screening site characterization which can then be used to design and install a monitoring well network. Indeed, alternatives to conventional monitoring wells are now being considered for some hydrogeologic settings. The ultimate design of any monitoring system should however be based upon adequate site characterization and be consistent with established monitoring objectives.

If the sampling program objectives include accurate assessment of the magnitude and extent of subsurface contamination over time and/or accurate assessment of subsequent remedial performance, then some information regarding plume delineation in three-dimensional space is necessary prior to monitoring well network design and installation. This can be accomplished with a variety of different tools and equipment ranging from hand-operated augers to screening tools mentioned above and large drilling rigs. Detailed information on ground-water flow velocity, direction, and horizontal and vertical variability are essential baseline data requirements. Detailed soil and geologic data are required prior to and during the installation of sampling points. This includes historical as well as detailed soil and geologic logs which accumulate during the site investigation. The use of borehole geophysical techniques is also recommended. With this information (together with other site characterization data) and a clear understanding of sampling

objectives, then appropriate location, screen length, well diameter, slot size, etc. for the monitoring well network can be decided. This is especially critical for new in situ remedial approaches or natural attenuation assessments at hazardous waste sites.

In general, the overall goal of any ground-water sampling program is to collect water samples with no alteration in water chemistry; analytical data thus obtained may be used for a variety of specific monitoring programs depending on the regulatory requirements. The sampling methodology described in this paper assumes that the monitoring goal is to sample monitoring wells for the presence of contaminants and it is applicable whether mobile colloids are a concern or not and whether the analytes of concern are metals (and metalloids) or organic compounds.

II. Monitoring Objectives and Design Considerations

The following issues are important to consider prior to the design and implementation of any ground-water monitoring program, including those which anticipate using low-flow purging and sampling procedures.

A. Data Quality Objectives (DQOs)

Monitoring objectives include four main types: detection, assessment, corrective-action evaluation and resource evaluation, along with *hybrid* variations such as site-assessments for property transfers and water availability investigations. Monitoring objectives may change as contamination or water quality problems are discovered. However, there are a number of common components of monitoring programs which should be recognized as important regardless of initial objectives. These components include:

1) Development of a conceptual model that incorporates elements of the regional geology to the local geologic framework. The conceptual model development also includes initial site characterization efforts to identify hydrostratigraphic units and likely flow-paths using a minimum number of borings and well completions;

2) Cost-effective and well documented collection of high quality data utilizing simple, accurate, and reproducible techniques; and

3) Refinement of the conceptual model based on supplementary data collection and analysis.

These fundamental components serve many types of monitoring programs and provide a basis for future efforts that evolve in complexity and level of spatial detail as purposes and objectives expand. High quality, reproducible data collection is a common goal regardless of program objectives.

High quality data collection implies data of sufficient accuracy, precision, and completeness (i.e., ratio of valid analytical results to the minimum sample number called for by the program design) to meet the program objectives. Accuracy depends on the correct choice of monitoring tools and procedures to minimize sample and subsurface disturbance from collection to analysis. Precision depends on the repeatability of sampling and analytical protocols. It can be assured or improved by replication of sample analyses including blanks, field/lab standards and reference standards.

B. Sample Representativeness

An important goal of any monitoring program is collection of data that is truly representative of conditions at the site. The term *representativeness* applies to chemical and hydrogeologic data collected via wells, borings, piezometers, geophysical and soil gas measurements, lysimeters, and temporary sampling points. It involves a recognition of the statistical variability of individual subsurface physical properties, and contaminant or major ion concentration levels, while explaining extreme values. Subsurface temporal and spatial variability are facts. Good professional practice seeks to maximize representativeness by using proven accurate and reproducible techniques to define limits on the distribution of measurements collected at a site. However, measures of representativeness are dynamic and are controlled by evolving site characterization and monitoring objectives. An evolutionary site characterization model, as shown in Figure 1, provides a systematic approach to the goal of consistent data collection.

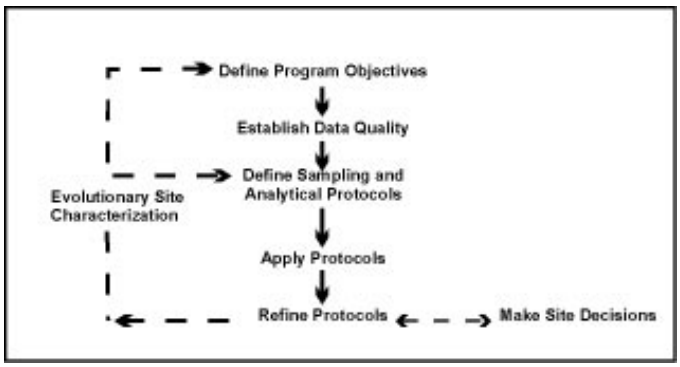

Figure 1. Evolutionary Site Characterization Model

The model emphasizes a recognition of the causes of the variability (e.g., use of inappropriate technology such as using bailers to purge wells; imprecise or operator-dependent methods) and the need to control avoidable errors.

1) Questions of Scale

A sampling plan designed to collect representative samples must take into account the potential scale of changes in site conditions through space and time as well as the chemical associations and behavior of the parameters that are targeted for investigation. In subsurface systems, physical (i.e., aquifer) and chemical properties over time or space are not statistically independent. In fact, samples taken in close proximity (i.e., within distances of a few meters) or within short time periods (i.e., more frequently than monthly) are highly auto-correlated. This means that designs employing high-sampling frequency (e.g., monthly) or dense spatial monitoring designs run the risk of redundant data collection and misleading inferences regarding trends in values that aren't statistically valid. In practice, contaminant detection and assessment monitoring programs rarely suffer these *over-sampling* concerns. In corrective-action evaluation programs, it is also possible that too little data may be collected over space or time. In these cases, false interpretation of the spatial extent of contamination or underestimation of temporal concentration variability may result.

2) Target Parameters

Parameter selection in monitoring program design is most often dictated by the regulatory status of the site. However, background water quality constituents, purging indicator parameters, and contaminants, all represent targets for data collection programs. The tools and procedures used in these programs should be equally rigorous and applicable to all categories of data, since all may be needed to determine or support regulatory action.

C. Sampling Point Design and Construction

Detailed site characterization is central to all decision-making purposes and the basis for this characterization resides in identification of the geologic framework and major hydro-stratigraphic units. Fundamental data for sample point location include: subsurface lithology, head-differences and background geochemical conditions. Each sampling point has a proper use or uses which should be documented at a level which is appropriate for the program's data quality objectives. Individual sampling points may not always be able to fulfill multiple monitoring objectives (e.g., detection, assessment, corrective action).

1) Compatibility with Monitoring Program and Data Quality Objectives

Specifics of sampling point location and design will be dictated by the complexity of subsurface lithology and variability in contaminant and/or geochemical conditions. It should be noted that, regardless of the ground-water sampling approach, few sampling points (e.g., wells, drive-points, screened augers) have zones of influence in excess of a few feet. Therefore, the spatial frequency of sampling points should be carefully selected and designed.

2) Flexibility of Sampling Point Design

In most cases *well-point* diameters in excess of 1 7/8 inches will permit the use of most types of submersible pumping devices for low-flow (minimal drawdown) sampling. It is suggested that *short* (e.g., less than 1.6 m) screens be incorporated into the monitoring design where possible so that comparable results from one device to another might be expected. *Short*, of course, is relative to the degree of vertical water quality variability expected at a site.

3) Equilibration of Sampling Point

Time should be allowed for equilibration of the well or sampling point with the formation after installation. Placement of well or sampling points in the subsurface produces some disturbance of ambient conditions. Drilling techniques (e.g., auger, rotary, etc.) are generally considered to cause more disturbance than *direct-push* technologies. In either case, there may be a period (i.e., days to months) during which water quality near the point may be distinctly different from that in the formation. Proper development of the sampling point and adjacent formation to remove fines created during emplacement will shorten this water quality *recovery* period.

III. Definition of Low-Flow Purging and Sampling

It is generally accepted that water in the well casing is non-representative of the formation water and needs to be purged prior to collection of ground-water samples. However, the water in the screened interval may indeed be representative of the formation, depending upon well construction and site hydrogeology. Wells are purged to some extent for the following reasons: the presence of the air interface at the top of the water column resulting in an oxygen concentration gradient with depth, loss of volatiles up the water column, leaching from or sorption to the casing or filter pack, chemical changes due to clay seals or backfill, and surface infiltration.

Low-flow purging, whether using portable or dedicated systems, should be done using pump-intake located in the middle or slightly above the middle of the screened interval. Placement of the pump too close to the bottom of the well will cause increased entrainment of solids which have collected in the well over time. These particles are present as a result of well development, prior purging and sampling events, and natural colloidal transport and deposition. Therefore, placement of the pump in the middle or toward the top of the screened interval is suggested. Placement of the pump at the top of the water column for sampling is only recommended in unconfined aquifers, screened across the water table, where this is the desired sampling point. Low-

flow purging has the advantage of minimizing mixing between the overlying stagnant casing water and water within the screened interval.

A. Low-Flow Purging and Sampling

Low-flow refers to the velocity with which water enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen. It does not necessarily refer to the flow rate of water discharged at the surface which can be affected by flow regulators or restrictions. Water level drawdown provides the best indication of the stress imparted by a given flow-rate for a given hydrological situation. The objective is to pump in a manner that minimizes stress (drawdown) to the system to the extent practical taking into account established site sampling objectives. Typically, flow rates on the order of 0.1 - 0.5 L/min are used, however this is dependent on site-specific hydrogeology. Some extremely coarse-textured formations have been successfully sampled in this manner at flow rates to 1 L/min. The effectiveness of using low-flow purging is intimately linked with proper screen location, screen length, and well construction and development techniques. The reestablishment of natural flow paths in both the vertical and horizontal directions is important for correct interpretation of the data. For high resolution sampling needs, screens less than 1 m should be used. Most of the need for purging has been found to be due to passing the sampling device through the overlying casing water which causes mixing of these stagnant waters and the dynamic waters within the screened interval. Additionally, there is disturbance to suspended sediment collected in the bottom of the casing and the displacement of water out into the formation immediately adjacent to the well screen. These disturbances and impacts can be avoided using dedicated sampling equipment, which precludes the need to insert the sampling device prior to purging and sampling.

Isolation of the screened interval water from the overlying stagnant casing water may be accomplished using low-flow minimal drawdown techniques. If the pump intake is located within the screened interval, most of the water pumped will be drawn in directly from the formation with little mixing of casing water or disturbance to the sampling zone. However, if the wells are not constructed and developed properly, zones other than those intended may be sampled. At some sites where geologic heterogeneities are sufficiently different within the screened interval, higher conductivity zones may be preferentially sampled. This is another reason to use shorter screened intervals, especially where high spatial resolution is a sampling objective.

B. Water Quality Indicator Parameters

It is recommended that water quality indicator parameters be used to determine purging needs prior to sample collection in each well. Stabilization of parameters such as pH, specific conductance, dissolved oxygen, oxidation-reduction potential, temperature and turbidity should be used to determine when formation water is accessed during purging. In general, the order of stabilization is pH, temperature, and specific conductance, followed by oxidation-reduction potential, dissolved oxygen and turbidity. Temperature and pH, while commonly used as purging indicators, are actually quite insensitive in distinguishing between formation water and stagnant casing water; nevertheless, these are important parameters for data interpretation purposes and should also be measured. Performance criteria for determination of stabilization should be based on water-level drawdown, pumping rate and equipment specifications for measuring indicator parameters. Instruments are available which utilize in-line flow cells to continuously measure the above parameters.

It is important to establish specific well stabilization criteria and then consistently follow the same methods thereafter, particularly with respect to drawdown, flow rate and sampling device. Generally, the time or purge volume required for parameter stabilization is independent of well depth or well volumes. Dependent variables are well diameter, sampling device, hydrogeochemistry, pump flow rate, and whether the devices are used in a portable or dedicated manner. If the sampling device is already in place (i.e., dedicated sampling systems), then the time and purge volume needed for stabilization is much shorter. Other advantages of dedicated equipment include less purge water for waste disposal, much less decontamination of equipment, less time spent in preparation of sampling as well as time in the field, and more consistency in the sampling approach which probably will translate into less variability in sampling results. The use of dedicated equipment is strongly recommended at wells which will undergo routine sampling over time.

If parameter stabilization criteria are too stringent, then minor oscillations in indicator parameters may cause purging operations to become unnecessarily protracted. It should also be noted that turbidity is a very conservative parameter in terms of stabilization. Turbidity is always the last parameter to stabilize. Excessive purge times are invariably related to the establishment of too stringent turbidity stabilization criteria. It should be noted that natural turbidity levels in ground water may exceed 10 nephelometric turbidity units (NTU).

C. Advantages and Disadvantages of Low-Flow (Minimum Drawdown) Purging

In general, the advantages of low-flow purging include:

- samples which are representative of the *mobile* load of contaminants present (dissolved and colloid-associated);
- minimal disturbance of the sampling point thereby minimizing sampling artifacts;
- less operator variability, greater operator control;

- reduced stress on the formation (minimal drawdown);
- less mixing of stagnant casing water with formation water;
- reduced need for filtration and, therefore, less time required for sampling;
- smaller purging volume which decreases waste disposal costs and sampling time;
- better sample consistency; reduced artificial sample variability.

Some disadvantages of low-flow purging are:

- higher initial capital costs,
- greater set-up time in the field,
- need to transport additional equipment to and from the site,
- increased training needs,
- resistance to change on the part of sampling practitioners,
- concern that new data will indicate a *change in conditions* and trigger an *action*.

IV. Low-Flow (Minimal Drawdown) Sampling Protocols

The following ground-water sampling procedure has evolved over many years of experience in ground-water sampling for organic and inorganic compound determinations and as such summarizes the authors' (and others) experiences to date (Barcelona et al., 1984, 1994; Barcelona and Helfrich, 1986; Puls and Barcelona, 1989; Puls et. al. 1990, 1992; Puls and Powell, 1992; Puls and Paul, 1995). High-quality chemical data collection is essential in ground-water monitoring and site characterization. The primary limitations to the collection of *representative* ground-water samples include: mixing of the stagnant casing and *fresh* screen waters during insertion of the sampling device or ground-water level measurement device; disturbance and resuspension of settled solids at the bottom of the well when using high pumping rates or raising and lowering a pump or bailer; introduction of atmospheric gases or degassing from the water during sample handling and transfer, or inappropriate use of vacuum sampling device, etc.

A. Sampling Recommendations

Water samples should not be taken immediately following well development. Sufficient time should be allowed for the ground-water flow regime in the vicinity of the monitoring well to stabilize and to approach chemical equilibrium with the well construction materials. This lag time will depend on site conditions and methods of installation but often exceeds one week.

Well purging is nearly always necessary to obtain samples of water flowing through the geologic formations in the screened interval. Rather than using a general but arbitrary guideline of purging three casing volumes prior to sampling, it is recommended that an in-line water quality measurement device (e.g., flow-through cell) be used to establish the stabilization time for several parameters (e.g. , pH, specific conductance, redox, dissolved oxygen, turbidity) on a well-specific basis. Data on pumping rate, drawdown, and volume required for parameter stabilization can be used as a guide for conducting subsequent sampling activities.

The following are recommendations to be considered before, during and after sampling:

- use low-flow rates (<0.5 L/min), during both purging and sampling to maintain minimal drawdown in the well;
- maximize tubing wall thickness, minimize tubing length;
- place the sampling device intake at the desired sampling point;
- minimize disturbances of the stagnant water column above the screened interval during water level measurement and sampling device insertion;
- make proper adjustments to stabilize the flow rate as soon as possible;
- monitor water quality indicators during purging;
- collect unfiltered samples to estimate contaminant loading and transport potential in the subsurface system.

B. Equipment Calibration

Prior to sampling, all sampling device and monitoring equipment should be calibrated according to manufacturer's recommendations and the site Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP). Calibration of pH should be performed with at least two buffers which bracket the expected range. Dissolved oxygen calibration must be corrected for local barometric pressure readings and elevation.

C. Water Level Measurement and Monitoring

It is recommended that a device be used which will least disturb the water surface in the casing. Well depth should be obtained from the well logs. Measuring to the bottom of the well casing will only cause resuspension of settled solids from the formation and require longer purging times for turbidity equilibration. Measure well depth after sampling is completed. The water level measurement should be taken from a permanent reference point which is surveyed relative to ground elevation.

D. Pump Type

The use of low-flow (e.g., 0.1-0.5 L/min) pumps is suggested for purging and sampling all types of analytes. All pumps have some limitation and these should be investigated with respect to application at a particular site. Bailers are inappropriate devices for low-flow sampling.

1) General Considerations

There are no unusual requirements for ground-water sampling devices when using low-flow, minimal drawdown techniques. The major concern is that the device give consistent results and minimal disturbance of the sample across a range of *low* flow rates (i.e., < 0.5 L/min). Clearly, pumping rates that cause minimal to no drawdown in one well could easily cause *significant* drawdown in another well finished in a less transmissive formation. In this sense, the pump should not cause undue pressure or temperature changes or physical disturbance on the water sample over a reasonable sampling range. Consistency in operation is critical to meet accuracy and precision goals.

2) Advantages and Disadvantages of Sampling Devices

A variety of sampling devices are available for low-flow (minimal drawdown) purging and sampling and include peristaltic pumps, bladder pumps, electrical submersible pumps, and gas-driven pumps. Devices which lend themselves to both dedication and consistent operation at definable low-flow rates are preferred. It is desirable that the pump be easily adjustable and operate reliably at these lower flow rates. The peristaltic pump is limited to shallow applications and can cause degassing resulting in alteration of pH, alkalinity, and some volatiles loss. Gas-driven pumps should be of a type that does not allow the gas to be in direct contact with the sampled fluid.

Clearly, bailers and other *grab* type samplers are ill-suited for low-flow sampling since they will cause repeated disturbance and mixing of *stagnant* water in the casing and the *dynamic* water in the screened interval. Similarly, the use of inertial lift foot-valve type samplers may cause too much disturbance at the point of sampling. Use of these devices also tends to introduce uncontrolled and unacceptable operator variability.

Summaries of advantages and disadvantages of various sampling devices are listed in Herzog et al. (1991), U. S. EPA (1992), Parker (1994) and Thurnblad (1994).

E. Pump Installation

Dedicated sampling devices (left in the well) capable of pumping and sampling are preferred over <u>any</u> other type of device. Any portable sampling device should be slowly and carefully lowered to the middle of the screened interval or slightly above the middle (e.g., 1-1.5 m below the top of a 3 m screen). This is to minimize excessive mixing of the stagnant water in the casing above the screen with the screened interval zone water, and to minimize resuspension of solids which will have collected at the bottom of the well. These two disturbance effects have been shown to directly affect the time required for purging. There also appears to be a direct correlation between size of portable sampling devices relative to the well bore and resulting purge volumes and times. The key is to minimize disturbance of water and solids in the well casing.

F. Filtration

Decisions to filter samples should be dictated by sampling objectives rather than as a *fix* for poor sampling practices, and field-filtering of certain constituents should not be the default. Consideration should be given as to what the application of field-filtration is trying to accomplish. For assessment of truly dissolved (as opposed to operationally *dissolved* [i.e., samples filtered with 0.45 µm filters]) concentrations of major ions and trace metals, 0.1 µm filters are recommended although 0.45 µm filters are normally used for most regulatory programs. Alkalinity samples must also be filtered if significant particulate calcium carbonate is suspected, since this material is likely to impact alkalinity titration results (although filtration itself may alter the CO_2 composition of the sample and, therefore, affect the results).

Although filtration may be appropriate, filtration of a sample may cause a number of unintended changes to occur (e.g. oxidation, aeration) possibly leading to filtration-induced artifacts during sample analysis and uncertainty in the results. Some of these unintended changes may be unavoidable but the factors leading to them must be recognized. Deleterious effects can be minimized by consistent application of certain filtration guidelines. Guidelines should address selection of filter type, media, pore size, etc. in order to identify and minimize potential sources of uncertainty when filtering samples.

In-line filtration is recommended because it provides better consistency through less sample handling, and minimizes sample exposure to the atmosphere. In-line filters are available in both disposable (barrel filters) and non-disposable (in-line filter holder, flat membrane filters) formats and various filter pore sizes (0.1-5.0 µm). Disposable filter cartridges have the advantage of greater sediment handling capacity when compared to traditional membrane filters. Filters must be pre-rinsed following manufacturer's recommendations. If there are no recommendations for rinsing, pass through a minimum of 1 L of ground water following purging and prior to sampling. Once filtration has begun, a filter cake may develop as particles larger than the pore size accumulate on the filter membrane. The result is that the effective pore diameter of the membrane is reduced and particles smaller than the stated pore size are excluded from the filtrate. Possible corrective measures include prefiltering (with larger pore size filters), minimizing particle loads to begin with, and reducing sample volume.

G. Monitoring of Water Level and Water Quality Indicator Parameters

Check water level periodically to monitor drawdown in the well as a guide to flow rate adjustment. The goal is minimal drawdown (<0.1 m) during purging. This goal may be difficult to achieve under some circumstances due to geologic heterogeneities within the screened interval, and may require adjustment based on site-specific conditions and personal experience. In-line water quality indicator parameters should be continuously monitored during purging. The water quality

indicator parameters monitored can include pH, redox potential, conductivity, dissolved oxygen (DO) and turbidity. The last three parameters are often most sensitive. Pumping rate, drawdown, and the time or volume required to obtain stabilization of parameter readings can be used as a future guide to purge the well. Measurements should be taken every three to five minutes if the above suggested rates are used. Stabilization is achieved after all parameters have stabilized for three successive readings. In lieu of measuring all five parameters, a minimum subset would include pH, conductivity, and turbidity or DO. Three successive readings should be within ± 0.1 for pH, ± 3% for conductivity, ± 10 mv for redox potential, and ± 10% for turbidity and DO. Stabilized purge indicator parameter trends are generally obvious and follow either an exponential or asymptotic change to stable values during purging. Dissolved oxygen and turbidity usually require the longest time for stabilization. The above stabilization guidelines are provided for rough estimates based on experience.

H. Sampling, Sample Containers, Preservation and Decontamination

Upon parameter stabilization, sampling can be initiated. If an in-line device is used to monitor water quality parameters, it should be disconnected or bypassed during sample collection. Sampling flow rate may remain at established purge rate or may be adjusted slightly to minimize aeration, bubble formation, turbulent filling of sample bottles, or loss of volatiles due to extended residence time in tubing. Typically, flow rates less than 0.5 L/min are appropriate. The same device should be used for sampling as was used for purging. Sampling should occur in a progression from least to most contaminated well, if this is known. Generally, volatile (e.g., solvents and fuel constituents) and gas sensitive (e.g., Fe^{2+}, CH_4, H_2S/HS^-, alkalinity) parameters should be sampled first. The sequence in which samples for most inorganic parameters are collected is immaterial unless filtered (dissolved) samples are desired. Filtering should be done last and in-line filters should be used as discussed above. During both well purging and sampling, proper protective clothing and equipment must be used based upon the type and level of contaminants present.

The appropriate sample container will be prepared in advance of actual sample collection for the analytes of interest and include sample preservative where necessary. Water samples should be collected directly into this container from the pump tubing.

Immediately after a sample bottle has been filled, it must be preserved as specified in the site (QAPP). Sample preservation requirements are based on the analyses being performed (use site QAPP, FSP, RCRA guidance document [U. S. EPA, 1992] or EPA SW-846 [U. S. EPA, 1982]). It may be advisable to add preservatives to sample bottles in a controlled setting prior to entering the field in order to reduce the chances of improperly preserving sample bottles or introducing field contaminants into a sample bottle while adding the preservatives.

The preservatives should be transferred from the chemical bottle to the sample container using a disposable polyethylene pipet and the disposable pipet should be used only once and then discarded.

After a sample container has been filled with ground water, a Teflon™ (or tin)-lined cap is screwed on tightly to prevent the container from leaking. A sample label is filled out as specified in the FSP. The samples should be stored inverted at 4°C.

Specific decontamination protocols for sampling devices are dependent to some extent on the type of device used and the type of contaminants encountered. Refer to the site QAPP and FSP for specific requirements.

I. Blanks

The following blanks should be collected:

(1) field blank: one field blank should be collected from each source water (distilled/deionized water) used for sampling equipment decontamination or for assisting well development procedures.

(2) equipment blank: one equipment blank should be taken prior to the commencement of field work, from each set of sampling equipment to be used for that day. Refer to site QAPP or FSP for specific requirements.

(3) trip blank: a trip blank is required to accompany each volatile sample shipment. These blanks are prepared in the laboratory by filling a 40-mL volatile organic analysis (VOA) bottle with distilled/deionized water.

V. Low-Permeability Formations and Fractured Rock

The overall sampling program goals or sampling objectives will drive how the sampling points are located, installed, and choice of sampling device. Likewise, site-specific hydrogeologic factors will affect these decisions. Sites with very low permeability formations or fractures causing discrete flow channels may require a unique monitoring approach. Unlike water supply wells, wells installed for ground-water quality assessment and restoration programs are often installed in low water-yielding settings (e.g., clays, silts). Alternative types of sampling points and sampling methods are often needed in these types of environments, because low-permeability settings may require extremely low-flow purging (<0.1 L/min) and may be technology-limited. Where devices are not readily available to pump at such low flow rates, the primary consideration is to avoid dewatering of

the well screen. This may require repeated recovery of the water during purging while leaving the pump in place within the well screen.

Use of low-flow techniques may be impractical in these settings, depending upon the water recharge rates. The sampler and the end-user of data collected from such wells need to understand the limitations of the data collected; i.e., a strong potential for underestimation of actual contaminant concentrations for volatile organics, potential false negatives for filtered metals and potential false positives for unfiltered metals. It is suggested that comparisons be made between samples recovered using low-flow purging techniques and samples recovered using passive sampling techniques (i.e., two sets of samples). Passive sample collection would essentially entail acquisition of the sample with no or very little purging using a dedicated sampling system installed within the screened interval or a passive sample collection device.

A. Low-Permeability Formations (<0.1 L/min recharge)

1. Low-Flow Purging and Sampling with Pumps

a. "portable or non-dedicated mode" - Lower the pump (one capable of pumping at <0.1 L/min) to mid-screen or slightly above and set in place for minimum of 48 hours (to lessen purge volume requirements). After 48 hours, use procedures listed in Part IV above regarding monitoring water quality parameters for stabilization, etc., but do not dewater the screen. If excessive drawdown and slow recovery is a problem, then alternate approaches such as those listed below may be better.

b. "dedicated mode" - Set the pump as above at least a week prior to sampling; that is, operate in a dedicated pump mode. With this approach significant reductions in purge volume should be realized. Water quality parameters should stabilize quite rapidly due to less disturbance of the sampling zone.

2. Passive Sample Collection

Passive sampling collection requires insertion of the device into the screened interval for a sufficient time period to allow flow and sample equilibration before extraction for analysis. Conceptually, the extraction of water from low yielding formations seems more akin to the collection of water from the unsaturated zone and passive sampling techniques may be more appropriate in terms of obtaining "representative" samples. Satisfying usual sample volume requirements is typically a problem with this approach and some latitude will be needed on the part of regulatory entities to achieve sampling objectives.

B. Fractured Rock

In fractured rock formations, a low-flow to zero purging approach using pumps in conjunction with packers to isolate the sampling zone in the borehole is suggested. Passive multi-layer sampling devices may also provide the most "representative" samples. It is imperative in these settings to identify flow paths or water-producing fractures prior to sampling using tools such as borehole flowmeters and/or other geophysical tools.

After identification of water-bearing fractures, install packer(s) and pump assembly for sample collection using low-flow sampling in "dedicated mode" or use a passive sampling device which can isolate the identified water-bearing fractures.

VI. Documentation

The usual practices for documenting the sampling event should be used for low-flow purging and sampling techniques. This should include, at a minimum: information on the conduct of purging operations (flow-rate, drawdown, water-quality parameter values, volumes extracted and times for measurements), field instrument calibration data, water sampling forms and chain of custody forms. See Figures 2 and 3 and "Ground Water Sampling Workshop -- A Workshop Summary" (U. S. EPA, 1995) for example forms and other documentation suggestions and information. This information coupled with laboratory analytical data and validation data are needed to judge the "useability" of the sampling data.

VII. Notice

The U.S. Environmental Protection Agency through its Office of Research and Development funded and managed the research described herein as part of its in-house research program and under Contract No. 68-C4-0031 to Dynamac Corporation. It has been subjected to the Agency's peer and administrative review and has been approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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Figure 2. **Ground Water Sampling Log**

Project _____ **Site** _____ **Well No.** _____ **Date** _____

Well Depth _____ **Screen Length** _____ **Well Diameter** _____ **Casing Type** _____

Sampling Device _____ **Tubing type** _____ **Water Level** _____

Measuring Point _____ **Other Infor** _____

_____

Sampling Personnel _____

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc			Notes

Type of Samples Collected

_____

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

Figure 3. **Ground Water Sampling Log** (with automatic data logging for most water quality parameters)

Project _____ **Site** _____ **Well No.** _____ **Date** _____

Well Depth _____ **Screen Length** _____ **Well Diameter** _____ **Casing Type** _____

Sampling Device _____ **Tubing type** _____ **Water Level** _____

Measuring Point _____ **Other Infor** _____

_____

Sampling Personnel _____

Time	Pump Rate	Turbidity	Alkalinity	[ ] Conc	Notes

Type of Samples Collected

_____

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

Appendix B
Lancaster Laboratory QA/QC Manual

Environmental Quality Policy Manual

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Revision Log:

Revision: 07		Effective Date: This version
Section	**Justification**	**Changes**
1.4	Incorporate Thermo Fisher philosophy	added the 4 I's
2.1	Reflect current information	added info. re: thermo fisher merger and minor clarification
2.11.1 and 2.11.2	Clarification	*added new hire training section header*
3	Reflect current information	updated building facilities
3.2	Reflect current practice	updated
4.1.5	Redundancy	moved external document section to 4.5
5.2.3	Clarification of practice	added preservation check section
5.2.4	Clarification of practice	added sample rejection policy
5.4	New section	moved some text to 5.2.3
6.5.1.4	Clarification	minor wording changes for clarification
7.1	Reflect current practice	added requirement of informing purchasing and QA when problems are encountered.
8.1	Reflect current practice	added/updated methods
8.2	Reflect current practice	added 1600 series of methods
8.4	More applicable section	moved DOC information to 2.11
9.1.5	Additional detail	added lab control sample duplicate
9.2	New practice	added information pertaining to marginal exceedances.
10.4	Reflect current practice	added that MDLs may be verified
10.8	Consolidate subcontracting information	moved text to 13.4
10.8	Renumbered	Section 10.9 became 10.8, all subsequent sections renumbered as applicable
10.10	Redundant info in 12.1	deleted redundant section
12.4	New practice	added PPI to preventative actions
13.4	Consolidate subcontracting information	added 10.8 text
13.5	Document policy	added section regarding the use of logos

Ver. #	Effective Date	Change
06	01/23/07	Major changes as follows: • Revision log – corrected typo • Minor wording changes throughout • 1.3 – Deleted "never condoned" and replaced with "grounds for termination" • 2.1 – Changed from "Company Overview" to "Company Overview and History". Expanded the section to update and add detail. • 2.2 – Added detail • 2.11 – Added Managements responsibility for training • 4. – Clarified that document control process does not apply to external documents • 4.4 – Expanded to detail archival process • 4.5 – Added control of external documents • 6.5.1.7 – Added, "This data is maintained in a secure manner that prevents the unauthorized access to and the unauthorized amendment of computer records." • 8.3 – Added, "Data related to the set up of the method would be archived at Lancaster Laboratories." • 10.1 – Updated to describe the sample set up process. Added generation/signing of reports to table.
05	01/04/06	Major changes as follows: • Created Appendix K to incorporate the *Microbiological Quality Policy Manual* • Updated titles throughout the text • Section 2.1 – updated to address change in ownership • Section 2.2 – updated to address change in ownership • Section 4.4 – expanded to clarify that OS verifies the status and location of logbooks that have been signed out for longer than five (5) years • Section 6.4.1.8 – Updated to describe CITRIX system • Section 11.1 – Defined the client notification timeline • Minor wording changes throughout

Ver. #	Effective Date	Change
04	01/06/05	Major changes as follows: • Section 1.3 Quality Policy – Expanded to clarify support of management and training • Section 2.4.1 Quality Assurance Officer – Added to define the role of the QA Director • Section 5.1 and 5.2 Sample Collection/Receipt and Entry and 5.4 Sample Storage – Expanded to clarify sample rejection policy/procedure • Section 7.1 Procurement – Expanded to address technical approval of supplies ordered • Section 10.7.1. Reporting the results – Added to define how reports are organized • Minor wording changes throughout for clarification
03	07/01/04	Major changes as follows: • Section 2.11 – Expanded to include EEO policy • Section 3.2 – Rewrote to provide more detail • Section 3.7 – Expanded to clarify what types of chemicals are used • Section 6.5 – Enumerated for clarification; added anti-virus software guidance, software inventory, and software verification detail • Section 6.6 – Rewrote to provide more detail • Minor corrections throughout
02	03/10/03	Major changes as follows: • Section 1.3 – Clarification of the Executive Management Group commitment to quality policy • Section 2.3 – Added wording regarding undue pressures • Section 4., 4.2 – Clarification of archiving of historical copies • Section 7. – Moved from Section 6. and renumbered sections thereafter • Section 10.9 – Added retention of archives in the event of change of ownership or if the lab goes out of business
01	10/02/02	New

1. INTRODUCTION

This *Quality Policy Manual* is based upon Lancaster Laboratories' overall business and management philosophies, mission, and goals. This manual was written to present the policies employed by the Environmental Division of Lancaster Laboratories as well as the support departments that serve the environmental laboratories and to comply with the NELAC and ISO 17025 standards. These policies define the "what" we do with emphasis on management's responsibilities and commitment to quality. Governing SOPs are in place within the organization, which will ensure the proper execution of this policy document (refer to Appendix A). The most recent and up-to-date *Quality Policy Manual* and all referenced documents are available to all laboratory personnel who work in or support the Environmental Division. Lancaster Laboratories actively strives for continuous improvement of its quality systems to better serve our clients.

1.1. Vision Statement

We make our clients heroes.

1.2. Mission Statement

Lancaster Laboratories offers analytical and consulting services in the chemical and biological sciences with comprehensive expertise in environmental and pharmaceutical laboratory applications. The company mission statement describes the corporate philosophy:

At Lancaster Laboratories, we are people working together to serve the health and environmental needs of society through science and technology. We strive to be the recognized leader in all that we do.

Our mission is to provide independent laboratory services in the chemical and biological sciences with excellent quality and service. As a corporate community, we:

- Deliver quality by fully understanding and always meeting the requirements of those we serve.
- Live our values by relating to our clients, coworkers, shareholders, suppliers, and community in a fair and ethical manner.
- Manage our growth and financial resources so we can serve our clients well, provide a satisfactory return to shareholders, and maintain our meaningful and enriching workplace.

1.3. Quality Policy

The Executive Management Group recognizes quality as a key element of the laboratory's standard of service. The group supports the laboratory's commitment to quality as defined by NELAC and ISO 17025 through the strict adherence to the Quality Policy Statement. The Quality Assurance Officer wrote the Quality Policy Statement, with final approval from the Company President. The policy may not be revised without the President and Quality Assurance Officer's approval.

The Quality Policy Statement gives employees clear requirements for the production of analytical data. Employees are trained on the components of the Quality Policy Statement during their first day of orientation. Each employee signs the statement as agreement to implement the policy in all aspects of their work. The statement is as follows:

We strive to provide the highest quality data achievable by:

- Describing clearly and accurately all activities performed; documenting "real time" as the task is carried out; understanding that it is never acceptable to "back date" entries and should additional information be required at a later date, the actual date and by whom the notation is made must be documented.
- Providing accountability and traceability for each sample analyzed through proper sample handling, labeling, preparation, instrument calibration/qualification, analysis, and reporting; establishing an audit trail that identifies date, time, analyst, instrument used, instrument conditions, quality control samples (where appropriate and/or required by the method), and associated standard material.
- Emphasizing a total quality management process which provides accuracy, and strict compliance with agency regulations and client requirements, giving the highest degree of confidence; understanding that meeting the requirements of the next employee in the work flow process is just as important as meeting the needs of the external client.
- Providing thorough documentation and explanation to qualify reported data that may not meet all requirements and specifications, but is still of use to the client; understanding this occurs only after discussion with the client on the data limitations and acceptability of this approach.
- Responding immediately to indications of questionable data, out-of-specification occurrences, equipment malfunctions, and other types of laboratory problems, with investigation and applicable corrective action; documenting these activities completely, including the reasons for the decisions made.
- Providing a work environment that ensures accessibility to all levels of management and encourages questions and expression of concern on quality issues to management.

We each take personal responsibility to provide this quality product while meeting the company's high standards of integrity and ethics, understanding that improprieties, such as failure to conduct the required test, manipulation of test procedures or data, or inaccurate documentation will not be tolerated. Intentional misrepresentation of the activities performed is considered fraud and is grounds for termination.

1.4. Statement of Values

As a corporate community, we embrace our heritage of integrity and strive to live by the following principles:

- Fairness and honesty in all our relationships
- Mutual trust
- A respect for ourselves and others
- A sense of caring that leads us to act responsibly toward each other and society, now and in the future
- Loyalty to our clients and one another

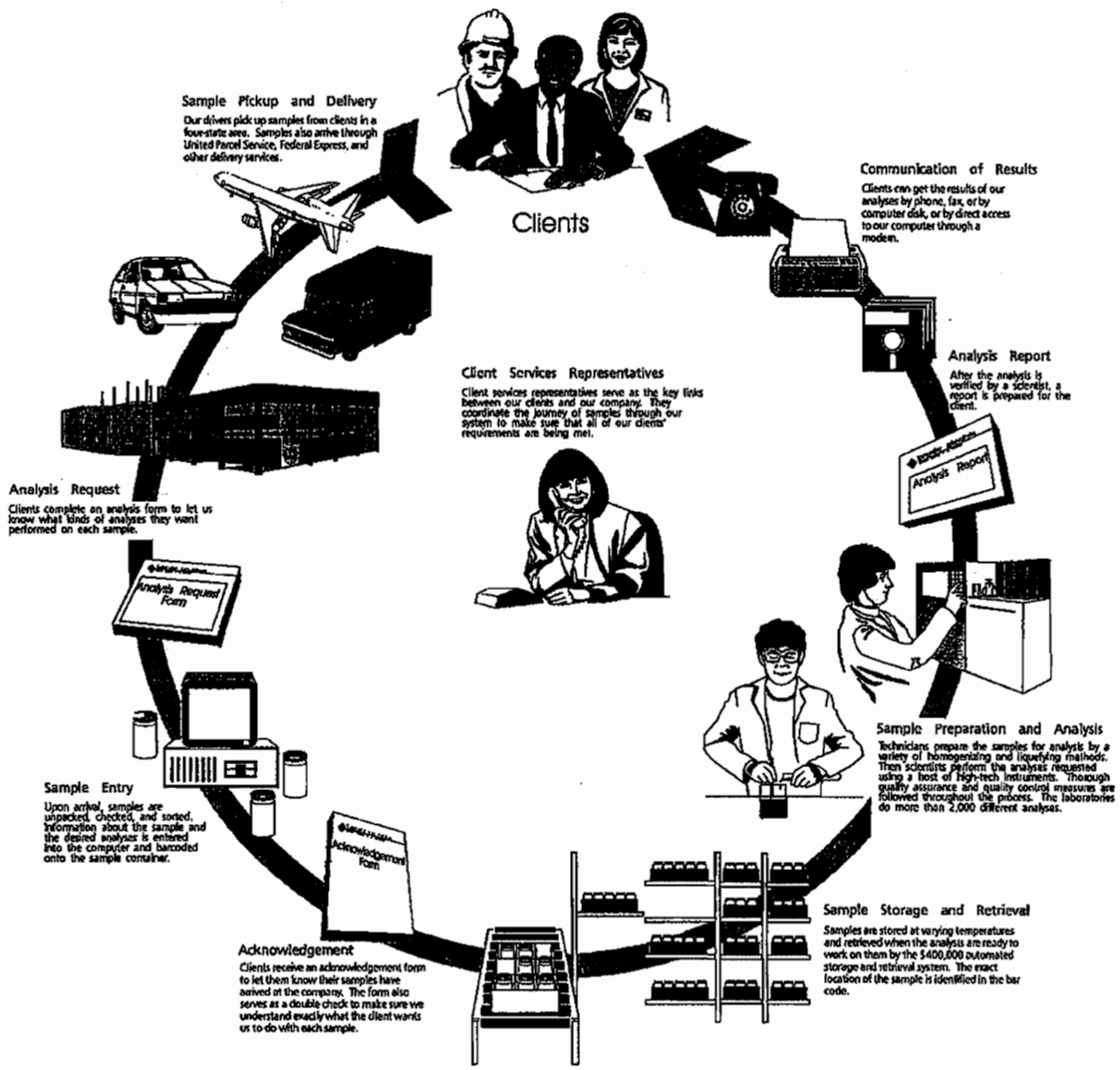
- A spirit of open-mindedness as we deal with all
- Dedication to service
- Good stewardship of our resources
- A commitment to flexibility and continuous improvement

We each take personal responsibility to live these values in all of our dealings, knowing full well our pledge may involve difficult choices, hard work, and courage.

We live our values through:

- *INTEGRITY* of action
- *INTENSITY* of effort
- *INNOVATION* in service
- *INVOLVEMENT* with clients

1.5. Sample Flow-Through Diagram



1.6. Certifications, Accreditations, and Registrations

Accreditation/Certification is the process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications and/or standards. It is the one generally accepted method by which a laboratory such as ours can demonstrate its capability of generating acceptable, professional, quality test results in those areas in which it claims competence. To this end, we have actively sought accreditation by organizations offering it in those areas relevant to our technical expertise. We strive to ensure that the facilities, equipment, procedures, records, and methods used by Lancaster Laboratories in the testing of environmental samples are in compliance with the requirements of these standards.

Although organizations offering accreditation differ somewhat in the details of their programs, they generally evaluate laboratories in four basic areas: personnel (adequate staffing, education, training, and experience), physical facilities, instrumentation/equipment, and quality assurance programs. This evaluation is performed by one or more of the following procedures: periodic on-site inspections of the laboratory by assessors experienced in technical operations and management, periodic testing of proficiency evaluation samples, and periodic updating of the laboratory's file to reflect changes in personnel, equipment, or services offered. Some states offer reciprocity with other state programs.

Appendix B lists accreditations, registrations, and contracts held by Lancaster Laboratories, Inc. in support of environmental work. Current copies of all scopes of accreditation are kept on file in the Quality Assurance Department.

2. ORGANIZATION AND PERSONNEL

2.1. Company Overview and History

Lancaster Laboratories was founded in 1961 by Dr. Earl Hess in response to a need for high quality technical services by the agricultural and industrial communities in southeastern Pennsylvania. Nourished in a culture of quality and caring about all those associated with the business, the corporation became an industry leader known for innovative business practices and people-friendly policies. The company was independently owned until the retirement of Dr. Hess in 1995. At that time, LLI was acquired by a publicly held company, Thermo TerraTech, Inc., a Thermo Electron company. Ownership changed in September 2000, when Lancaster Laboratories was acquired by Goldner Hawn Johnson and Morrison, Inc. (GHJ&M), a private equity investment firm. In August 2005, LLI was acquired by Fisher Scientific under their BioPharma Division. On November 9, 2006, Thermo Electron and Fisher Scientific merged to form Thermo Fisher Scientific. There have been no changes at Lancaster Laboratories as a result of this merger. LLI is not a part of any other Thermo Fisher Scientific laboratory and performs limited analytical work for other Thermo Fisher Scientific companies. Lancaster Laboratories operates as an independent laboratory and is incorporated by the State of Minnesota.

Lancaster Laboratories provides a wide array of laboratory services to clients working in the pharmaceutical and environmental industries. We strive to offer high quality technical services in the chemical and biological sciences with personal attention to client needs. These services include chemical analyses, microbiological testing, biopharmaceutical testing, and analytical method development. We are, therefore, a technical service company and do not manufacturer or distribute goods. Our "product" is accurate and timely technical information and our continued existence depends on the quality of the services we offer and efficiency with which we deliver them.

2.2. Organizational Structure

The president of Lancaster Laboratories, J. Wilson Hershey, Ph.D., is responsible for the daily operations of the laboratory. Dr. Hershey reports to the President of Fisher BioPharma Services. The Executive Vice Presidents lead the technical operations and business development areas of the company. Their management staff includes directors, managers and group leaders. Organizational charts are presented in Appendix C of this manual. A list of key personnel is also provided.

The Executive Management Group is defined as Lancaster Laboratories' President and Vice Presidents.

Senior Management is defined as directors and above, including the Quality Assurance Director.

2.3. Management Responsibilities

Management/supervisor is defined as group leaders, managers, directors, and above.

Laboratory management duties are outlined for supervisory personnel using a job plan format, which details each individual's responsibilities along with expected results. Typically, management duties include, but are not limited to:

- Personnel hiring and training
- Supervision of personnel
- Ensuring quality of data produced
- Resource allocation
- Directing daily work operations, including scheduling of work
- Maintaining awareness of technical developments and regulatory requirements
- Assessing laboratory capacity and workload
- Contributing to the continuous improvement of the laboratory operation
- Providing resources to ensure a safe work environment
- Providing resources to ensure a work environment free of undue pressures
- Communicating problems and concerns to Senior and Executive Management to enlist a higher level of support for corrections and continuous improvements.
- Ensuring compliance with the requirements of ISO 17025 and NELAC.

2.4. Overview of the Quality Assurance Program

Quality Assurance (QA) is responsible for developing planned activities whose purpose is to provide assurance to all levels of management that a quality program is in place within the laboratory, and that it is functioning in an effective manner. The major function of an independent analytical testing laboratory is to generate accurate and regulatory-compliant technical information. Here at Lancaster Laboratories that information consists of the results of chemical and microbiological analyses, along with any required supporting data. Since this testing information is important to our clients, it is necessary to produce it under a program which will assure that it has the necessary "quality" (i.e. that it has the degree of accuracy and compliance that is commensurate with its intended use).

The administration of the QA program is the responsibility of the QA Director in cooperation with all levels of management.

2.4.1. Quality Assurance Director

The Quality Assurance Director ensures that the quality system is followed at all times. The QA Director reports directly to the President of LLI, thus ensuring corrective actions to quality issues are taken promptly and are separate from business decisions. The QA Director has no direct supervisory responsibility for the generation of technical data to avoid any conflict of interest in administrating the QA program. The QA Director has the final authority to stop work that may compromise our integrity or data quality. The situation must be investigated and appropriate corrective action must be put in place before the QA Director will authorize the resumption of work. The specific duties of the QA Director are communicated in job plan format.

The QA program, as directed by executive management, was established to:

- Ensure accountability, accuracy, and traceability of all analytical data generated.
- Ensure that current regulatory, agency, and client requirements are being met.
- Ensure that operating procedures are in place to minimize the possible loss, damage, and tampering with data, in addition to ensuring that raw data is stored in a secured area and is maintained by designated archivists and/or system administrators.
- Ensure that curriculum vitae (CVs) and training records are maintained to document that staff members have the necessary education, training, and experience to perform their job responsibilities and functions.
- Ensure that regulatory training is provided to applicable employees on a routine and ongoing basis.
- Ensure that all procedures are available, controlled, and current.
- Ensure that all equipment and instrumentation is qualified, maintained, and calibrated, as appropriate, in accordance with written standard operating procedures.
- Ensure that all significant laboratory problems are investigated and corrective action is documented.
- Ensure that an internal audit program is in place to confirm that laboratory personnel are adhering to standard operating procedures and applicable regulations.
- Ensure that quality issues are brought to the attention of management in a timely manner.
- Communicate (within 30 days) to the relevant state authorities when there are management or facility changes that impact the environmental division.

2.5. Quality Assurance Responsibilities

Responsibilities within the QA Department are divided and assigned in accordance with the regulations the business unit of interest is required to follow (i.e., Food and Drug Administration [FDA], Environmental Protection Agency [EPA]). The QA Director assigns tasks with input from the company President. The primary responsibilities of QA in support of the Environmental Division include, but are not limited to the following:

- Oversee the laboratories' internal audit program which consists of various audit types and applies to all laboratory activities (environmental, technical, and administrative).

- Review and approve standard operating procedures and LLI analytical methods.
- Review and approve validation documentation.
- Review non-conforming quality control data and approve laboratory investigation and corrective action reports.
- Perform tracking and trending of quality measurements and investigation report issues.
- Ensure that appropriate corrective actions are implemented as needed in response to quality issues or audit findings.
- Host client and regulatory agencies during facility audits and follow-up to any cited deficiencies.
- Provide regulatory guidance to the laboratory.
- Monitor GLP regulatory activities.
- Communicate quality issues to management.
- Provide and/or coordinate on-going regulatory training (e.g., Good Laboratory Practice [GLP], Good Manufacturing Practice [GMP]).
- Participate in the vendor and supplier approval process, including subcontractors.
- Review analytical data.
- Prepare and review QA project plans (QAPPs) as required by EPA and client projects.
- Maintain and update this *Quality Policy Manual*.
- Administer proficiency test sample programs, both single and double blinds.

2.6. Communication of Quality Issues to Management

The QA Department is responsible for preparing reports to Senior Management to keep them abreast of outstanding quality issues. Reports to management foster communication, review, and refinement of QA activities to ensure that the QA program is adequate to meet regulatory and Lancaster Laboratories' quality objectives. The following reports are used to communicate quality issues include, but are not limited to:

- Internal, client, and agency audit reports and corrective action plans
- Proficiency test reports
- Investigation and corrective action reports
- Monthly and quarterly quality status reports
- Plans for corrective action

2.7. Personnel Qualifications and Responsibilities

Full resumes and responsibilities of key personnel are provided in Appendix D.

Due to the number of analysts on staff, entry level chemists, technicians, and support personnel are not included in the resume section. However, all employees have job plans that define their responsibilities. Duties for these personnel typically include:

- Sample storage

- Sample preparations
- Performance of tests
- Calibration, operation, and maintenance of instruments
- Data entry
- Standard and reagent preparation
- Glassware preparation
- Data package preparation

2.8. Relationship of Functional Groups and the Quality Assurance Program

In addition to this *Quality Policy Manual*, aspects of the QA program are documented in a series of standard operating procedures that support the proper execution of this document. Technical operation procedures with required quality components are also in place. A current list of the titles of relevant SOPs is provided in Appendix E. There are a variety of mechanisms used to communicate requirements of and verify compliance with the QA program, including:

- Management requires that all employees read and be trained in the policies and SOPs that are pertinent to their jobs.
- Employee job plans define individual responsibilities. All job plans include QA aspects, and performance is reviewed annually.
- Laboratory audit findings are circulated to management and require a response and follow-up to items needing corrective action.
- Cross-functional meetings, including representatives from QA, Client Services, Marketing, management, and technical operations are held regularly to review specific projects and quality issues.

2.9. Balancing Laboratory Capacity and Workload

Evaluating laboratory capacity to perform specific projects is the responsibility of the Vice President of Technical Operations and the Director of the Client Services/Project Management Group. These responsibilities are documented in the individual job plans for these positions.

The laboratory facilities and staff size are very large compared to other laboratories serving the environmental industry. In addition, many analysts are cross-trained to perform a variety of tests, and there is redundant equipment available in case of malfunctions. This minimizes the need to evaluate small and medium size projects against capacity available to complete them. Large projects are reviewed against capacity estimates before bids are submitted to ensure that the client's analysis schedule will be met.

Regularly scheduled meetings are held with upper management, laboratory middle management, Client Services and QA personnel to review progress with current projects, as well as special requirements of new work scheduled for the laboratory.

Laboratory capacity and backlog is tracked on a continuous basis using information from the sample management system, including turnaround time, and work in-house.

2.10. Identification of Approved Signatories

Approved signatories for laboratory reports are defined in a SOP on final review of laboratory generated reports. Directors, managers, group leaders, and other designated employees (such as project managers and senior technical staff) may be designated to sign reports. Request for approval of an employee to review/sign reports must be made through the QA Department. Approved signatories are designated with an asterisk in the personnel list provided in Appendix C.

2.11. Personnel Training

The experience and training received by personnel is of great importance to our clients and regulatory agencies. CVs and on-going training documentation are available to demonstrate how personnel have been prepared for the tasks they routinely perform. To ensure the highest quality of services at Lancaster Laboratories, training programs and plans are developed to match skills with job functions. On a routine basis, the supervisor must review and sign training documentation to verify that it is completed and current. Current and accurate training documentation is the responsibility of both the employee and their supervisor.

Training requirements can be met through education, prior job experience, internal and external training classes, on-the-job training, TRN training modules, procedure reading, or any combination thereof, to enable the person to perform assigned job functions and meet regulatory compliance.

Each analyst training to perform a new analysis must perform the required initial demonstration of capability and meet the requirements for accuracy and precision before working independently on the test method. Typically, this is accomplished by the successful analysis of four known samples. However, there are certain tests performed that are not required by the mandated test method or regulation to perform the above procedure (i.e., EPA 1010, 9095). In this case, the analyst's documentation of proficiency is satisfied by the sign-off of having read, understood, and agreed to follow the SOP as written and observation by a senior analyst.

Management personnel have the responsibility for planning ongoing professional growth and development activities for an employee through on-the–job training and/or internal and external training courses so an employee can maintain a current skill set to match job responsibilities.

An annual performance review based on job accountabilities, objective measures, and pre-defined standards is completed by management personnel for each employee. This assessment is documented and maintained. Input is obtained from other managerial personnel as needed.

2.11.1. New Hire Training

New employees are oriented as part of a year-long process that is designed to make the employee feel welcome and comfortable by defining our culture, traditions, philosophies, and work practices. During the orientation process an employee will learn about personnel and safety policies and business strategies in addition to quality, ethics, and customer satisfaction expectations through a formal process administered by our Human Resources Department.

New employees are also required to attend a "core" technical orientation as applicable, which can entail the participation in training module exercises, short session attendance, and/or other skill training specific to their assigned department or job function. Additional job-specific training required for an employee is based upon his/her assigned duties and is identified by his/her supervisor. Technical orientation occurs during the first few weeks of employment.

This orientation process is designed to enable employees to initiate and take responsibility for their personal and professional career growth at Lancaster Laboratories. The orientation process is conducted without regard to employee race, color, creed, national origin, sex, age, or disability in accordance with LLI's Employee Equal Opportunity (EEO) policy.

2.11.2. Ongoing Training

Refresher and ongoing training occurs through various means, which include but are not limited to, training in or independently review new/updated LLI standard operating procedures and TRN training procedures; on-going regulatory training; in-house or off-site classes/seminars. The goal of this training is to ensure employees remain current with changes to laboratory systems and practices, as applicable to his/her job function. Retraining and re-qualification activities occur as directed by procedures or regulations. Employees are also retrained if an issue or investigation warrants that retraining is a necessary corrective action. Management directs when employee re-training is warranted, and the extent of the re-training.

2.12. Regulatory Training

The QA Department is responsible for conducting and/or coordinating initial and ongoing regulatory training (i.e., GMP, GLP) to all applicable laboratory and support personnel. It is the responsibility of management within each department to ensure that personnel attend the required training sessions.

The choice of training format and topics covered for ongoing regulatory training is left to the discretion of QA and the trainer. All training sessions will reinforce the concepts in the regulations as they are relevant to Lancaster Laboratories.

Whenever possible, after training is completed, a demonstration of proficiency of the training topic is given. The demonstration of proficiency will generally be in the form of a quiz although other demonstrations of proficiency may also be acceptable depending on the scope and content of the training. If necessary, training may be presented and/or repeated one-on-one with individuals who do not demonstrate proficiency in the training topic. This is performed by QA in conjunction with applicable laboratory management personnel.

2.13. Employee Safety

Lancaster Laboratories, being mindful of its responsibilities as an employer and active corporate citizen, has established the following objectives of its safety program:

- Provide a safe environment for its employees, visitors, and the community surrounding its place of business.
- Provide ongoing safety training for employees.

- Provide all necessary facilities and equipment to ensure the safety of its employees and to minimize all chemical exposure during the normal performance of their required tasks, and to take all necessary precautions to safeguard the surrounding environment.
- Provide for periodic health physicals for employees.
- Foster and encourage safe operations and a proper safety attitude on the part of our employees through general operations and systems, training, and the *Chemical Hygiene Plan* (CHP).

The *Lancaster Laboratories Chemical Hygiene Plan* addresses various aspects of our safety program in greater detail.

A Safety Committee works to enhance our overall safety program. The committee meets on a routine and ongoing basis and its specific responsibilities are detailed below:

- Review accident and incident reports. Make recommendations for methods of prevention to eliminate further accidents.
- Promote safety awareness and distribute safety information by various means (e.g., posters, videotapes, pamphlets, and books). Use internal communication channels to promote safety awareness.
- Enhance and recommend safety-training programs for all employees, as necessary.
- Maintain up-to-date information on employee concerns that are safety related. Offer input and information to the Chemical Hygiene Officer and/or Safety Officer, as needed.

2.14. Client Services/Project Management Responsibilities

Members of the Environmental Client Services/Project Management Group are responsible for organizing and managing client projects. Clients are assigned a project manager who will be their primary contact at LLI. It is the project manager's responsibility to act as the client advocate by communicating client requirements to laboratory personnel and ensuring that clients provide complete information needed by the laboratory to meet those requirements. All client communications are documented by the project manager in a controlled notebook. In addition to information management, Project Management responsibilities include:

- Coordinating and preparing proposals in conjunction with technical staff.
- Hosting client visits and audits.
- Coordinating and communicating turnaround time (TAT) requirements for high priority samples/projects.
- Answering common technical questions, facilitating problem resolution.
- Providing clients with sample status report or results prior to receipt of hardcopy analytical reports (e.g., fax, e-mail, phone).
- Scheduling sample submissions, sample containers, and sample pick-up via LL courier service.

2.15. Confidentiality

Strict confidentiality is maintained in all of our dealings with clients. Confidentiality agreements, therefore, are willingly provided. Clients are promptly notified any time their data is subpoenaed or requested by a regulatory or legal body.

All employees are required to protect company technical data, including client names and test results from disclosure to any third party. This policy, as described in the *Lancaster Laboratories Personnel Manual*, is provided and presented to employees during their orientation period.

Intellectual property associated with the testing that we perform under contract for a client is the property of the client.

In an attempt to ensure the confidentiality of **OUR** systems and procedures within our laboratory, it is our policy to restrict the distribution of our internal procedures to clients. Clients are more than welcome to review our procedures while on-site as part of an audit or visit. Based on this policy, we would request that any documents viewed would not be shared or made available to any third parties without the permission of Lancaster Laboratories.

2.16. Business Conduct

Our business conduct policy applies to all operations of the company. All employees must avoid any relationship with other individuals or organizations that might impair, or even appear to impair, the proper performance of their company-related responsibilities. Employees must avoid any situation that might affect their independence of judgment with respect to any business dealings between the company and any other organization or individual. Any employee who believes that he or she may have such a conflict, whether actual or potential, or who is aware of any conflict involving any other employee must report all pertinent details to a Vice President or the President of the company. The company's management will vigorously enforce this policy and will take prompt and appropriate action, including termination, against any employee found to be in violation.

2.17. Operational Integrity

All levels of management consider the following activities unacceptable:

- Knowingly recording inaccurate data.
- Fabrication of data without performing the work needed to generate the information. This includes creating any type of fictitious data or documentation.
- Time travel or adjusting clocks on computerized systems to make it appear that data was acquired at some time other than the actual time.
- Manipulation of data for the express purpose of passing system suitability or quality control criteria.
- Selective use of data generated, or not using data that was legitimately generated and has an impact on the outcome of the test.
- Executing significant deviations from approved test methods and procedures without prior approval from Lancaster Laboratories management and/or the client.

All employees responsible for generating, handling, or reviewing laboratory data understand that Lancaster Laboratories mission is to perform all work with the highest level of integrity. Under no circumstances should shortcuts or generating results to suit a client's purpose rather than good scientific practice be considered acceptable. Any violation of the laboratory integrity policy will result in a detailed investigation that could lead to termination.

If an issue does arise which could compromise our integrity, personnel are instructed to perform the following activities:

- Clearly document the situation and maintain all data generated. There is a big difference between poor judgment and fraud. Fraud usually involves intent to conceal an action taken. Therefore, the more documentation that is maintained, the less likely that an action will be considered fraudulent if further scrutinized.
- When out-of-specification results or quality type issues are detected, all supporting data and relative background information must be documented and presented for management review. Problem resolution and client contact, as applicable, must also be documented.
- Review any questionable situations and decisions with a supervisor.
- Bring a questionable or uncomfortable issue directly to the QA Director or a member of the QA Department as part of our QA open door policy.
- Utilize the company's Ethics Committee. See Section 12.4 of this manual.

3. BUILDINGS AND FACILITIES

3.1. Facility

Lancaster Laboratories is located at 2425 New Holland Pike (Route 23), Lancaster, PA 17601. The facility consists of two primary buildings, Building A and Building B, which are connected by a pedestrian bridge spanning Route 23.

Building A resides on a commercial plot measuring 5.2 acres on the north side of Route 23. Building A is a three-story building of concrete, brick, and wood construction. It is approximately 116,000 square feet and consists of approximately 62,000 square feet of laboratory space; 25,000 square feet of office space; and 29,000 square feet of storage, mechanical, and service space. On this plot, adjacent to Building A, sits 1000 square foot chemical storage building (solvent, acid and gas cylinder storage) and 8000 square foot storage building which also houses stability chambers (referred to as Building J). The bottles packing area, which includes preservation of bottles being sent to clients for sampling, is located in a separate 3000 square foot building (referred to as Building K).

Property adjacent to Building A also includes two buildings that are leased for support functions. This space includes 1200 square feet for supply storage, 600 square feet for recycling, and 3500 square feet for shop and facilities maintenance areas.

Building B resides on a commercial plot measuring 14.48 acres on the south side of Route 23. Building B is a three-story building of steel construction. It is approximately 55,000 square feet and consists of approximately 15,000 square feet of laboratory space; 18,000 square feet of office space; and 22,000 square feet of storage, mechanical, and service space.

An automatic fire alarm and security system monitors the entire facility. The system is tied into central dispatch at a security firm.

3.2. Security

Lancaster Laboratories is considered a secure facility. All outside doors except the main lobby entrance and sample receipt area/security area (accessible through Building A) are kept locked during normal business hours to prevent unauthorized entry. An attendant monitors the main lobby entrance.

During evenings, weekends, and holidays, all doors are locked and Security personnel are on site to prevent unauthorized entry into the building. Video cameras are utilized by Security personnel to monitor the facility grounds.

Every employee is issued a photo ID badge, which also serves as his/her building access card. This badge must be worn at all times while on laboratory property so that employees can be easily identified. Access to secured/designated areas within the building is limited to only applicable employees through the building security system. This system is administered by Security staff.

All visitors must register with the receptionist/lobby attendant and will be issued a visitor badge. A staff person must accompany visitors while in the facility. Additional visitor rules are outlined in the *Visitor Security and Safety Rules* pamphlet, which is provided to all guests.

Building access cards may be issued on a temporary basis to contractors or service technicians (e.g., electricians and plumbers) who need access to the building to work on a project. These cards will provide the contractor with limited access during the normal workday and will be returned when the work is complete.

3.3. Disaster Recovery

A disaster recovery plan is in place to provide direction for situations where normal operations of the laboratory may not be possible. In the event that the building would be severely challenged, a designated disaster recovery team, which includes Maintenance, Safety, Corporate Management, Public Relations, and other applicable personnel depending on the scope of the disaster, would assemble at a designated area to assess the situation and formulate a plan.

The plan also addresses, in general terms, how to approach the following issues: electrical failures, heating/air conditioning failures, fire/building evacuation, computer failures, hazardous material spills, injury to employees, disruption of phone service, and stability chamber failures.

3.4. Environmental Monitoring

The air handling system for the main laboratory is specially designed to protect sensitive instruments from harmful vapors to ensure that samples are not contaminated. The Physical Services/Maintenance Group is responsible for maintaining the HVAC and exhaust hood systems. This is particularly important in our instrumentation rooms and computer center where a controlled environment, positive pressure system is maintained.

Refrigerators, freezers, incubators, and ovens used for analysis are monitored by the Andover System equipped with stationary thermometer temperature probes linked to a master panel that is accessed through a computer in the Plant Engineer's office. Temperatures are taken every

6 seconds and a log prints with the hourly average. If a unit is outside of a predefined temperature range for a specified period of time, the system alarms. Units not on the Andover System are monitored manually by recording thermometer temperature readings twice daily.

Laboratory storage blanks are also used to evaluate conditions under which samples for volatile analysis are stored to monitor for cross-contamination potential. QA provides oversight of the environmental system monitoring.

3.5. Water Systems

Well water and the public sewer system service the facility.

Quality control of laboratory analyses involves the control and quality of laboratory water available to analysts for preparation, dilutions, and rinsing of glassware. Two (one within each building) reverse-osmosis deionized water systems deliver highly purified water to a sealed fiberglass storage tank. From the storage tank the water is delivered to an ion-exchange-carbon filter system for further polishing. The water is also exposed to an in-line ultraviolet sterilization lamp before being circulated to taps throughout the laboratory.

Daily monitoring and preventive maintenance for the system is the responsibility of the Maintenance Department. At regular intervals, monthly/annual testing is performed as required by regulatory guidance. QA provides oversight of the water system monitoring. In addition, method blanks are tested with each batch (≤20) of samples.

3.6. Housekeeping/Cleaning

Lancaster Laboratories is dedicated to providing a clean workplace. A third party professional cleaning service provides routine cleaning of "common areas" that include lavatories, drinking fountains, floors, and windows. Technical staff are responsible for the cleaning (or the contract of cleaning) of specific laboratory work areas.

Detergents used for cleaning contain no to very low levels of metals, pesticides/herbicides/ fungicides, or volatile solvents.

3.7. Insect & Rodent Control

Steps are taken to prevent, monitor, and control insect and rodent infestation. The coordination of this program is the responsibility of the Physical Services Department under the direction of QA. An outside service firm is contracted to perform routine and ongoing monitoring of the facility to ensure that preventive measures which are in place are effective and are working as intended.

No insect or rodent control chemical agents in a liquid or vapor form are applied or sprayed in any laboratory building, unless there is no other option, in which case department management will be contacted for approval.

3.8. Emergency Power Supply

The laboratory is located at the junction of two power grids that supply electrical service to the facility. If one of the power grids fails, service is switched to the other grid. Various types of diesel and natural gas generators are also available on a standby basis to supply power to selected areas of the laboratory in case of a power outage.

To reduce spikes and spurious line voltage changes to laboratory instruments that can affect results or damage electronic equipment, "conditional power" is fed to these sensitive instruments. All essential computer systems are on uninterrupted power supply (UPS) which is a battery system that provides continuous conditional power for a limited time period in the event of a short power outage.

3.9. Facility Changes

Procedures are in place to manage change, ensure communication, and to minimize negative consequences through active participation of personnel involved in a facility change. The goal is to ensure that physical and environmental condition changes are adequately evaluated for impact and reduction of risk to quality, safety, health, employee, environment, property, analytical services, and business operations before and after the change is implemented.

4. DOCUMENT CONTROL

The administration of the document control system including tracking, filing, updating, distribution of new procedures, and archiving of historical copies is the responsibility of the Office Services (OS) Department. It does not apply to external documents.

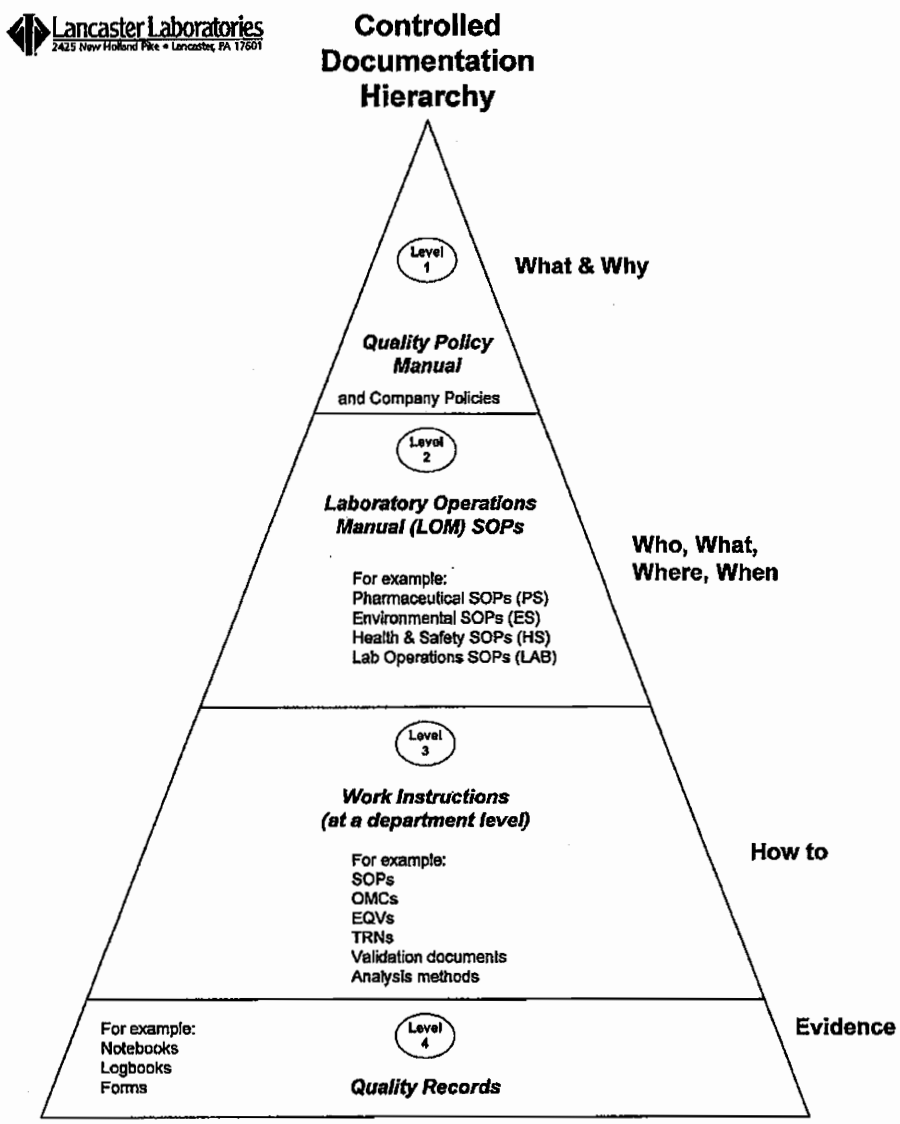
It is our policy to restrict the distribution of our internal procedures to clients and we discourage the distribution of company confidential documents outside of the facility. Clients are more than welcome to review our procedures while on-site as part of an audit or visit. Any documents that are distributed are only sent with the approval of QA.

The goals of the document control process are:

- Format documents according to consistent and defined standards
- Review and approve new documents
- Schedule review of existing documents
- Control of document versions and effective dates
- Review and approval of document changes
- Control document distribution and obsolete documents
- Archive and protect obsolete documents

4.1. Hierarchy of Internal Operating Procedures

The hierarchy of controlled procedures at Lancaster Laboratories is defined in the following pyramid diagram. These procedures and documentation are made available to promote consistency throughout the organization and to meet regulatory requirements. A list of relevant methods and procedures is located in Appendix E. The development of new procedures and the updating and reclassification of current procedures is an ongoing project.



4.1.1. Level 1 – *Quality Policy Manual* and Company Policies

The intent of these documents is to define "what" we do with emphasis on Executive and Senior Management's responsibility for quality.

The purpose of the *Quality Manual* (this document) is to provide a framework to outline the quality systems at Lancaster Laboratories. Organizational charts, list of SOPs, a list of equipment, instrumentation, and personnel resumes are included as attachments to this manual.

- Executive Management is responsible for ensuring adequate personnel, resources, and support are available to carry out the requirements of this *Quality Policy Manual*.
- Senior Management is responsible for ensuring that SOPs or other appropriate documents are written and are available to personnel to define the practices and systems which will support these policies.
- All employees are responsible for conducting business in a manner, which is compliant with quality and company policies and associated SOPs or other appropriate documents. Review of these policies and procedures must be documented.

Additional company policies are written to support and expand upon this *Quality Manual*. These policies will contain more detailed information about a subject with approval signatures executed at the Executive and/or Senior Management level.

4.1.2. Level 2 – Laboratory Operations Manual (LOM) SOPs

The intent of these standard operating procedures is to define "who, what, where, and when." These procedures provide specific information for a process or topic so that the requirements outlined in this *Quality Policy Manual* and company policies can be achieved. The review and approval of these SOPs is performed at the director/manager/group leader level, including QA review and signoff, and the responsibility of these SOPs lies with the area or person directing the operation.

SOPs are organized into different categories dependent on subject matter and area to which they apply within the company. They can apply across the entire company, across a division, or a specific operating area. Some examples of areas addressed at this level are:

LAB – Laboratory Section
HS – Health and Safety
ES – Environmental Sciences

4.1.3. Level 3 – Work Instructions (at a departmental level)

The intent of these procedures or documents is to define in greater detail the specific "how to". The level of detail in these documents should be sufficient so any appropriately trained person can perform the task accurately. Examples include, but are not limited to standard operating procedures (SOPs); operation, maintenance and calibration (OMC) procedures; equipment, qualification, and validation (EQV) procedures; validation documents; and Lancaster Laboratories' analytical methods. Departmental level procedures/documents are reviewed and approved at the manager or group leader level including QA review and signoff.

4.1.4. Level 4 – Quality Records

The intent of these documents is to provide documented evidence to support our quality systems and operations. Examples include but are not limited to, data notebooks/logbooks, and preformatted data recording forms.

4.2. Document Approval, Issue, Control, and Maintenance

Our document control process ensures documents are approved and adequate for use. It also ensures that documents are readily available to personnel and at locations where essential operations are performed. Distribution of each document is controlled to ensure that analysts are working with the correct version.

Controlled policies, procedures, and work instructions are reviewed and approved by appropriate individuals and are formally issued and administered through the Office Services Group. Each document is uniquely identified and includes an effective date, revision identification, and page numbering (totaling number of pages). All documents are indexed and identified on a "master list." Each procedure has a unique file record that contains pertinent information used in the tracking process.

The original signed hard copy of the procedure is maintained in a locked area while in the active status. Electronic copies of each procedure are stored in a secure directory that is accessible only to designated personnel. Office Services also monitors the number of copies of each procedure in the laboratory.

Procedures are reviewed on a regular basis to ensure they remain accurate and current. Upon the receipt of new or updated documents, all copies of obsolete documents are removed from service and destroyed. The original historical copy of each outdated/obsolete procedure is clearly identified as a historical version and maintained in a permanent archive file separate from any current versions.

Company policies and corporate level procedures are available in electronic form on the company's intranet site. Electronic copies are made available to enhance communication across the company. Electronic copies are scanned-in versions of the most recent hard copy of the document. These procedures cannot be printed from this system. The Office Services Group maintains this system in a current and accurate state.

4.3. Client-Supplied Methods and Documentation

Client documentation to support environmental testing at Lancaster Laboratories is maintained in a centralized area. This information is organized by client/project in the Client Services/Project Management Group. Client documentation may include some of the following information depending on project size and scope:

- Client supplied analyte lists
- Client supplied project plans
- Client contract quality manuals with specified limits, QC criteria, etc.
- Communication/correspondence records which relate to testing requirements, interpretation of results, or reporting formats

4.4. Laboratory Notebooks, Logbooks, and Forms

Procedures are in place to ensure that all data is traceable, authentic, complete, and retrievable. The following general requirements outline our system for the issuing, control, and archival of laboratory notebook and logbooks.

- The administration of notebooks and logbooks is controlled by the Office Services Group. They maintain a master index to uniquely number and identify each book distributed.
- Notebooks and logbooks can contain blank or preformatted pages.
- Notebooks and logbooks are bound, uniquely identified and have sequentially pre-numbered pages.
- If notebooks or logbooks contain preprinted laboratory form pages:
  - A unique identification number is assigned to each form
  - Forms are approved by appropriate management personnel before they are put into production use
  - Forms are reviewed on a routine basis to ensure they are still accurate and current
- Completed notebooks are returned to an archivist. Incomplete books are returned to Document Control:
  - when an employee leaves the company
  - when an employee transfers to another division
  - when the project for which it was used is complete
  - at a defined time line from the issue date
- Office Services verifies the status and location of any notebook or logbook which has been signed out for longer than two (2) years.
- In specific situations, records are bound to create books at the time of archival (e.g., temperature charts).
- At the time of archival any page(s) in the notebook or logbook that does not contain data documentation is crossed-out or a statement is written on the last page used to note that the book is complete to prevent data from being entered at a later date.
- Notebooks and logbooks identified as requiring permanent archival are assigned a designated qualifier.

4.5. Control of External Documents

Our document control system does not apply to externally generated documents such as manufacturers' manuals, standards, and written methods.

Currently, external documents such as copies of the 40 CFR and ASTM methods are stored exclusively in the QA Department. QA also keeps applicable agency documents on file, these include, but are not limited to, the NELAC Standards and ISO 17025 standards.

Environmental methods from the EPA or Standard Methods are available in the QA Department, but the technical areas may also have copies that pertain to the tests that they perform. Some methods are available on-line and are accessed through the Internet. Regulatory methods are used as references by the laboratory and testing is performed as per written SOPs that fall under our existing

document control system and have scheduled reviews. It is the laboratory's understanding that the need to control external documents is to ensure that the most current version of a method is referenced or appropriate manual is being used. While using the most current version of an analytical method is our typical practice, there are specific client needs and accreditation rules that require previous versions of a method be used. Our scheduled review of SOPs is used to ensure that the proper version of a method is referenced.

The technical areas are responsible for ensuring that all manufacturer's manuals are current and available to analysts. The vendor provides instrument manuals when new equipment is purchased or existing instruments are updated. These manuals are kept with the instruments to which they are associated. The laboratory labels the instrument books with the corresponding identification number of the instrument. Logbooks, which fall under the document control system also include the title and date/version of the instrument manual.

5. SAMPLE HANDLING

5.1. Sample Collection

In order for meaningful analytical data to be produced, the samples analyzed must be representative of the system from which they are drawn.

It is the responsibility of the client to send us representative and/or homogeneous and properly preserved samples of the system from which they are drawn. Lancaster Laboratories will assume that all multiple sample containers with the same designator/description and bottle type contain a homogeneous, representative sample. We will also assume that it is acceptable to deplete one container and move to the next, without implications unless otherwise indicated by the client.

The laboratory will provide the appropriate sample containers, required preservative, chain-of-custody forms, shipping containers, labels, and seals. The laboratory also provides trip blanks and analyte-free water for field blanks. Preparation of methanol containers for field preservation of volatile soil samples is available.

Sample containers are purchased pre-cleaned by the supplier. Special containers with traceability documentation are available upon request. For pre-preserved bottles, each lot of preservative is checked for contaminants before use and this testing is documented.

The laboratory provides instructions with all bottle orders that define how to sample, preserve, store, and ship the samples prior to their delivery at Lancaster Laboratories. These instructions inform the client of the importance of proper sampling and advise them that non-compliant samples may be rejected or reported with a qualifier.

If samples are collected by Lancaster Laboratories personnel, applicable sampling methods will be in place to perform the sampling operation.

As samples are analyzed at Lancaster Laboratories, there are times when additional sample volume may become necessary to complete testing or perform retesting. If this situation arises, "additional sample" is requested by Lancaster Laboratories and/or submitted by a client to supplement current work being performed within our facility. Additional samples received may be either assigned a new Lancaster Laboratories internal tracking number and/or a comment will be noted on the final report to state that additional sample was received, depending on the situation. It is our goal to provide accurate traceability between sample submitted and testing performed.

5.2. Sample Receipt and Entry

5.2.1. Sample Receipt

Samples can be received at the laboratory 24 hours a day, 7 days a week, 365 days of the year. Receipt can occur in one of three ways:

- Lancaster Laboratories courier services (i.e., Transportation Department)
- Personal delivery
- Commercial courier

All samples received for testing are delivered to the Sample Administration Department immediately upon arrival. This group is responsible for the unpacking and organizing of the samples. This process includes checking custody seals if present, paperwork agreement, signing the chain of custody, recording cooler temperatures, documenting the condition of containers, accounting for all sample bottles, and observing any safety hazards, and reporting any problems to Client Services for communication to the client. This receipt process is documented.

5.2.2. Sample Entry

As soon as practical after sample receipt, all samples are entered into our laboratory information management system (LIMS). Samples awaiting log-in are stored in temporary holding areas, at appropriate storage conditions to maintain sample integrity. If there is doubt about the suitability of items received or if items do not conform to the description provided or the testing required is not clear or specified, the client will be contacted and the conversation documented.

At the time of entry, the LIMS will assign a unique Lancaster Laboratories' identification number to each sample. This number is sequentially assigned. Upon entry of pertinent client information and assignment of a unique sample number, a label will print identifying each container, which is attached to the sample container.

Samples are tracked to the minute upon arrival. This will allow the client to see exactly how long it took the samples to pass through receipt, unpacking, and entry.

A sample acknowledgement will print from the LIMS per sample delivery group (SDG). This notification may be sent to the client to confirm sample receipt and entry on the day following sample log-in. Internally, appropriate personnel will audit all applicable sample entry and client paperwork.

5.2.3. Sample Preservation Check

Support personnel check and document preservation of non-volatile liquid samples after the samples have been entered into the LIMS and before they are placed into storage. Any checks of volatile samples are performed and documented after analysis.

5.2.4. Sample Rejection Policy

Any time a sample is received in a condition that does not meet the method requirements, the condition of the sample is clearly documented on a sample administration documentation log or sample problem form. These forms are forwarded to the project manager and the client is contacted to discuss the best course of action. The client is given the option to resample or have the sample analyzed and reported with a comment.

5.3. Sample Identification and Tracking

A sample label is generated for each sample and; in addition to the assigned Lancaster Laboratories' sample number, the following information is printed on the label: client name, sample identification assigned by the client, sample collection information, storage area, bottle code ID, analyses requested, and any applicable notes to laboratory personnel.

To ensure accountability of results, the unique sample number assigned is used to identify the sample in all laboratory data documentation, including notebooks, instrument printouts, and final reports. The sample number will also be used to identify additional containers of the sample that may be created during sample preparation and analysis (e.g., subsamples, extracts, digests).

5.4. Sample Storage

After sample entry, samples are placed in an assigned and identified storage location until needed for analysis. Room temperature, refrigerated, and freezer storage are available and samples are stored in accordance with regulatory, method, or client direction. The LIMS is used to assign storage locations, which assists in the orderly storage of samples. Sample storage locations are secured and monitored for accurate temperature control.

The central locked storage facility contains 3430 square feet of refrigerated space, including 2740 square feet equipped for automated sample retrieval. Samples are stored in the laboratory's automated storage and retrieval system (ASRS) or other assigned storage locations (separate volatiles areas) within the laboratory until completion of all analytical work.

When a sample is scheduled for analysis, the analyst retrieves it from the storage area. To maintain the integrity and security of the sample(s), the amount needed for analysis is removed and the sample(s) returned to storage as soon as possible

5.5. Sample Return/Disposal

Samples will remain in the storage area following analysis until the testing results have been authorized and the analysis report has been generated. On a regular basis, a list is printed from the LIMS that summarizes samples that can be removed from the storage area so that the storage locations may be assigned to incoming samples. Samples are either returned to the client or disposed of in accordance with local, state, and federal regulations.

Due to the variety of waste generated at Lancaster Laboratories, several general categories of wastes and waste streams have been identified. Identification of waste occurs through information provided by the client, historical information, and/or analytical testing. Lancaster Laboratories uses a sophisticated, computerized sample management system, which includes programming to assist in the identification of hazardous wastes at time of discard.

For reasons of environmental liability, client confidentiality, proprietary product formulation protection, etc., with three exceptions, wastes generated by Lancaster Laboratories are disposed of via incineration at EPA licensed facilities. The exceptions include bulk neutralized acid waste, COD analysis waste, and labpack wastes containing mercury. None of these exceptions involve containers with client information.

5.6. Chain of Custody

Samples being tested for litigation or regulatory purposes may require locked storage and documentation of the time and personnel responsible when the sample was not in storage. Procedures to define these activities are in place and include the following:

- A chain-of-custody document is initiated for each bottle type submitted by the client.
- The chain of custody is signed each time the sample is stored, removed from storage, or changes hands.
- Clients requesting internal chain-of-custody documentation receive the completed forms after the analysis is complete.

5.7. Representativeness of Samples

Each analytical method provides specific procedures for ensuring that a representative aliquot of the sample is used for testing. These procedures include shaking water samples and homogenizing solid samples. Analysts are instructed in sampling techniques that prevent contamination of samples.

6. TECHNICAL REQUIREMENTS – TRACEABILITY OF MEASUREMENTS

6.1. Reagents and Solvents

The reliability of our analytical results can be directly affected by the quality of reagents used in the laboratory. Procedures are in place to address labeling, storing, and evaluation of these materials. Reagents and solvents include acids, bases, indicators, buffer solutions, colorimetric solutions (CS), test solutions (TS), and volumetric solutions (VS). *The Lancaster Laboratories' Chemical Hygiene Plan* provides safety information in regard to the storage and handling of laboratory chemicals.

Each analytical method includes a list of reagents needed to perform the test. Reagents are fully described, including chemical name, purity, and description of preparation. Where applicable, shelf life and storage conditions are also listed. The laboratory is responsible for checking that new supplies meet the method requirements.

Departmental management will ensure that an adequate inventory of reagents needed to perform testing is maintained. Reagents received at the laboratory will funnel through the Shipping and Receiving Department and deliveries are verified and labeled with the date of receipt. Large volume reagents (e.g., solvents, acids) are stored in a building outside of the laboratory until needed for use.

In addition to the name and concentration of the reagent, all reagents are labeled with storage conditions, the date opened, and an expiration or re-evaluation date. Before using any reagent, the analyst will ensure that the material was properly stored and labeled. If a reagent has passed

its expiration date or shows signs of deterioration, the material will not be used in the laboratory and must be disposed. If a re-evaluation date is reached before a reagent is completely consumed, the reagent will be inspected by physical observation for signs of degradation. Physical signs include, but are not limited to, color changes, clumping or other texture changes for solids, formation of precipitate in solutions. This evaluation is performed by an experienced chemist or microbiologist.

Subsequent reagent solutions or mixtures prepared at the laboratory are fully documented in a logbook and labeled to include: a unique name, concentration, date prepared, name of analyst preparing or reference to the logbook, storage conditions, and expiration/re-evaluation date.

All reagent certificates and MSDSs are retained by the laboratory.

6.2. Media

Within the microbiology laboratory, procedures are in place to address preparation, labeling, storage, expiration, documentation, and quality/sterility evaluation requirements for these materials. These procedures are described in Appendix K of this manual.

6.3. Calibration Standards

Written calibration procedures are required, where applicable, for all instruments and equipment used in the laboratory. The source and accuracy of standards used for calibration purposes are integral to obtaining quality data. Requirements for calibration are provided in each analytical method including specifications for the standards used. Calibration measurements made by the laboratory should be traceable to national standards of measurement (e.g., NIST) where available. C of A's are maintained for each material, as applicable.

Standards are usually purchased from commercial supply houses either as neat compounds or as solutions with certified concentrations. The accuracy and quality of these purchased standards is documented on a C of A and these certificates are maintained on file in the laboratory. Upon receipt at Lancaster Laboratories, material will be labeled with a date of receipt and stored appropriately.

Most solutions and all neat materials require subsequent dilution to an appropriate working range. Records of all standard preparations include the dilution(s) made and a reference to the original and any intermediate mixtures. Solutions are labeled according to laboratory procedures and assigned unique names or code numbers that provide traceability to the original components and stored appropriately. Each new preparation of standard is tested for integrity by comparison to standards from another source or previously prepared solutions. Standards are not to be used in the laboratory past their expiration date.

6.4. Equipment and Instrumentation

We are continuously updating our equipment and instrumentation capabilities to serve our clients fully and to keep up with advances in technology. A master list of our equipment is maintained by our accounting department and includes the date that the instrument was received and the condition at receipt (new v. used). Our major equipment capabilities are summarized within Appendix F of this manual. In addition, we have numerous other instruments including pH meters and analytical balances along with support equipment such as ovens, incubators, muffle furnaces, centrifuges, etc.

6.4.1. General Requirements

- Equipment/instrumentation is assigned a unique designation. This unique number or system identification is used to track the piece of equipment within data documentation.
- An equipment logbook is established in conjunction with installation and will be readily available to document all incidents that pertain to the equipment as they occur.
- All test, measuring, and inspection of laboratory systems, equipment, and instrumentation used at Lancaster Laboratories is routinely calibrated and maintained in accordance with applicable standard operating procedures.
- A member of the technical group, or designated individual, performs routinely scheduled maintenance and calibration of laboratory equipment as required by laboratory procedures. These activities are documented.
- If appropriate standards or expertise for calibration or maintenance are not available in-house, the operation is conducted by an outside service firm. Certificates or other data generated by the service firm are reviewed by applicable Lancaster Laboratories personnel to verify acceptability. This information is maintained on file.
- All equipment taken out of service is tagged "DO NOT USE". The following minimum information is documented:
  - Date taken out of service
  - Employee who took the equipment out of service
  - Reason for tag-out

6.4.2. Standard Operating Procedures

Information regarding operation, maintenance, and calibration of equipment and instrumentation are found in respective SOPs. The procedures include a routine schedule for preventive maintenance and calibration as applicable, along with acceptance criteria and remedial action to be taken in the event of failure. These procedures are maintained in the document control system and reviewed on a regular basis to verify they remain current and accurate. Equipment manuals are also available to provide additional information in regard to operation and maintenance.

6.4.3. Maintenance

- Equipment maintenance is performed as either a preventive or corrective operation.
- Preventive maintenance procedures and schedules are developed for each piece of equipment, where applicable. Preventive maintenance operations are performed by an analyst, equipment maintenance specialist, or contracted (manufacturer's representative or service firm personnel). Documentation is maintained for the procedure(s) performed as part of the preventive maintenance operation. It is the responsibility of departmental management to ensure that a preventive maintenance schedule is addressed by a procedure where appropriate and is followed.

- Corrective maintenance is performed by an analyst, equipment maintenance specialist, or contracted (manufacturer's representative or service firm personnel) in response to indications of equipment malfunctions. The unit will be clearly tagged as out of service. All corrective actions taken to bring the unit back into service are documented. After repair, a notation is made in the logbook to note whether the function has been fixed. Calibration activities are performed as applicable, before the instrument is placed back into service.
- A supply of commonly needed replacement parts is maintained by the laboratory.
- A preventive maintenance schedule for major instruments is given in Appendix G. Maintenance of equipment used in microbiological testing may be found in Appendix K of this manual

6.4.4. Calibration

- Calibration is the establishment of, under specified conditions, the relationship between the values/response indicated by a measuring instrument or system and the corresponding known/certified values associated with the standards used. Some types of calibrations are performed with a set frequency (e.g. daily), while others provide intermediate checks to ensure that the instrument response has not changed significantly.
- All measuring and testing equipment having an effect on the accuracy, precision, or validity of calibrations and tests are calibrated and/or verified on an on-going and routine basis. Methods for calibration of instruments and equipment vary widely with the nature of the device and the direction given by analytical procedures, departmental procedures, or manufacturer recommendations. Frequency of calibration can also depend on additional factors including ruggedness of the instrument or equipment and the frequency of use.
- Departmental management is responsible for developing or acquiring written calibration procedures for the types of relevant equipment and instruments employed within their area, as applicable. Procedures will address the following aspects: description of the calibration method, frequency/schedule for calibration, acceptance criteria, and corrective actions if failure occurs.
- Calibration information is recorded in a logbook that is associated with the instrument/equipment and/or a calibration certificate is maintained and/or data printouts are generated to document the activity.
- Calibration measurements are traceable to national standards of measurement (e.g., NIST) where available. Physical standards, such as NIST certified weights or thermometers, are re-certified on a routine basis. Calibration certificates are maintained on file, where applicable, to indicate the traceability to national standards of measurement. These physical standards are used for no other purpose than calibration.

- Calibration failures are documented in the logbook for the instrument and/or within the data printouts from the instrument. Management personnel will perform an evaluation and review of failures and assess any potential impact the failure might have on previously generated data. Lancaster Laboratories utilizes "real-time" controls to ensure the accuracy of the data. These controls are used to assist in assessing the impact of the situation.
- After repair, adjustments, or relocation that may affect instrument response, calibration/verification activities are performed, as applicable, before the unit is returned to service.
- Analytical data will not be reported from instrumentation or equipment that fails to meet calibration requirements.
- A summary of the calibrations for most major equipment is given in Appendix H.
- Procedures for calibration of equipment used in microbiological testing may be found in Appendix K of this *Quality Policy Manual.*

6.5. Computerized Systems and Computer Software

6.5.1. Computer Usage – Lancaster Laboratories provides computer equipment for employees to use as a tool in performing their work. Computer equipment is the property of Lancaster Laboratories and will be used in accordance with defined terms and conditions. Our goal is to provide standard hardware and software that meets the needs of the user. The laboratory is in the process of implementing standard desktop computers.

6.5.1.1. Physical security of computer systems – It is company policy to protect computer hardware, software, and data documentation from misuse, theft, unauthorized access, and environmental hazards. In addition to the facility security outlined in Section 3.2. the corporate computer area is locked and requires key-card access. All vendors, contractors, or other visitors must be escorted into this area.

6.5.1.2. Passwords – Passwords are important for the security of company data and resources. Lancaster Laboratories' primary network operating system is WindowsNT and each employee will have a user ID and password combination to access the system. Other computer systems within the Environmental Division also require a user ID and password combination for access. The following procedures apply regardless of what system(s) is being utilized:

- Passwords must be kept confidential
- Users must log-out of a system when not in use to prevent unauthorized access.
- Forgotten passwords can only be reset by the Computer Systems Department or by an appropriate System Administrator.
- WindowsNT passwords automatically expire every 90 days. The computer will prompt a user to change the password when the expiration date nears.

6.5.1.3. Computer viruses – Lancaster Laboratories centrally and continuously monitors the computer network for computer viruses. Employees are prohibited from using the company's computer equipment to propagate any virus. Anti-virus software is employed to detect viruses on the WindowsNT network. There may be occasions where a notice is sent from the anti-virus administrator, or designee when there is a particularly dangerous or virulent data destructive program that employees should be aware of. However, employees are reminded to always be cautious and observant if there are no current warnings. Employees who share files between their home computer and the laboratory should install anti-virus software on their home computer.

6.5.1.4. Internet and e-mail system – The e-mail system is used primarily for Lancaster Laboratories business purposes. The *Lancaster Laboratories Personnel Manual* provides additional information in regard to system usage. Employee access to the Internet is restricted to those employees who have a business need for it. All employees have access to e-mail. Access to the internet is configured through a user's WindowsNT account. All internet and e-mail activity is subject to monitoring. All messages created, sent or received over the internet are the property of Lancaster Laboratories and may be regarded as public information. The laboratory uses e-mail filtering software in order to manage the risk of viruses and malicious code.

6.5.1.5. Lancaster Laboratories' Intranet (LabLinks) – The Lancaster Laboratories' Intranet, is designed to be a useful tool for employees to acquire company information and to provide a company computerized communication system. The *Lancaster Laboratories Personnel Manual* provides additional information in regard to usage.

6.5.1.6. Software policy

- Copyright laws protect software, and Lancaster Laboratories intent is to abide by all software agreements.
- Software purchases must be formally requested and approved by management and validation personnel, as necessary.
- All software is used in accordance with applicable license agreements.
- Employees are not to install any software on computer(s) unless authorized by the Computer Systems Department.
- All laboratory software is inventoried and maintained by the Computer Systems Department.
- Employees may not give software to outsiders (e.g., clients, contractors), unless approval is granted by management.
- Users may not make copies of any licensed software or related documentation without permission. Any user that illegally reproduces software will be subject to civil and criminal penalties including fines and imprisonment.

- Periodic software audits will be performed. Any unauthorized software that is found during an audit will be reported to management and will be removed from the computer(s).

6.5.1.7. Computer system backup, data restoration and data archival – Mission critical data is stored on several computers throughout the laboratory. These computers are connected through the local area network. Selected files on these computers are backed up using an entrepreneurial backup software system. The objective of this backup is to have the ability to restore data after a total loss (e.g., theft, fire, natural disaster). Two types of backup are performed at the end of each workday (Monday through Friday); full and differential backup.

This data is maintained in a secure manner that prevents the unauthorized access to and the unauthorized amendment of computer records.

Procedures are in place to address restoration of backed up data. At the beginning of each month, a full archival of data is performed and stored offsite.

6.5.1.8. Remote access to computer systems – Employees may remotely connect to the laboratory computer systems through an encrypted (SSL) login to our Citrix server if management approval is granted. When logging in, users are authenticated with their Windows Active Directory account and password.

6.5.2. System and Software Verification – Before a new computer system or significant modification of an existing system is implemented in our laboratory, it is necessary to meet the following documents:

- Requirements documents – Describe the required system functionality and specifications
- Design documents – System overview, screen design, report layout, data description, system configuration, file structure and module design
- Testing documentation for system development/verification – Structural testing of the internal mechanisms and user testing of the installation and system qualification
- Standard operating procedures and/or manuals

6.5.3. CROMERRR – The laboratory has reviewed and evaluated EPA's proposed Cross-Media Electronic Reporting and Record-keeping Rule. While we will monitor the rules progress, the laboratory will wait to make any definitive changes in response to the rule until it is clear what direction the agency plans to take and within what timeline. Working with FDA's 21 CFR Part 11 regulation in our Pharmaceutical Division has given the laboratory a head start in understanding the demands of CROMERRR.

6.6. Change Control

Procedures are in place to define how to maintain processes, instrumentation, equipment, computerized systems, and computer software in a validated or controlled state through a plan of change control. Successful changes require a thorough evaluation and testing for potential consequences prior to implementation. Planning, authorizing, testing, and reviewing of proposed changes will be documented throughout the change process. Changes may be planned or could be made in response to an emergency situation. The following "general" elements apply to changes, as appropriate:

- Request to perform a change
- Evaluation of a change
- Authorization of a change request
- Preparation for an authorized change
- Execution and testing of the change
- Documentation of the change
- Approval of the change
- Change implementation and follow-up (Documentation is required to summarize the change and to reflect the outcome of the change. Formal approval of the change is performed by designated responsible individuals and QA.)

6.7. Labware Cleaning

Dedicated washroom personnel are in place to support the laboratory operations in regard to labware preparation, washing, rinsing, and drying. Labware can include, but is not limited to glassware, plasticware, utensils, and pipettes. Procedures are in place to outline the washing process for each type of labware. Most labware is cleaned using a Miele glass washing machine. Some Labware is still washed by hand and either air-dried or dried in specifically designed ovens.

Most of the labware used in the laboratory is "common or non-dedicated" labware (common to a department), but some of the labware used in the laboratory is identified as "dedicated" labware. Dedicated labware is exclusively used for certain analyses. Examples of dedicated labware include glassware used for MBAS and Ortho (acid washed) and "oils" glassware. This labware is isolated and cleaned only with "like" labware.

All glassware is 100% visually inspected for breakage (e.g., cracks, chips), cleanliness, and dryness before being returning to the laboratory for use.

Generally, each test will have controls in place to ensure that results were not negatively affected by unclean labware. These may include blanks to detect positive interferences and controls to detect negative interferences.

7. PURCHASING EQUIPMENT AND SUPPLIES

7.1. Procurement

It is the responsibility of management personnel within each department to ensure that the appropriate supplies are available and/or ordered with sufficient lead-time to perform analytical testing or to provide support to the testing areas. The individual technical departments have trained personnel who enter the supply order into the company's requisition software system. The selection of these products is based on technical input at the analyst level and authorized by technical departmental management. The Purchasing Department maintains an ordering system in which purchase requisitions are managed. Common laboratory items (e.g., beakers, flasks, reagents) are ordered directly through the Purchasing Department. Purchase orders over a specified dollar amount require verification from the appropriate member(s) of the Executive Management Group before an order can be placed.

Upon receipt of an order, the Purchasing Department checks the order to ensure that all items were received as specified. Products that have specific storage requirements are taken to the technical area upon receipt. It is the technical area's responsibility to ensure that the product is stored in the appropriate manner. Any checks on the quality of the materials received for use in a specific test are the responsibility of the laboratory using them. This is based upon the experience of the laboratory with the usability of the product. Generally, each test has controls in place to ensure that test results are not negatively affected by the materials.

Any problems encountered when using a material in the laboratory must be brought to the attention of the Purchasing Department and/or Quality Assurance as applicable, to ensure that follow-up and corrective action occur.

7.2. Supplier Evaluation

Procedures are in place to evaluate vendors who supply us with: new equipment, instrumentation, computerized systems and computer software; commercially purchased glassware, including sample bottleware, reagents, chemicals, solvents, gases, media, and standards; and contracted and subcontracted services.

Lancaster Laboratories strives to ensure our suppliers continually improve their quality systems and we reserve the right to purchase from suppliers of our choice in order to best fulfill the needs of our clients and our business. When directed by a client to purchase from a specific supplier, we will do so. In this instance it is the client's responsibility to "qualify" the specified supplier. We attempt to purchase from businesses that we have an established purchase history or have previously acquired information regarding the supplier's quality programs.

Lancaster Laboratories may not evaluate every supplier. Risk assessment is taken into consideration when making this decision. The risk assessment analysis includes system, material, services, and number of samples or operations the purchase may affect or support. Evaluations are not required for computer operating systems, utilities, toolsets, or systems software. They also are not required for any off-the-shelf configurable software package that has an extensive market performance history (e.g., Microsoft Word, Excel, Access).

Additional quality systems are also in place within the laboratory to further verify and support the materials used:

- C of A for every lot of purchased prepared microbiological media and for purchased chemicals, where available, are reviewed and maintained on file.
- For many chemical analyses (e.g., HPLC, GC, IC) a blank is routinely run which serves as real time suitability testing of the reagent being used.
- Microbiological testing often employs positive and negative controls, which serve as real time control checks.

8. ANALYTICAL METHODS

8.1. Scope of Testing

Samples are analyzed in accordance with client-supplied methodology, official published methods, standard methods, or validated in-house methods. We recognize the importance of providing verifiable results and, therefore, use methods accepted and approved by a broad range of federal and state regulatory agencies. In order to meet the needs of our clients as well as regulatory agencies, the laboratory may need to support different versions of the same method (i.e. SW-846 8021A and 8021B). The laboratory can also assist in developing and validating analytical methods for specific products and matrices. All methods submitted for our review, as well as all analytical results, are considered confidential.

The laboratory performs a wide variety of environmental testing in support of the Safe Drinking Water Act (SDWA); Clean Water Act (CWA); Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund); and the Clean Air Act (CAA). Standard methods approved by ASTM are also used in testing. Potable water, wastewater, soil, sediment, sludge, oils, biota, and air are among the matrices typically analyzed.

Our areas of expertise include:

• Gas Chromatography (GC) • Gas Chromatography/mass spectrometry (GC/MS) • High Performance Liquid Chromatography (HPLC) • Liquid Chromatography/mass spectrometry/mass spectrometry (LC/MS/MS) • Ion Chromatography (IC) • Purge and Trap • Selected Ion Monitoring (SIM) • Atomic absorption spectrophotometry (CVAA) • Cold vapor atomic fluorescence spectrometer (CVFA) • Inductively coupled spectrophotometry (ICP) • Inductively coupled spectrophotometry/mass spectrometry (ICP/MS) • Autoanalyzer • UV/VIS spectrophotometry • Fourier transform spectrophotometry (FTIR)	• TOC • Water Quality and inorganic analysis • Summa Canister & Tedlar Bag Air analysis • Microbiology • Full range of petroleum analysis/UST (including state-specific methods such as AK-101, AK-102, AK-103, CT ETPH, FL PRO, MA VPH, MA EPH, NW-DX/GX, NW-HCID, NY STARS, OA-1&2, QAM 025, TX-1005, TX-1006, WI DNR GRO, WI DNR DRO) • Method development • Data Package deliverables • Electronic data deliverables • QAPP development • Consulting services

A list of tests covered under the laboratory's NELAP accreditation may be found in Appendix I. A complete list of the tests routinely performed by the laboratory may be found in the *Schedule of Services*.

8.2. Analytical Test Methods

Each laboratory is required to establish and maintain an analytical methods manual containing current copies of all the methods used for standard testing. The sources for these methods include the most recent versions of these compendia:

- Test Methods for Evaluating Solid Waste, SW-846
- Standard Methods for the Examination of Water and Waste
- Contract Laboratory Program Statement of Work
- Code of Federal Regulations, Chapter 40
- EPA 100 through 600 and 1600 series methods

Most of the test methods used are re-written into a laboratory standard format, which provides consistency in content and allows the analysts to locate the information they need quickly. Procedures are in place to define the format, required approvals, and the control system for these method documents. The format requirements include:

- Uniquely assigned method number, which is used extensively for scheduling and documentation purposes.
- Reference to the original source of the method (e.g. SW-846)
- Scope
- Basic Principles
- Apparatus and Reagents
- Personnel Training and Qualifications
- Safety and Waste Disposal
- Detailed procedure (including any method modifications)
- Calculations
- QA/Quality Control
- Revision Log
- Approval signatures from technical, management, and QA personnel

Analytical methods are maintained as controlled documents to ensure that analysts are always working with the most current version and are reviewed periodically for accuracy.

8.3. Client Supplied Methods

Most of the client-supplied method requirements presented to us involve achieving specific quality control criteria or limits of quantitation using standard EPA methods. These requirements would be communicated to the appropriate technical groups prior to the project start up. Each technical group would evaluate the scope of work and the requirements to assure the criteria can be met using the standard EPA method. They would also monitor the data to assure the criteria are met throughout the project. A client service representative would notify the client if there is a more appropriate method available or if the client's criteria could not be achieved on a certain sample matrix (i.e., due to matrix or dilutions). Occasionally, we are asked to transfer a non-standardized method from a client into our lab or to develop a new method, when one is not available. In the case of a method transfer, we would set up the client's method and perform some initial evaluation. After the initial evaluation, we may make recommendations on how to improve method performance. If the method appears to be adequate, we would determine linearity, specificity, precision, accuracy, LOD, and LOQ by performing calibrations, analyzing method blanks, and carrying out method detection limit and quad studies. In the case of method development, we would work with the client and/or data user to determine the level of validation

required ensuring that the method meets its intended purpose. In addition to the elements above, we may also determine standard and sample stability and robustness depending on the scope of the project. Typically, a standard operating procedure would be written and submitted to the client along with the results of the validation. These steps would be completed prior to analysis of field samples. Data related to the set up of the method would be archived at Lancaster Laboratories.

8.4. Method Validation

Before new or revised analytical methods are authorized for routine use in the laboratory, validation data is required to demonstrate that the method and analysts performing it are capable of meeting data quality objectives for precision and accuracy. A procedure is in place to outline this process.

Many methods published by USEPA include instructions for performing an initial demonstration of capability, which typically consist of determining the method detection limit and analyzing fortified samples in quadruplicate. This demonstration is performed and compared to acceptance limits for precision, accuracy, and detection limits, when available.

Methods that do not include specific validation requirements are validated by analyzing fortified samples or standard reference materials in replicate. The results of these analyses are used to assess accuracy and precision. Results of validation studies are subject to review and approval.

8.5. Procedural Deviations

Analysts are required to follow documented method for all tests performed. Procedures are in place to ensure that deviations from analytical methods are documented, approved, and justified in an appropriate and consistent manner. We classify method deviations as either being a planned deviation or an unplanned deviation. "In general," the following information is captured to document both types of situations:

- Description of the deviation
- Reason or justification for the deviation
- Impact the deviation will have on the testing
- Signature/date of analyst performing test involved
- Signature/date of LL director approving the deviation
- Signature/date of client approval, if necessary

Deviations to written procedures are documented in raw data notebooks or by using a procedural amendment. The procedural amendment process is appropriate if the change will apply to a group of samples over a period of time and is usually used for a specific project. Both types of documentation require management review and approval.

9. INTERNAL QUALITY CONTROL CHECKS

9.1. Laboratory Quality Control Samples and Acceptance Criteria

Quality control (QC) samples are analyzed with each batch of samples to demonstrate that all aspects of the analysis are in control within established limits of precision and accuracy. As required in the procedure on written methods, each analytical method specifies (or cross-references another procedure) the type of QC sample, frequency of analysis, acceptance criteria for QC sample results, and corrective action to be taken if QC sample results fall outside of the acceptable range.

The handling of QC data is described in the procedure addressing, "Quality Control Records." The types of QC samples and the information each provides are discussed in the following paragraphs.

Quality control checks used for microbiological tests may be found in Appendix K of this *Quality Policy Manual.*

9.1.1. Blanks - A blank is a designated sample designed to monitor for sample contamination during the analysis process. A volume of deionized laboratory water is typically used to monitor water sample analysis, while solid sample analysis blanks may consist of a purified solid matrix or just the reagents used in the test. The blank and field samples are treated with the same reagents, internal standards, and surrogate standards and carried through the entire analytical procedure. Ideally, blanks should demonstrate that no artifacts were introduced during the analysis process. The specific acceptance criteria for each test is given in the analytical method and is usually based on the required reporting limit.

9.1.2. Surrogates - Surrogates are organic compounds, which are chemically similar to the analytes of interest, but are not naturally occurring, in environmental samples. When required by the analytical method, surrogates are spiked into all the field and QC samples to monitor analytical efficiency by measuring recovery on an individual sample basis. The percent recovery is determined and compared to the acceptance criteria. Acceptance criteria may be set limits required by the method or based on a statistical determination from laboratory data.

9.1.3. Matrix Spikes - A matrix spike sample is created by fortifying a second aliquot of a water or soil sample with some or all of the analytes of interest. The concentration added is known and compared to the amount recovered to determine percent recovery. Matrix spike recoveries provide information about the accuracy of the method in light of the matrix analyzed. The acceptance criteria are given in the analytical method and may be set limits required by the method or based on a statistical determination from laboratory data.

9.1.4. Laboratory Control Samples - Laboratory control samples (LCS) are aqueous or solid samples of known composition that are analyzed with each batch of samples to demonstrate laboratory accuracy. The samples may naturally contain the analytes of interest or they may be clean samples fortified with known concentrations. Laboratory fortified blank is another term used to describe a LCS. Percent recovery is calculated and compared to acceptance criteria, which may be set limits required by the method or based on a statistical determination from laboratory data.

9.1.5. Duplicates and Matrix Spike Duplicates and Laboratory Control Sample Duplicates - A duplicate is a second aliquot of a sample that is treated identically to the original to determine precision of the test. To compare the values for each compound, the relative percent difference (RPD) is calculated by dividing the difference between the numbers by their average. Precision for analytes that are not typically found in environmental samples (i.e., organic contaminants) is determined by analyzing a pair of matrix spike duplicates, defined as two spiked samples and comparing the RPD for the spiked compounds. The acceptance criteria are described as a maximum for the RPD value, which may be set limits required by the method or based on a statistical determination from laboratory data.

9.1.6. Internal Standards - Internal standards are organic compounds, which are chemically similar to the analytes of interest, but are not naturally occurring in environmental samples. When required by the method, internal standards are added to every field and QC sample after extraction but prior to analysis. Comparison of the peak areas of the internal standards is used for quantitation of target analytes. Internal standard peak area and retention time also provide a check for changes in the instrument response. The acceptance criteria for these is stipulated in the analytical method.

9.1.7. Serial Dilutions - A serial dilution is the dilution of a sample with sufficiently high concentration by a factor of five to check for the influence of interferents. This QC check is performed for inorganics analyzed by ICP or GFAA. When corrected by the dilution factor, the diluted sample result must agree with the original sample within specified limits.

9.1.8 Interelement Correction Standard – Analyzed to verify interelement and background correction factors. A solution containing both interfering and analyte elements of known concentration is analyzed at the beginning and end of each analysis run or a minimum of twice per 8 hours.

9.1.9. Second Source Check - A second source check is analyzed using either the LCS and/or an ICV (Initial Calibration Verification). The second source is a standard that is made from a solution or neat purchased from a different vendor than that used for the calibration standards. For some organic custom mixes, the same vendor but a different lot and preparation is used. This ensures that potential problems with a vendor supply would be evident in the analysis. Some areas of the lab may use the continuing calibration verification standards as a second source from the initial calibration.

9.2. Quality Control Sample Frequency and Corrective Action

Each analytical method defines the frequency for the required QC samples. A summary is provided in Appendix J. The corrective action required when a QC result fails to meet the acceptance criteria is also given.

The QC acceptance criteria are available to analysts in the laboratory. If the method reference requires the use of specific limits, such as in Contract Laboratory Program methods, the laboratory will use the published limits and these may be documented as part of the analytical method. Many methods require that each laboratory determine their own acceptance criteria based on statistics from performance of the method. In these cases, the limits are available to the analysts and are entered into the laboratory's computerized QC system described below. Statistically determined acceptance criteria are frequently subject to change as the laboratory recalculates its control limits. Due to their dynamic nature, acceptance criteria are not included in this manual.

The results of all quality control samples are entered into the computer in the same way as the results of client samples. The computer is programmed to compare the individual values with the acceptance limits (statistically determined or method specified) and inform the analyst if the results of the quality control tests are in or out of specification. If the results are not within the acceptance criteria, corrective action suitable to the situation must be taken. This may include, but is not limited to, checking calculations, examining other quality control analyzed with the same batch of samples, qualifying results with a comment stating the observed deviation, and reanalysis of the samples in the batch. In addition, computerized reports on the results for all quality control analyses including mean and standard deviation are generated monthly. These statistical analyses are used by the QA Department to check for trends that may indicate method bias.

The laboratory allows for marginal exceedances based on the number of analytes in the LCS. The exceedances are carefully monitored so that any systemic problems would be identified and corrective action taken. If the LCS is being reported based on the marginal exceedance allowance, a comment is printed on the analytical report.

9.3. Quality Control Charts

Quality control results entered into the computer are used to generate control charts that are plotted via computer and may be accessed at any time by all analysts. The system charts results from surrogates, matrix spike/matrix spike duplicates, duplicates, and laboratory control samples. These charts provide a graphical method for monitoring precision and bias over time. They can be used to detect quality problems by observation of patterns. The charts are available on-line to analysts and quality control personnel for review.

The computerized quality control system is also used to report QC data to clients and to collect data for assessment of precision and accuracy limits.

9.4. Measurement Uncertainty

(ISO 17025) "All uncertainty components which are of importance in a given situation shall be taken into account using appropriate methods of analysis" (5.4.6.3). This means the laboratory must determine the uncertainty contribution of all steps in the testing process such as equipment, calibration, standards, reagents, preparation, cleanups, etc. Since, in most methods, the laboratory control sample (LCS) goes through the entire process of preparation to analysis; all factors that would contribute to uncertainty will be evident through the LCS results. LCSs are performed with every batch of samples where appropriate for the method.

Measurement uncertainty is calculated as two times the standard deviation of the LCS recoveries for the group and date range of data points selected for all applicable methods. This is reported as a percentage. Reports for uncertainty are generated and submitted to QA on an annual basis. At this point, it is not necessary to apply or report the uncertainty determination with sample results. Should a client request the measurement uncertainty it would be applied by multiplying the determined analyte concentration by the uncertainty percentage.

10. ASSURING QUALITY OF TEST RESULTS

10.1. Data Management

At a minimum, data management is initiated when Lancaster Laboratories receives the samples from the client. More often the process begins with client communication of their needs and requirements for a specific project and/or testing. The client service representatives/project managers are responsible for entering the information in the sample set up function of the LIMS. Upon receipt of the samples the unique tracking number is generated based on this information. At this point, computer technology becomes an integral part of tracking the samples through laboratory operations. The flow of data from the time samples enter the laboratory until the data is reported is summarized in the following table:

Sample and Data Flow

Action	Personnel Involved
Sample received at Lancaster Labs • Unpacked and reconciled against the client paper work or Chain of Custody • SA Documentation log completed	Sample Administration
Sample is entered into sample management system • Lab ID number assigned • Analyses entered • Chain of custody started • Storage location assigned • Electronic record of sample number • Labels generated • Acknowledgement printed (record of samples received and analysis entered)	Sample Administration
Sample stored in assigned location (refrigerator, freezer, etc) • Electronic record of sample #, bottle code, and location	Sample Support
Acknowledgment sent to client	Sample Administration
Sample removed from storage for analysis • Electronic requisition of sample number by bottle code • Necessary aliquot taken • Sample returned to storage	Technical Personnel
Analysis is performed according to selected analytical method • Raw data recorded • Reviewed • Transferred to computer by chemist or technician* (This is tracked by the unique sample number and batch number.)	Technical Personnel
Computer performs calculations as programmed according to methods	Data Processing
Second chemist or supervisor verifies raw data	Technical Personnel
Generation/signing of reports	Billing and Reporting Group, technical report signers
Data package deliverables are assembled	Data Package Group
Electronic Data Deliverables (EDDs) are generated	EDD Group
Data packages are reviewed prior to sending to client	QA, Data Package Personnel, and Laboratory Management
Data packages are microfilmed or scanned onto CDROM Hard copy of batch raw data is archived Electronic files are backed up and archived	Data Package Personnel, Office Services

*Analyses requiring the chemist's interpretation may involve manual data reduction before entry into the computer.

10.2. Data Documentation

Analytical data generated in the laboratory is collected on printouts from the instruments or associated data system or is manually documented in bound notebooks. Analysts review data as it is generated to determine that the instruments/systems are performing within specifications. If any problems are observed during an analytical run or the testing process, corrective action is taken and documented.

Procedures are in place to ensure that all data is traceable, authentic, and complete. The following general requirements outline our system for notebook, logbook, and documentation recording:

- Observations, data, and calculations are recorded at the time they are made and are identifiable to the specific task
- Entries are legible, signed, and dated
- Errors are corrected in a manner that does not obliterate the original entry, initialed and dated
- Blank pages or substantial portions of pages which are left blank are crossed-out to eliminate the possibility of data entry at a later date
- Notebook pages and instrument printouts are signed/dated to indicate second party data review
- At periodic intervals a supervisor or data reviewer checks equipment/instrument logbook entries and temperature recordings for completeness, legibility, and conformance to procedures.
- At a minimum, the following information is recorded as part of data documentation:
    - Date of analysis/operation
    - Signature/date of analyst performing test/operation
    - Identification of client sample(s) and material(s) analyzed
    - Materials, reagents, standards used to perform the testing/operation
    - Method used to perform testing/operation (including version number and/or effective date)
    - Equipment/instrumentation used to perform testing/operation
    - Calculations and how they were derived
    - Signature/date of person reviewing data documentation
- For computer generated data, the following information is recorded:
    - Sample(s) analyzed/operations performed
    - Date of analysis/operation
    - Unique instrument identification
    - Name/date of person operating the instrument
    - Name/date of person reviewing data
    - Any manual notations or interpretations made on instrument printouts are signed, dated, and reviewed

10.3. Data Calculations

Most instruments either include or are connected to a data system programmed to perform calculations needed to reduce the raw data to a reportable form. All calculations are maintained in the instrument manuals and/or as part of the analytical method.

In many cases, the data from the local instrument system are uploaded directly to the laboratory information management system for review and reporting. This direct upload eliminates the need to retype data and an associated source of transcription errors from the analytical scheme.

Some instruments report data that require application of additional factors before the data is in final form. For example, an extract concentration may be reported by the instrumental data system, but additional dilution and preparation factors may be needed before the result represents the concentration of analyte in the sample. Analysts may input these additional factors into the laboratory sample management system, where final calculations are performed.

Analysts type manually collected data, such as pH and titration data, into the laboratory sample management system, which is programmed to perform calculations for final reporting. Documentation of the programming for each calculation performed by the sample management system is maintained.

10.4. Reporting Limits

It is important to ascertain the limit of quantitation that can be achieved by a given method, particularly when the method is commonly used to determine trace levels of analyte. The Environmental Protection Agency has set forth one method for determining method detection limits (MDLs) from which limits of quantitation (LOQs) can be extrapolated which is summarized in a laboratory procedure.

MDLs are verified or determined annually on each instrument and are the basis for the LOQ used in the default reporting format. Because MDLs change each time they are re-evaluated, they are not included in this manual, but are available in each laboratory.

The reporting limit used to determine whether a result is significant and should be reported as detectable is dependent upon agency and client requirements. A variety of formats are available and include use of the MDL, LOQ, method specified limits, and project specific limits. The MDL and LOQ for each analyte are programmed into LIMS for reporting purposes.

10.5. Data Review

Final review and verification of the data is performed by a trained analyst using the sample results and quality control information entered into the laboratory sample management system. A second analyst or supervisor knowledgeable in the test, other than the employee responsible for performing the test, reviews the data. The review includes checks for correct transcription, calculations, passing calibrations, and quality control results that meet acceptance criteria. Any errors identified during this stage are corrected and reviewed with the responsible person.

After determining that all necessary requirements for valid data are met, the reviewer electronically approves the data by changing the status of the data from "complete" to "verified". The computer is programmed with a list of approved reviewers for each test, and the system is password protected to ensure that only qualified individuals verify the data.

10.6. Data Qualification

Data qualifiers are used to provide additional information about the results reported. The most typical use for data qualifiers is for results that fall below the quantitation limit, in the region where it becomes more difficult to distinguish a positive result from the background instrument signal. The data systems used to generate and report results are programmed to flag values in this range as estimates.

Other qualifiers are applied to advise data users of any validation issues associated with the data. The laboratory makes every effort to meet all of the requirements for generation of data. Occasionally, generation of data that does not meet all the method requirements occurs due to sample matrix or other analytical problems. If the test can not be repeated or reanalysis would not yield better quality data, qualified data is reported. Qualifiers may be in the form of comments on the analytical report or flags applied to the results.

10.7. Data Reporting

When all analyses are completed, reviewed and verified, a report is generated. The client receives a copy of the report containing the results of the analysis, plus comments added by the analyst, where necessary. To avoid ambiguity in interpreting results, the reverse side of the client's copy of the report contains an explanation of all symbols and units used in reporting data. Copies of reports and associated supporting raw data are retained in our archives. The report contains the signatures of the people who reviewed the final report. Since each result was previously reviewed, the final report review provides a last look for obvious typographical errors and ensures that the results are consistent with each other. Personnel responsible to review and sign reports are noted in the key personnel list provided in Appendix C.

Lancaster Laboratories offers a variety of data levels and formats, from a basic report of results only, to a comprehensive data package of quality control information and raw data. The client and any agency involved direct the selection of report type. A summary of report formats and data packages types is provided in the laboratory *Schedule of Services*. Various electronic formats are also available formatted to client-specified file structure and sent via e-mail, direct upload, web-site access (LLabWeb), or common courier.

Client confidentiality of LLabWeb data is ensured by the use of a secured firewall internet environment coupled with the use of a user ID and password to gain login access to the system. User accounts are configured to only allow access to specific data associated with the user's Lancaster Laboratories business account number.

Amendments to a final report after issue will be in the form of an additional document or data transfer and will include a reference to the original report. When a completely new final report is required, it will be uniquely identified and it will include a reference to the original report it replaces. A letter is sent with each revised report that clearly identifies the reason for the revision.

10.7.1. Reporting the Results

Analytical reports are printed with a cover page that summarizes all samples in that group. This page lists the Lancaster Laboratories' assigned sample number and the corresponding client description. The cover page identifies the laboratory contact person's name and phone number should there be a question about the report. Within this package, each page is uniquely identified and paginated. Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC and ISO 17025 unless noted otherwise.

10.8. Data Storage, Security, and Archival

Lancaster Laboratories has documented procedures and instructions for the identification, collection, access, indexing, filing, storage, maintenance, and disposition of data records. Records are in the form of hard-copy paper records, electronic data files, magnetic tape, and discs.

Data records are legible and identifiable to the samples or operations to which they apply. Lancaster Laboratories maintains records to demonstrate conformance to specified requirements and the effective operation of the quality system. Records are stored and maintained in such a way that they are readily retrievable in facilities that provide a suitable environment to minimize deterioration or damage and to prevent loss. Retention time for records is in accordance with specific procedures or instructions. At the end of Lancaster Laboratories defined archival period, the client will be notified if requested and is asked to provide the laboratory with instruction regarding whether the data on file are to be disposed of or whether the documentation is to be returned to the client.

The following types of documents are maintained in the archive system:

- Analysis reports
- Data notebooks
- Data logbooks
- Instrument printouts
- Correspondence and client files
- Instrument and equipment logbooks
- QA records
- Corporate documents
- Electronic records

If specified in client contract(s), archived records will be transferred according to their instructions in the event of a change in laboratory ownership or should the laboratory go out of business. If not specified by the client, the sale agreement will require that archived records be maintained as scheduled by the new owners. In the case of bankruptcy, appropriate regulatory and state legal requirements concerning laboratory records must be followed.

11. AUDITS AND INSPECTIONS

11.1. Internal Quality Assurance Audits

The QA Department, which is independent of laboratory activities, performs routine and on-going system, traceability, and observation audits to objectively review current systems, operations, and procedures. The goal of the audits is to ensure that the quality system activities are effective and in compliance with regulatory, including NELAC and ISO 17025, as well as internal policies and procedures. Audits are documented and tracked in a QA database.

Audits are scheduled and conducted following a predefined schedule, based on criticality of operation and prior audit results.

Results of an audit are documented in a report format and distributed to applicable management personnel responsible for the area(s) under audit. Management is responsible to address all non-conformances found during an audit.

Audit reports and responses are circulated to Management to communicate the outcome of the audit and the proposed plan(s) for corrective action, if warranted. If any of the audit findings cast doubt on the validity of the results, the clients will be notified within three business days of the investigation.

All records maintained as part of an audit are kept on file.

On an annual basis, an audit of the QA Department is performed as directed by the company President. The auditors assigned to carry out this operation are qualified staff members independent of the QA Department.

The specific content and findings of internal audits are not shared with clients or regulatory bodies.

11.2. Review of the Quality Assurance Program

All levels of management are continually updated on the status of quality and compliance by circulation of pertinent documents. Management review is documented by signatures on the route list, along with any comments or request for additional follow-up. The types of documents circulated real-time include:

- Internal, client, and agency audit reports
- Plans for corrective action
- Proficiency test results
- Investigation and corrective action reports
- Monthly and quarterly QA status reports

Executive management reviews the elements of the total QA program on an annual basis to ensure its continuing suitability and effectiveness in meeting the stated objectives outlined in Section 2.4 of this manual. The evaluation entails review of reports to management, all audit findings, client complaints, laboratory investigations, staff adequacy and training, and projected growth in workload. Patterns or trends in any of these areas are reviewed as a means to continually improve the quality system. This review also includes an evaluation of any audit

findings resulting from the audit of the QA Department. At the conclusion of this quality system review, executive management determines the need to introduce changes or improvements into the quality systems at Lancaster Laboratories.

11.3. Good Laboratory Practice Critical Phase Inspections

Any project that is subject to Good Laboratory Practice (GLP) regulations is audited by the QA Department at intervals adequate to ensure the integrity of the study, as required by the client. Inspections of a GLP project include direct observation of analysts as they perform various phases of the study. Documentation is reviewed as part of the inspection. The purpose of this type of audit is to ensure that there are no deviations from written methods, procedures, or study protocols.

Results of inspections are documented in a report format and distributed to applicable management personnel responsible for the area(s) under audit. Management is responsible to address all non-conformances found during an inspection. Inspection reports and responses are circulated to applicable Lancaster Laboratories management and an off-site study director, as applicable, to communicate the outcome of the inspection and the proposed plan(s) for corrective action, if warranted.

All records maintained as part of an inspection are kept on file.

11.4. Client Audits

Because clients place great importance on compliance with applicable regulations, data quality, and project requirements, they may choose to audit our facility as assurance that their objectives are being met. QA, Project Management, and the analytical laboratories play a key role in these audits. Visits by clients can range anywhere from a tour (to verify laboratory facilities and instrumentation) to an intensive inspection of technical operations, procedures, regulatory compliance, and/or review of specific project(s).

- Audits are scheduled directly with the Environmental Project Management Group or QA. The request to audit is communicated to all applicable laboratory departments.
- In accordance with our policy on client confidentiality, a client may only review specific data and results that apply to their work, or which have been approved by Lancaster Laboratories' personnel.
- An escort (Lancaster Laboratories' employee) remains with an auditor at all times.

The following responsibilities are assigned to the following groups in regard to client audits:

11.4.1. QA Department

- Research previous audit reports and laboratory responses to past deficiencies.
- Follows-up with the applicable analytical laboratory areas to ensure follow-up items were completed from the last audit, as necessary.
- Function as an escort during the audit
- Answer questions the auditor may have in regard to laboratory and quality systems.

- Take notes of areas where corrective action or suggestions are recommended during the audit.
- Communicate audit issues to management at the completion of the audit.
- Respond to client audit reports.
- Ensure follow-up to cited items are performed in a timely manner.

11.4.2. Project Management

- Work with client to set audit agenda.
- Gather and organize relevant information (e.g., client correspondences, analysis/project requests, copies of analytical data from archives).
- Be knowledgeable about client-specific project requirements and issues.
- Function as an escort during the audit.
- Communicate issues/problems to appropriate personnel.

11.4.3. Laboratories

- Gather and organize laboratory data and documentation in preparation for client review.
- Assure corrective action was implemented from past audit findings, if necessary.
- Be prepared to discuss project data/testing results during the audit.
- Be familiar with client-specific project requirements and be prepared to answer client questions.
- Be familiar with the location of routine laboratory information and equipment (e.g., SOPs, data notebooks, calibration data, etc.).
- Be prepared to answer specific technical questions in regards to laboratory procedures and instrumentation within the area.
- Functions as an audit escort within the department during the audit.

11.5. Agency Inspections

It is Lancaster Laboratories' policy to cooperate to the fullest extent and maintain cordial relations with all government agencies. The QA Department is assigned the responsibility of hosting and working with agency representatives. Their role includes, escorting the investigator(s); ensuring all questions are answered, promptly and accurately; making note of all unresolved issues; informing management of the audit status and outcome; responding to the audit report and ensuring that appropriate corrective action is completed.

Inspections can be performed by investigators or auditors from the FDA, DEA, United States Department of Agriculture (USDA), EPA, states, third-party accreditors (A2LA), or other regulatory agencies outside of the United States.

Government agencies have the right to investigate and inspect Lancaster Laboratories during normal business hours and permission to inspect is granted by Executive Management.

Clients are notified if their data or projects are being reviewed as part of an agency inspection.

Designated members of the QA Department are primary contacts for announced inspections. The QA Director is the primary contact for all unannounced agency inspections. If the QA Director is unavailable, the Vice President of Operations will be notified, in addition to a designated member of the QA Department. The QA Director, or their designee, will obtain evidence of the investigator's authority either in the form of a letter or examination/explanation of credentials.

Investigations may include the examination of records or the inspection of facilities. Investigators are usually concerned only with the records relating to their responsibilities. As a general rule, they may be given copies of records and documents, if requested. All copied records taken by an investigator will be stamped as being confidential material. Lancaster Laboratories will make and keep duplicate copies of all items taken by an investigator.

Investigators will not go unescorted through the laboratory. The laboratory is not obligated to show an investigator the following types of information: internal QA audit reports, investigation reports that address internal problems/issues, sales, financial or pricing information, or any personnel data other than training or qualification documentation. Investigators may not use recording devices and photographs may not be taken. Any questions or doubts about a request made by an investigator in regard to recording devices or photographs will be reviewed with legal counsel.

Lancaster Laboratories' personnel are not permitted to sign affidavits. Should an affidavit be presented during an inspection, all personnel will be directed not to sign it, read it, nor listen to it being read. The only document that is acceptable to sign is an acknowledgement that an inspection report has been received. If there is any doubt as to what should be signed, legal counsel will be consulted.

11.6. Proficiency Testing

Many of the organizations that certify our laboratory to perform various analyses require proof of our competency. Laboratory performance is checked regularly by participation in a variety of proficiency testing programs. When available, blind samples are obtained from NELAC-approved vendors for all test and matrices routinely tested in the Environmental Division at Lancaster Laboratories. In addition, some individual certification programs require analysis of specific sets of proficiency samples, and the laboratory also chooses to participate in a double blind program.

Generally, the proficiency test programs consist of samples or ampulated spiking solutions used to fortify laboratory water samples. Some studies provide spiked soil samples. The laboratories analyze the samples in the same manner as a client sample and the data is sent to the agency or vendor for evaluation. After the study results are returned to the laboratory, any data falling outside the acceptance criteria is investigated and corrective action is implemented, if needed. Results are circulated to management and communicated to the analyst. No proficiency testing samples or portion of a proficiency test sample are sent to another laboratory for analysis.

Clients routinely submit blind and double blind samples to evaluate the laboratory's performance. If a report is issued to the laboratory, it is handled in the same manner as a scheduled PT study evaluation and follow-up.

Double blind samples are submitted to the laboratories by the Client Services Department using a fictitious client name so that the analysts are not aware that the samples are proficiency tests. The samples are submitted quarterly with the scope of testing alternating between organic and inorganic tests. The acceptance criteria for these double blind samples are developed statistically using data from participating laboratories, providing a source of inter-laboratory comparison. Results are reviewed and investigated as needed and circulated to management.

Should QA notice a trend in PT failures, additional blind samples may be ordered for that specific test as corrective action.

12. CORRECTIVE AND PREVENTIVE ACTION

12.1. Laboratory Investigations and Corrective Action

Due to the technical nature of laboratory work and the encompassing nature of our QA program, a wide variety of laboratory issues can require investigations, documentation, and corrective action. Prompt investigation and implementation of corrective action ensure that only data of known quality are reported and prevent the reoccurrence of errors. The following list provides "examples" of the type of issues that warrant investigation:

- Out-of-specification QC results
- Failed performance evaluation samples
- Reporting incorrect results
- Contamination issues
- Client technical complaints
- Procedural errors
- Missed holding times
- Systematic problems that may compromise the accuracy or compliance of the data generated
- Problems with instrumentation and equipment which could compromise the data generated

Depending on the situation, system, and severity of the issue, Lancaster Laboratories uses a number of procedures to investigate laboratory problems. A "common" investigation and documentation format, which is outlined below, applies to each of the various types of investigations that may need to be performed:

- Identification of the problem
- Steps taken to investigate the problem
- Explanation of probable cause(s) of the problem
- Steps taken to prevent future occurrence
- Determination of samples or systems affected by the problem

Management is informed of problem situations and the QA Department tracks documentation and the status of the investigation activities. The goal is to identify root cause, have the corrective action implemented promptly, and to the degree appropriate for the magnitude and risk of the problem. Corrective action issues are subject to follow up by the QA Department. Tracking and trending of laboratory issues is performed by the QA Department and reported to management on a monthly and quarterly basis.

12.2. Investigation Processes

All results from quality control (QC) samples are logged into the computerized quality control system, which is programmed to alert analysts to unacceptable results. Analysts are required to review the results and determine the source of the problem. The source of the problem and proposed corrective action must be documented. Corrective action may include, but is not limited to, re-analysis, re-extraction or re-digestion, instrument maintenance, or re-calibration. If these actions do not yield compliant data within the required hold time, a Nonconformance Form is initiated to document actions and communication with the client, including any data that will be reported to the client as qualified. The original form is archived with the associated raw data. Nonconformance Forms are reviewed by the technical department's management, or designee. A copy of the form is submitted to QA and reviewed on a regular basis.

Missed holding times are investigated and documented according to a procedure specific to this issue. A standard form is used for documenting this type of incident and signed by a representative of all areas involved, in addition to management and QA. Clients are informed of any problems involving holding time.

Other types of problems having the potential for impact on the quality of data are investigated and documented using a form titled Investigation and Corrective Action Report (ICAR). This process was developed to ensure that laboratory problems are investigated, documented, and corrective action is put into place to prevent reoccurrence. Any employee may initiate an ICAR to document a laboratory problem. Once initiated, the QA Department is notified to assign a unique tracking number and the due date for the investigation.

12.3. Client Technical Complaints

Lancaster Laboratories is in the business of providing high quality analytical testing services. The data that we supply to our clients must be technically complete, accurate, and compliant with applicable regulations. When a complaint is received at the laboratory, it is our responsibility to determine, to the best of our ability, the extent of the issues and what data is in question. Complaints can be received via letter, phone call, fax, e-mail, or face-to-face meeting.

When a complaint is received, as much information as possible is acquired about the situation. The person receiving the complaint documents this information and promptly forwards it to the appropriate management personnel where the work in question was performed. In many cases, an investigation is initiated to address and document the situation.

If a transcription or calculation error is discovered, the final report and/or data may need to be regenerated with the correct value(s).

If a laboratory error is identified from the outcome of the investigation, the client must be immediately notified in writing of the situation. If the root cause of the problem has affected other client's sample results, all affected clients are notified immediately of the problem.

12.4. Preventive Actions

Various training courses are provided to all employees to assist with building quality and efficiency into their daily jobs. They stress a proactive approach/environment to problem solving and to review quality systems and operational efficiencies.

- "Making Quality a Science" is an introductory TQM course required for all employees to teach why quality is important and to explain the Lancaster Laboratories' quality philosophy and processes, and how to apply quality thinking and techniques on the job. Topics discussed include: communication, teamwork, serving the client, measurement, quality tools, and continuous process improvement. To foster continuous improvements of laboratory systems, MOS process improvement teams are formed, as needed, if an employee needs help in solving a problem or addressing an issue. The goal of these groups is to have representation from various areas of the laboratory work together to look at a problem, evaluate the need for a temporary fix, brainstorm root causes, plan process improvement, implement the process improvement, evaluate and follow-up to the corrective action.

- "Putting our Values to Work" is a seminar required for all employees to teach the Lancaster Laboratories Statement of Values by examining how it translates to our everyday jobs and ethical decision making. Topics discussed include: Statement of Values, ethical paradigms, and ethical decision making. Mandatory ethics training refresher seminars are offered on an annual basis.

  Lancaster Laboratories has an Ethics Committee that meets on a regular basis to discuss and handle ethical issues or situations that cause concern or make employees feel uncomfortable. The mission of this group is to promote sharing of concerns on ethical issues; encourage and maintain commitment among employees to our core ethical values; and to maintain an environment that ensures open access to committee members and all levels of management and the confidential handling of ethical issues.

- The laboratory also utilizes a formal program to encourage preventive action called, Practical Process Improvement (PPI). PPI embodies three principles: logical simplicity, practical methods & tools, and involve everyone. Using proven hands-on methodology, teams of employees learn the tools and immediately apply them to a real business problem in their functional area. Measurable results are key to process improvement therefore, the teams collect data, analyze it to find a solution, and then test the results, using metrics. Once the solution has been proven effective, the team implements it and then monitors the solution to ensure that the results are sustained.

13. SERVICE TO CLIENTS

13.1. Service to Clients

We value our client relationships and support these partnerships through the following principles:

- Honesty and Fairness – Our corporate culture is founded on the principles of professionalism and high ethical standards in dealing with our clients. This may mean declining to provide the service requested (if we are convinced that to do so would be meaningless) or it may mean referring clients outside of our Lab if we believe that another company can better meet their needs.

- Complete Service – We will give our clients full value on every service provided. We will provide detailed information on our methods, procedures, and QA programs if requested, and take a personal interest and initiative in helping solve our client's problems within the area of our professional expertise.

- Trustworthiness – All data and information developed for a client will be held confidential and not disclosed to a third party except on written request of the client. If information is subpoenaed, we must, by law, release it, but the client will be informed of the release.

  - Commitment to Quality – We constantly strive to improve our service in quality, flexibility, and dependability, to keep our competitive edge. We will achieve this through: meeting the requirements of those we serve, staying apprised of regulatory and industry expectations, and providing prompt responses to client concerns.

- Basics of Superlative Service – Our vision is to make our clients heroes. By choosing our attitude daily, taking pride and ownership in our work allows us to provide superlative service to our clients. These basics are how we will foster and promote a work environment that will set the bar for premier service in our industry.

  - Warmly greet clients and one another to create a friendly and fun work environment.

  - Approach our work and relationships with the focus on making a positive difference for our external and internal clients.

  - Anticipate our clients' needs and proactively provide outstanding service.

  - Strive for excellence in our work practices by always keeping in mind our goal of continuous improvement.

  - Own any problems that you become aware of and take personal responsibility for solving it or passing it on to someone who can.

We also view our fellow employees as our clients since they frequently receive the results of our labor. Meeting the requirements of the next employee in the workflow process is just as important as meeting the needs of an external client.

13.2. Review of Work Requests, Tenders, and Contracts

Lancaster Laboratories places great importance on understanding client requirements for a project. We ensure, to the best of our ability, that client/project requirements are identified, including accreditations held by the laboratory, inconsistencies clarified, and nonstandard work requests are discussed and addressed with both the client and the technical laboratories before the project is accepted and samples arrive. This can be achieved in various ways, including the review of analytical methods, protocols, business contracts, and quality agreements. Project kick-off meetings can also be arranged through the Business Development and/or the Environmental Project Management Group. These meetings allow the client and key technical personnel to discuss project issues and requirements prior to project initiation.

A key client contact will be assigned to oversee the project and review all results in a timely manner. Communication between the client and LL technical staff is available and is coordinated through the Environmental Project Management Group.

As a project continues, the Environmental Project Management Group provides continuous communication and status reports about the project to the client. This group will relay any project changes or modifications to the technical groups. They will also relay issues encountered by the technical laboratories back to the client.

13.3. Timely Delivery

Evaluating laboratory capacity and ability to perform specific projects is a joint responsibility between the Vice President of Technical Operations, Business Development, and the laboratory managers. We recognize that one of the most important aspects of the service we offer is turnaround time.

Many analysts are cross-trained to perform a variety of tests, and there is redundant equipment available in the laboratory area creating operation flexibility for routine work. Larger projects are reviewed against capacity estimates before bids are submitted to ensure that the client's schedule will be met. Turnaround time is continually measured.

Regularly scheduled meetings are held with senior management, technical and support management, and project management personnel to review progress with current projects, as well as special requirements of new work scheduled for the laboratory.

Management receives a daily report of the status of all samples in the lab, including a printout of those with priority status or those that have exceeded a preset turnaround time. This is of inestimable value in planning and organizing the workload through efficient scheduling.

Any changes to the established timeline by the client or the laboratory will be communicated to the client or laboratory as soon as possible. Upon communication of changes, a new timeline will be established and agreed upon by both parties. Should the client require a change in the scope of the project (e.g., number of samples submitted, change in analyses, revised protocol) the laboratory must be informed in writing and a new timeline and cost estimate will be provided.

Verified results are available by phone, fax, diskette, direct access (modem and password), or hardcopy report.

13.4. Subcontracting

Occasionally, Lancaster Laboratories subcontracts tests to other laboratories if the requested testing is not routinely performed in our laboratory or when backlog is high. Testing is only subcontracted with the client's knowledge and approval. Subcontract laboratories are selected based on their qualifications and review of their QA information. If tests require a specific agency certification, only another appropriately certified laboratory will be used.

Data obtained from subcontract laboratories is clearly marked as such when reported by Lancaster Laboratories.

13.5. Use of NELAC and A2LA logo

It is not laboratory policy to use these logos on any company letterhead, including analytical reports.

Lancaster Laboratories

Environmental Quality Policy Manual

Appendix A
Procedure Cross Reference List

Current as of January 16, 2008
4 Total Pages (including this coversheet)

Lancaster Laboratories, Inc. • 2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681

Lancaster Laboratories
2425 New Holland Pike • Lancaster, PA 17601

Procedure Cross Reference List

Section #	Title	Procedure(s)
1	Introduction	
1.1.	Vision Statement	Personnel Manual
1.2.	Mission Statement	Personnel Manual
1.3.	Quality Policy	Personnel Manual
1.4.	Statement of Values	Personnel Manual
1.6.	Certifications, Accreditations, and Registrations	Form 3501
2	Organization and Personnel	
2.2.	Organizational Structure	Organization Charts
2.3.	Management Responsibilities	Job Plan
2.4.	Overview of the Quality Assurance Program	SOP-QC-024
2.5.	Quality Assurance Responsibilities	SOP-QC-024 "QC" SOP Series
2.6.	Communication of Quality Issues to Management	SOP-QC-022 SOP-QC-025
2.7.	Personnel Qualifications and Responsibilities	LOM-SOP- ES-229 Job Plans Task Specific Training
2.8.	Relationship of Functional Groups and the Quality Assurance Program	Quality Orientation "QA" SOP series TQM Training Job Plans
2.9.	Balancing Laboratory Capacity and Workload	Job Plans
2.10.	Identification of Approved Signatories	LOM-SOP-ES-218
2.11.	Personnel Training	LOM-SOP-ES-229 Job Plans Task Specific Training
2.12.	Regulatory Training	LOM-SOP-LAB-204
2.13.	Employee Safety	Analytical Methods Chemical Hygiene Plan Policy #0010 "EHS"/"HS" SOP Series
2.14.	Client Services/Project Management Responsibilities	"CL" SOP Series
2.15.	Confidentiality	Personnel Manual LOM-SOP-LAB-205 SOP-QC-010 SOP-CL-005
2.16.	Business Conduct	Personnel Manual
2.17.	Operational Integrity	Policy #0001 Policy #0007 LOM-SOP-LAB-226 LOM-SOP-ES-232
3	Buildings and Facilities	
3.1.	Facility	Floor Plans
3.2.	Security	LOM-SOP-LAB-212
3.3.	Disaster Recovery	LOM-SOP-HS-212
3.4.	Environmental Monitoring	LOM-SOP-ES-205 LOM-SOP-ES-210
3.5.	Water Systems	LOM-SOP-LAB-214
3.6.	Housekeeping/Cleaning	LOM-SOP-LAB-221
3.7.	Insect & Rodent Control	LOM-SOP-LAB-213
3.8.	Emergency Power Supply	LOM-SOP-HS-212
3.9.	Facility Changes	LOM-SOP-LAB-209

Section #	Title	Procedure(s)
4	Document Control	
4.1.	Hierarchy of Internal Operating Procedures	LOM-SOP-LAB-201
4.2.	Document Approval, Issue, Control, and Maintenance	LOM-SOP-ES-226 LOM-SOP-LAB-202
4.3.	Client-Supplied Methods and Documentation	LOM-SOP-ES-221 SOP-QC-030 SOP-CL-007
4.4.	Laboratory Notebooks, Logbooks, and Forms	LOM-SOP-LAB-202 LOM-SOP-LAB-220
5	Sample Handling	
5.1.	Sample Collection	"FS" SOP Series SOP-TR-001 SOP-TR-003
5.2.	Sample Receipt and Entry	"SA" SOP Series
5.3.	Sample Identification and Tracking	"SA" SOP Series
5.4.	Sample Storage	"SS" SOP Series
5.5.	Sample Return/Disposal	LOM-SOP-HS-205 SOP-EHS-001 SOP-EHS-002
5.6.	Chain of Custody	LOM-SOP-ES-212
5.7.	Representativeness of Samples	Analytical Methods SOP-SS-009
6	Technical Requirements - Traceability of Measurements	
6.1.	Reagents and Solvents	LOM-SOP-ES-225 Analytical Methods
6.3.	Calibration Standards	LOM-SOP-ES-225 Analytical Methods
6.4.	Equipment and Instrumentation	LOM-SOP-ES-222 LOM-SOP-LAB-208 LOM-SOP-ES-208 Technical SOPs , MCs and OMCs
6.5.	Computerized Systems and Computer Software	LOM-SOP-LAB-206 LOM-SOP-ES-219 SOP-CS-031 Personnel Manual
6.6.	Change Control	LOM-SOP-VAL-205
6.7.	Labware Cleaning	Technical SOPs
7	Purchasing Equipment and Supplies	
7.1	Procurement	LOM-SOP-LAB-218 SOP-PU-005
7.2	Supplier Evaluation	LOM-SOP-LAB-218 LOM-SOP-ES-204
8	Analytical Methods	
8.1.	Scope of Testing	Schedule of Services
8.2.	Analytical Test Methods	LOM-SOP-ES-226
8.3.	Client Supplied Methods	LOM-SOP-ES-221
8.4.	Method Validation	LOM-SOP-ES-226
8.5.	Procedural Deviations	LOM-SOP-ES-230
9	Internal Quality Control Checks	
9.1.	Laboratory Quality Control Samples and Acceptance Criteria	LOM-SOP-ES-207 LOM-SOP-ES-213 Analytical Methods

Section #	Title	Procedure(s)
9.2.	Quality Control Sample Frequency and Corrective Action	LOM-SOP-ES-209 LOM-SOP-ES-213 Analytical Methods
9.3.	Quality Control Charts	LOM-SOP-ES-213
9.4.	Measurement Uncertainty	LOM-SOP-ES-207
10	Assuring Quality of Test Results	
10.1.	Data Management	LOM-SOP-LAB-220
10.2.	Data Documentation	LOM-SOP-LAB-220 LOM-SOP-ES-224
10.3.	Data Calculations	LOM-SOP-ES-224 Analytical Methods
10.4.	Reporting Limits	LOM-SOP-ES-203
10.5.	Data Review	LOM-SOP-LAB-220 LOM-SOP-ES-218 LOM-SOP-ES-224
10.6.	Data Qualification	LOM-SOP-ES-209
10.7.	Data Reporting	LOM-SOP-ES-218 LOM-SOP-ES-224 LOM-SOP-ES-227
10.8.	Reporting Data from Subcontract Laboratories	LOM-SOP-ES-215
10.9.	Data Storage, Security, and Archival	LOM-SOP-LAB-203
10.10.	Investigation of Nonconforming Work	LOM-SOP-ES-218 LOM-SOP-ES-230 LOM-SOP-ES-231
11	Audits and Inspections	
11.1.	Internal Quality Assurance Audits	SOP-QC-006 SOP-QC-021 SOP-QC-032
11.2.	Review of the Quality Assurance Program	SOP-QC-022 SOP-QC-025
11.3.	Good Laboratory Practice Critical Phase Inspections	SOP-QC-032
11.4.	Client Audits	Personnel Manual SOP-QC-010
11.5.	Agency Inspections	Personnel Manual SOP-QC-008
11.6.	Proficiency Testing	LOM-SOP-ES-216 LOM-SOP-ES-223 SOP-QC-003 SOP-QC-007
12	Corrective and Preventive Action	
12.1.	Laboratory Investigations and Corrective Action	LOM-SOP-ES-209 LOM-SOP-ES-230 LOM-SOP-ES-231
12.2.	Investigation Processes	LOM-SOP-ES-223 LOM-SOP-ES-230
12.3.	Client Technical Complaints	LOM-SOP-ES-231
12.4.	Preventive Actions	Corporate Training
13	Service to Clients	
13.1.	Service to Clients	Personnel Manual TQM Training
13.2.	Review of Work Requests, Tenders, and Contracts	SOP-QC-030 SOP-CL-007
13.3.	Timely Delivery	SOP-CL-005 SOP-CL-010 TAT Tracking Report
13.4.	Subcontracting	LOM-SOP-ES-215 SOP-QC-023

Lancaster Laboratories

Environmental Quality Policy Manual

Appendix B

Certifications, Accreditation, Registrations, and Contracts

Current as of January 16, 2008
3 Total Pages (including this coversheet)

Lancaster Laboratories
2425 New Holland Pike • Lancaster, PA 17601

Certifications, Accreditations, Registrations, and Contracts

Agency	Parameter	Applicable Matrices	Lab ID No. Certificate No.
Federal Programs:			
American Association for Laboratory Accreditation (A2LA)	Various testing technologies in the environmental field using EPA methods, client specific methods, ISO 17025	Nonpotable water, solid and hazardous waste, tobacco	0001.01
Environmental Protection Agency Contract Laboratory Program	Our contract for full organics with the EPA CLP has expired.	When our contract expired, we were in good standing with the EPA.	
U.S. Air Force (AFCEE)	Organics, inorganics	Project specific – Initiated by client request	None
U.S. Army Corps of Engineers, Missouri River Division	Organics, inorganics	Project specific – Initiated by client request	None
U.S. Navy (NFESC)	Organics, inorganics	Project specific – Initiated by client request	None
USDA Quarantine Soil Permit	All	All	S-50452
State Programs:			
State of Alabama, Department of Environmental Management	Organics, inorganics	Potable water	41080
State of Alaska, Department of Environmental Conservation	Organics, inorganics, UST analysis	Nonpotable water, solid and hazardous waste	UST-061
State of Arkansas, Department of Environmental Quality	Organics, inorganics	Nonpotable water, solid and hazardous waste	88-0660
State of California ELAP	Organics, inorganics	Potable water, nonpotable water, solid and hazardous waste	2501
State of Colorado, Department of Health	Organics, inorganics	Potable water	None
State of Connecticut, Department of Public Health	Organics, inorganics	Potable water, nonpotable water, solid and hazardous waste	PH-0746
[1] State of Delaware, Health and Social Services	Organics, inorganics, micro	Potable water	PA009
[2] State of Florida, Department of Health	Organics, inorganics	Potable water, nonpotable water, solid and hazardous waste, air, and emissions	E87997
State of Georgia, Department of Natural Resources	Organics, inorganics	Potable water	930
[3] State of Illinois, Environmental Protection Agency	Organics, inorganics	Nonpotable water, solid and hazardous waste	200027
State of Indiana, Department of Health	Organics, inorganics	Potable water	None
State of Iowa, Department of Natural Resources	Organics, inorganics, UST analysis	Nonpotable water, solid and hazardous waste	361
[3] State of Kansas, Department of Health and Environment	Organics, inorganics	Potable water, nonpotable water	E-10151
[4] State of Kentucky, Division of Environmental Services	Organics, inorganics	Potable water	90088
[3] State of Louisiana, Department of Environmental Quality	Organics, inorganics	Nonpotable water, air and emissions	02055

[1] Effective January 22, 2002: The State of Delaware does not maintain a registry of laboratory certification for out of state laboratories. Proof of home state certification is required for laboratories analyzing samples.

[2] NELAP Primary AA: CWA, RCRA, CAA

[3] NELAP Secondary AA

[4] Approval for UST work by A2LA

Certifications, Accreditations, Registrations, and Contracts

State of Maryland, Department of the Environment	Organics, inorganics, micro	Potable water	100
Commonwealth of Massachusetts, Department of Environmental Protection	Organics, inorganics	Potable water, nonpotable water	M-PA009
State of Michigan, Department of Public Health	Organics, inorganics,	Potable water	9930
State of Mississippi, Department of Heath	Organics, inorganics	Potable water	None
State of Missouri, Department of Natural Resources	Organics, inorganics	Potable water	450
State of Montana, Department of Environmental Quality	UST analysis	Nonpotable water, solid and hazardous waste	None
[3] State of Nevada, Division of Environmental Protection	Organics, inorganics	Nonpotable water, solid and hazardous waste	PA9
[3] State of New Hampshire, Department of Environmental Services	Organics, inorganics	Potable water, nonpotable water	2730
[3] State of New Jersey, Department of Environmental Protection (NJDEP)	Organics, inorganics, micro	Potable water, solid and hazardous waste, air and emissions	PA011
[3] State of New York, Department of Health	Organics, inorganics	Nonpotable water, potable water, solid and hazardous waste, air and emissions, Analytical Services Protocol	10670
State of North Carolina, Department of Health and Natural Resources,	Organics, inorganics	Nonpotable water	521
North Carolina, Department of Health and Human Services	Volatile Organic Chemicals	Potable water	42705
State of Ohio, Environmental Protection Agency (Voluntary Action Program)	Organics, inorganics, UST analysis	Nonpotable water, solid and hazardous waste	CL0070
State of Oklahoma, Department of Environmental Quality	Organics, inorganics	Nonpotable water, solid and hazardous waste	9804
[3] State of Oregon, Public Health Laboratory	Organics, inorganics	Nonpotable water, solid and hazardous waste	PA-200-001
[2] Commonwealth of Pennsylvania, Department of Environmental Protection (Bureau of Laboratories)	Organics, inorganics	Potable water	36-00037
State of Rhode Island, Department of Health Laboratory	Organics, inorganics	Potable water, nonpotable water	159
State of South Carolina, Department of Health and Environmental Control	Organics, inorganics	Potable water, nonpotable water, solid and hazardous waste	89002
State of Tennessee, Department of Health	Organics, inorganics	Potable water	TN02838
State of Texas, Commission on Environmental Quality	Organics, inorganics	Potable water, nonpotable water, solid and hazardous waste, air and emissions	TX263-2002A
[3] State of Utah, Department of Health	Organics, inorganics	Solid and hazardous waste	None
State of Vermont, Department of Health Laboratory	Organics, inorganics	Potable water	VT 36-037
Commonwealth of Virginia, Department of General Services	Organics, inorganics	Potable water	00187
State of Washington, Department of Ecology	Wet chem, metals, organics, inorganics	Nonpotable water, solid and hazardous waste, air and emissions	C574
State of West Virginia, Department of Health	Organics, inorganics	Potable water	9906C
State of West Virginia, Division of Environmental Protection	Organics, inorganics	Nonpotable water	055
State of Wisconsin, Department of Natural Resources	Organics, inorganics	Nonpotable water, solid and hazardous waste	EN748

NOTE: This list accurately reflects the certifications, accreditations, registrations, and contracts held at the time of publication and is subject to change. Check with your account manager on the status of any certification needed for a specific project.

Lancaster Laboratories

Environmental Quality Policy Manual

Appendix C
Organizational Charts
Personnel to Sign Reports

Current as of January 22, 2008
10 Total Pages (including this coversheet)

Lancaster Laboratories, Inc. • 2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681

Lancaster Laboratories
2425 New Holland Pike • Lancaster, PA 17601

Name	Degree	Title
CORPORATE SERVICES		
J. Wilson Hershey	Ph.D.	President
Quality Assurance		
Kathleen Loewen	B.S.	Quality Assurance Officer
Dorothy Love*	B.S.	Principal Specialist Group Leader
Amy Doupe	B.S.	Senior Specialist
Tara McNamara	B.S.	Specialist
Barbara Reedy*	B.S.	Senior Specialist
Tracie Williams*	B.S.	Specialist
ENVIRONMENTAL SCIENCES		
Timothy Oostdyk	Ph.D.	Executive Vice President Chief Operating Officer
Donald Wyand	B.S.	Director
Charles Bagi	B.S.	Principal Specialist
Michael Kramer	B.A.	Senior Specialist
Kevin Moran	M.B.A.	Senior Specialist
Client Services/Business Development		
Robert Large	B.S.	Director
Teresa Cunningham	B.S.	Manager
Wendy Kozma	B.S.	Principal Specialist Group Leader
Lynn Frederiksen	B.S.	Senior Specialist Group Leader
Nicole Maljovec	M.S.	Senior Specialist Group Leader
Gwen Birchall	B.S.	Senior Specialist
Nancy Bornholm	B.S.	Principal Specialist
Marianne Bragg	B.S.	Principal Specialist
Loran Amek Carter	B.S.	Specialist
Irene Lynn Dodd	M.S.	Principal Specialist
Richard Entz	B.A.	Principal Specialist
Jessica Heun	B.S.	Specialist
Katherine Klinefelter	M.S.	Principal Specialist
Natalie Luciano	B.A.	Specialist
Melissa McDermott	B.A.	Senior Specialist
Angela Miller	B.S.	Specialist
Megan Moeller	B.S.	Senior Specialist
Jessica Rudy	B.S.	Specialist
Tara Spaide		Senior Specialist
Barbara Weyandt	M.S.	Specialist
Deanna Wyand	B.S.	Specialist
Additional support personnel in this group: 3		
Data Deliverables		
Michele Turner	B.A.	Director
Dana Kauffman		Manager
F. Bradley Ayars		Senior Specialist Group Leader
Lietta Milton		Senior Specialist Group Leader
Luz Torres		Senior Specialist Group Leader
Jessica Baron		Specialist
Judy Brown		Specialist
Catherine Cammauf		Specialist
Kathy Fair		Specialist
Ginelle Feister		Specialist
M. Susan Kreider		Senior Specialist

Lancaster Laboratories
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Name	Degree	Title
Suzette Lehman		Specialist
Raymond Longacre		Specialist
Patricia Madrigal-Kauffman	A.S.	Specialist
Sherry Maurer		Senior Specialist
Audrey McClune		Specialist
Betsy Menefee	B.S.	Senior Specialist
Sandra Miller		Specialist
Tracy Pang-Ward		Specialist
Grace Salm		Specialist
Nancy Saunders	B.S.	Specialist
Elizabeth Smith	B.S.	Specialist
Lydia Steinke	B.S.	Specialist
Christiane Sweigart	B.S.	Senior Specialist
Michelle Tuel	B.S.	Specialist
Betty Umble		Specialist
Karen Williams		Specialist
Additional support personnel in this group: 9		
Bay Area Service Center		
Robert Large	B.S.	Director
Elizabeth Leonhardt	M.S.	Senior Specialist Group Leader
Andres Amaya		Specialist
Kay Sorg	B.S.	Specialist
Additional support personnel in this group: 2		
Environmental Microbiology		
Mark Kaiser		Director
Harolyn Clow	M.S.	Manager
Jeff Groff*	B.S.	Microbiologist Group Leader
Diane Lockard*		Principal Microbiologist Group Leader
Adam Black	B.S.	Microbiologist
Hanna Cottman	B.S.	Microbiologist
Martha Helwig	B.S.	Microbiologist
Keith Hoover*	B.S.	Microbiologist
Amy MacKay	B.S.	Senior Microbiologist
Lindsay McClure	B.S.	Microbiologist
Marlaina Raines		Microbiologist
Kimberly Small	B.A.	Senior Microbiologist
Extractable Petroleum Hydrocarbons (EPH)/Miscellaneous GC		
Duane Luckenbill	B.S.	Director
Jenifer Hess*	B.S.	Manager
Robert Brown		Principal Chemist Group Leader
Susan Goshert*	B.S.	Senior Specialist Group Leader
Matthew Barton	B.S.	Senior Chemist
Tracy Cole		Chemist
Diane Do	B.S.	Chemist
Gordon Lodde	B.S.	Senior Chemist
John Polson	B.S.	Chemist
Heather Williams	B.S.	Chemist
Additional support personnel in this group: 1		
Field Sampling		
Duane Luckenbill	B.S.	Director

Name	Degree	Title
Samuel Huber*	B.S.	Manager
Jeffrey Allen		Specialist Group Leader
Timothy Hauck		Specialist
Flexible Staffing		
Kimberly Davies	M.B.A.	Manager
Nicole Bomberger	B.A.	Chemist
Florida Cimino	B.S.	Chemist
Barton Conner	B.S.	Chemist
Sara Knaub	B.S.	Microbiologist
Michael Kochan	B.S.	Chemist
David Landis	B.S.	Microbiologist
Tiffany Myers	A.S.B.	Specialist
Hai Nguyen	B.S.	Chemist
Stacie Powroznik	B.S.	Chemist
Douglas Seitz	B.S.	Senior Chemist
Brian Veety	B.S.	Chemist
Sara Wolf	B.S.	Chemist
Additional support personnel in this group: 4		
GC/MS Semivolatiles		
Duane Luckenbill	B.S.	Director
Richard Karam*	B.S.	Manager
Rachel Cochis*	B.A.	Senior Specialist Group Leader
Chad Moline*	B.S.	Senior Chemist Group Leader
Michele Smith*	B.S.	Senior Specialist Group Leader
Ryan Byrne	B.S.	Senior Chemist
Mark Clark	B.S.	Principal Chemist
Gregory Drahovsky	B.S.	Chemist
Joseph Gambler	B.S.	Senior Chemist
Brian Graham	B.A.	Senior Chemist
Linda Hartenstine	B.A.	Senior Chemist
George Main	B.S.	Principal Chemist
William Parker	B.S.	Chemist
Christine Ratcliff	B.S.	Senior Specialist
Mark Ratcliff	B.A.	Senior Specialist
Andrew Strebel		Principal Chemist
Timothy Trees	A.S.	Principal Chemist
Barbara B. Weaver	B.S.	Senior Specialist
GC/MS Volatiles		
Duane Luckenbill	B.S.	Director
Marc Neal	B.S.	Manager
Roy Mellott	B.S.	Senior Chemist Group Leader
Ryan Nolt	B.S.	Principal Chemist Group Leader
Holly Berry	B.S.	Chemist
Kenneth Boley	B.S.	Senior Chemist
Kelly Brickley		Chemist
Paul Cormier	B.A.	Principal Specialist
Anita Dale		Chemist
Christine Dulaney*	B.S.	Senior Specialist
Chelsea Eastep	B.S.	Chemist
Dawn Harle	B.S.	Chemist

Lancaster Laboratories
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Name	Degree	Title
Daniel Heller	B.S.E.	Chemist
Emiley King	B.A.	Chemist
Kerri Koch	B.S.	Chemist
Jason Long	B.S.	Senior Chemist
Marla Lord*	B.S.	Senior Specialist
Lauren Marzario	B.S.	Senior Chemist
John Morton	M.S.	Principal Specialist
Kathrine Muramatsu	B.S.	Chemist
Matthew Regan	B.S.	Chemist
Richard Rodgers	B.S.	Principal Specialist
Nicholas Rossi	B.S.	Chemist
Robin Runkle*	B.S.	Senior Specialist
Stephanie Selis	B.S.	Senior Chemist
Angela Sneeringer	B.S.	Chemist
Lawrence Taylor*	B.S.	Senior Specialist
Abraham Uysal	M.E.	Senior Specialist
Matthew Woods	B.S.	Chemist
Michael Ziegler	B.S.	Chemist
Additional support personnel in this group: 3		
Instrumental Water Quality		
Michele Turner	B.A.	Director
Erik Frederiksen*	B.A.	Manager
Tonya Beck*		Senior Chemist Group Leader
William Hamaker		Chemist
Ashley Heckman	B.S.	Chemist
Nicole Kepley		Senior Chemist
Additional support personnel in this group: 4		
Metals		
Michele Turner	B.A.	Director
Robert Strocko*	B.S.	Manager
Debra Bryan		Specialist Group Leader
Nina Haller*		Senior Specialist Group Leader
David Beck	B.S.	Chemist
Eric Eby	B.S.	Senior Chemist
John Hook	B.S.	Senior Chemist
Deborah Krady	B.S.	Specialist
Parker Lindstrom*	B.S.	Senior Chemist
Nelli Markaryan	B.S.	Chemist
Thomas McLamb	B.S.	Chemist
Jennifer Moyer	B.S.	Senior Specialist
Julie Slaughenhoupt*	B.S.	Senior Specialist
Max Snavely*	B.S.	Senior Specialist
Tara Snyder	B.S.	Chemist
Damary Valentin		Chemist
James Williams	B.S.	Chemist
Additional support personnel in this group: 6		
Nitrosamines		
Duane Luckenbill	B.S.	Director
Jenifer Hess*	B.S.	Manager
John Perkins		Chemist

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Name	Degree	Title
Organic Extraction		
Duane Luckenbill	B.S.	Director
Richard Karam*	B.S.	Manager
Wanda Oswald		Chemist Group Leader
Joseph Feister		Chemist Group Leader
David Hershey		Chemist Group Leader
Maria Davenport		Chemist
Kerrie Freeburn	B.S.	Chemist
Heidi Ortenzi	B.S.	Senior Chemist
Elaine Stoltzfus		Chemist
Robert Vincent	B.S.	Senior Chemist
Darin Wagner	B.A.	Chemist
Deborah Zimmerman		Chemist
Additional support personnel in this group: 26		
Pesticide Residue Analysis		
Duane Luckenbill	B.S.	Director
Jenifer Hess*	B.S.	Manager
Michele Hamilton*	B.S.	Senior Chemist Group Leader
Jamie Brillhart	B.S.	Chemist
Andrea Covey	B.S.	Chemist
Candice Hibberd	B.S.	Chemist
Lindsey Lafferty	B.S.	Chemist
Mark McNulty	B.S.	Chemist
James Place	B.S.	Chemist
Richard Shober	B.S.	Principal Chemist
Sarah Snyder	B.A.	Specialist
Additional support personnel in this group: 1		
Specialty Services Group		
Duane Luckenbill	B.S.	Director
Charles Neslund*	B.S.	Manager
Jia Wang	Ph.D.	Principal Chemist
Volatiles by GC		
Duane Luckenbill	B.S.	Director
Jenifer Hess*	B.S.	Manager
Valerie Tomayko*	B.S.	Senior Specialist Group Leader
K. Robert Caulfeild-James	M.S.	Chemist
Robin Cheal	B.S.	Chemist
Patrick Evans	B.S.	Chemist
Marie John	B.S.	Chemist
Linda Pape	B.A.	Senior Chemist
Martha Seidel*	B.S.	Senior Chemist
Steven Skiles*	B.S.	Senior Chemist
Carrie Youtzy	B.S.	Chemist
Volatiles in Air		
Duane Luckenbill	B.S.	Director
Charles Neslund*	B.S.	Manager
Jeffrey Smith	B.A.	Senior Chemist Group Leader
Jonathan Nardelli		Senior Chemist
David Ressler		Chemist
Fanella Zamcho	M.S.	Chemist

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Name	Degree	Title
Water Quality		
Michele Turner	B.A.	Director
Erik Frederiksen*	B.A.	Manager
Kenneth Bell*	B.S.	Senior Chemist Group Leader
Susan Engle		Chemist
Michele Graham	B.S.	Chemist
Robert Heisey*	B.A.	Senior Specialist
Susan Hibner	B.S.	Chemist
Michelle Lalli		Chemist
Additional support personnel in this group: 8		
Accounting & Finance		
Thomas Wolgemuth	M.B.A.	Executive Vice President Chief Financial Officer
Susan Guarducci	B.S.	Manager
Jeffrey Cooper	A.S.B.	Specialist
Lindsay Fisher	B.S.	Specialist
Marjorie Hollinger		Senior Specialist
Tammy Robinson	B.B.A.	Senior Specialist
Administration		
Katiria Agosto		Specialist
Gerry Hershey		Principal Specialist
Billing & Reporting		
Beatrice Stauffer*		Manager
Adrienne Kuhl*		Specialist Group Leader
Jaime Ferguson	A.S.	Senior Specialist
Shirley Habalar		Specialist
Jacqueline Miller		Specialist
Victoria Zacharias		Specialist
Additional support personnel in this group: 6		
Computer Applications Development		
Art Pezzica	B.A.	Director
Cynthia Ayars	M.B.A.	Manager
Gordon Beitzel	B.S.	Manager
Holly Trego	B.S.	Manager
Chadwick Hershey	B.S.	Senior Specialist
Tiffany Betz	B.S.	Senior Specialist
Catherine Holt	B.S.	Principal Specialist
Kevin Lasher	B.S.	Senior Specialist
S. Scott Paist	B.A.	Specialist
Justin Risser	B.S.	Senior Specialist
Harry Thompson	B.A.	Senior Specialist
Timothy Weaver	B.A.	Specialist
Andy Whang	B.S.	Senior Specialist
Thomas Wise	B.S.	Principal Specialist
Jon Wright	B.S.	Principal Specialist
Computer Systems		
Art Pezzica	B.A.	Director
Mary Thiers	B.S.	Senior Specialist Group Leader
Shawn Beamenderfer	B.S.	Specialist
James Butler	A.S.B.	Specialist
Lee Seats	M.B.A.	Principal Specialist

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Name	Degree	Title
Susan Shorter	B.S.	Senior Specialist
Destry Usner	B.S.	Senior Specialist
Edward Zeigler	A.A	Senior Specialist
Additional support personnel in this group: 1		
Environmental Sample Administration		
Anneliese Owen	M.B.A.	Manager
Deborah Neslund		Senior Specialist Group Leader
Carolyn Cyms	B.S.	Senior Specialist Group Leader
Traci Bedard	B.S.	Specialist
Tamara Helsel		Senior Specialist
Linda Kauffman		Specialist
Christine Knoedler	B.A.	Specialist
Mary Beth Reed	B.S.	Specialist
Russell Sturnick	B.S.	Senior Specialist
Kristin Zeigler	B.S.	Specialist
Additional support personnel in this group: 6		
Equipment Maintenance & Repair		
Samuel Huber	B.S.	Manager
Robert Allison		Specialist
Human Resources		
Beth DiPaolo	B.S.	Director
Margaret Stoltzfus		Director
Robert Schindewolf	B.A.	Senior Specialist Group Leader
Cindy Weiser		Senior Specialist Group Leader
Jill Andes	B.S.	Specialist
Jeanette Beisel		Principal Specialist
Dewey Brown	B.S.	Senior Specialist
Matthew Gehman	B.S.	Senior Specialist
Jodi Ho	B.A.	Senior Specialist
Melanie Nixon-Stillman	B.A.	Specialist
Beth Rich		Specialist
Corporate Training		
Beth DiPaolo	B.S.	Director
Kimberly Davies	M.B.A.	Manager
Dennis Urban	M.S.	Principal Specialist
Harry Ward	Ph.D.	Senior Specialist
Barbara Weaver	M.S.	Principal Specialist
Marketing & Communication Services		
Margaret Stoltzfus		Director
Lisa Allison	A.A	Principal Specialist
Lisa Bamford	B.S.	Principal Specialist
Office Services		
Denise Splain		Manager
Dana Defibaugh	A.S.	Specialist Group Leader
April Pietsch		Senior Specialist Group Leader
Nancy Broderick		Specialist
Maureen Caputo	A.S.	Specialist
Carol Martin		Specialist
Lee Ann Ressler		Specialist
Jazzire Sierra	A.A.S.	Specialist

Name	Degree	Title
Jean Sroka		Specialist
Tracey Steffy		Specialist
Mary Stem		Specialist
Michele White		Specialist
Additional support personnel in this group: 3		
Physical Services		
Samuel Huber	B.S.	Manager
Gerald Clipper		Principal Specialist Group Leader
Barry Gehman		Senior Specialist Group Leader
Warren Hamilton		Specialist Group Leader
Robert Hufford		Principal Specialist Group Leader
Mark Allison		Specialist
Robert Bishop		Specialist
Traci Bowman		Specialist
Chad Ferguson		Specialist
Richard Gingrich		Specialist
Kenneth Grumbling		Specialist
Edward Huegel		Specialist
Ronald Hufford		Specialist
Thomas Koller		Specialist
Ronald Reed		Specialist
David Splain		Specialist
David Washington		Specialist
Additional support personnel in this group: 4		
Purchasing		
Thomas Wolgemuth	M.B.A.	Executive Vice President Chief Financial Officer
Charles Kurtz		Senior Specialist Group Leader
Thomas Dull	A.S.	Senior Specialist
Adam Huegel		Specialist
Lester Metzger		Specialist
Sample Bottles		
Steven Davies	B.S.	Manager
Jeffrey Moyer	B.S.	Senior Specialist Group Leader
Theresa Carlson	A.S.	Specialist
Karen Guito		Specialist
Sandra Muckle		Specialist
Additional support personnel in this group: 1		
Sample Support		
Michele Turner	B.A.	Director
Dana Kauffman*		Manager
Lisa Cooke		Specialist Group Leader
Chad Wettig		Specialist Group Leader
Stephanie Sanchez		Chemist
Additional support personnel in this group: 12		
Transportation		
Steven Davies	B.S.	Manager
Erma Dillman		Specialist
Gilbert Kauffman		Specialist
Tony Luque		Specialist
Marvin McGallicher		Specialist

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Name	Degree	Title
L. Kenneth Miller		Specialist
Timothy Miller		Specialist
Christopher Winters		Specialist
Leon Wolf		Specialist On-Call
Additional support personnel in this group: 11		

*Denotes those employees that sign reports for Environmental Sciences.

Lancaster Laboratories

Environmental Quality Policy Manual

Appendix D
Personnel Qualifications and Responsibilities

Current as of January 22, 2008
47 Total Pages (including this coversheet)

Lancaster Laboratories, Inc. • 2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681

Brad Ayars, Senior Specialist Group Leader, Electronic Data Deliverables, Environmental Sciences

Continuing Education:

Environmental Law & Policy, Franklin & Marshall College (1991)

Professional Experience:

With Lancaster Laboratories since 1988
- Client Services Specialist (1992)
- Environmental Project Management (1994)
- Senior Specialist/Coordinator, Electronic Data Deliverables (1997)
  - Responsibilities included: supervise EDD staff; develop and maintain EDD formats; overcheck lab data for EDDs; primary contact for EDD issues.
- Senior Specialist Group Leader, Electronic Data Deliverables (2005)
  - Responsibilities include: supervise EDD staff; develop and maintain EDD formats; overcheck lab data for EDDs; primary contact for EDD issues.

Charles Bagi, B.S., Principal Specialist, Environmental Business Development/Sales, Environmental Sciences

Education:

B.S. Chemistry, Oakland University (1987)

Continuing Education:

ITS/MS Interpretation, Finnigan-MAT Institute (1990)
Computer Air Dispersion Modeling, USEPA APTI (1996)
ISO 14001, Lead Env. Management System Auditor (1997)
High Resolution GC/MS Dioxins and Furans (2002)
Certified Erosion Control Lead (CECL) - WA (2007)

Professional Experience:

Testing Engineers and Consultants, Laboratory Scientist/Project Manager (1987-1989)
Midwest Analytical Services, Lead Chemist (1989-1990)
City Environmental, Senior Chemist (1990-1991)
Sterling Environmental Analytical Laboratory, Laboratory Director (1991-1994)
Pinnacle Consulting Group, Technical/Sales/Marketing Director (1994-2006)
Clear Creek Systems, Northwest Branch Manager (2006-2007)
With Lancaster Laboratories since 2007
- Principal Specialist, Environmental Business Development/Sales (2007)
  - Responsibilities include developing long-term, mutually beneficial relationships with new and existing clients; monitoring clients' project status and level of satisfaction; presenting Lancaster Labs' capabilities through formal presentations and personal account visits to current and prospective clients within assigned geographic territory; maintaining and communicating knowledge of regulatory issues, analytical methodology, and industry requirements to new and existing clients; preparing proposals and quotations for clients and assisting project planning for many accounts

Awards, Citations, Honorary Societies, and Publications:

Environmental impact reduction award for solvent reclamation system (1989)
Presentations:
How Laboratory Data Impacts Regulatory Compliance, AWMA
Clean Air Act Amendments and Industry, guest speaker on Detroit radio
Publication:
The Economics of Waste, *Corporate Detroit* magazine

Memberships and Appointments:

National Groundwater Association (2007-present)

Matthew Barton, B.S., Senior Chemist, EPH/Misc. GC, Environmental Sciences

Education:

B.S. Biochemistry, East Stroudsburg University (1991)

Professional Experience:

With Lancaster Laboratories since 1991
- Senior Chemist (1998)
- Senior Chemist/Coordinator (1999)
  - Responsibilities included: supervise personnel; schedule lab work; perform purge and trap gas chromatography testing; operate O.I. 4560/4551, Tekmar 3000, Archon 5100, and HP5890 Series II OC instruments; review and approve data; and developing and evaluating new methods.
- Senior Chemist, Nitrosamines (2004)
  - Responsibilities included: Analysis of nitrites in tobacco samples

Senior Chemist, EPH/Misc. GC (2005)
Responsibilities include: Analysis of environmental samples for diesel range organics via gas chromatography

Tonya Beck, B.S., Senior Chemist Group Leader, Instrumental Water Quality, Environmental Sciences

Education:

B.S. Environmental Science, Millersville University (1994)

Professional Experience:

With Lancaster Laboratories since 1990
Chemist Coordinator (1996)
Senior Chemist Coordinator (1997)
Responsibilities included: supervise personnel; schedule lab work; manage laboratory operations; review and approve data; and revise and update analytical methods.
Senior Chemist Group Leader (2005)
Responsibilities include: supervise personnel; schedule lab work; manage laboratory operations; review and approve data; and revise and update analytical methods.

Kenneth A. Bell, B.S., Senior Chemist Group Leader, Water Quality, Environmental Sciences

Education:

B.S. Chemistry, Millersville University (1997)

Professional Experience:

Johnsons Chemical, Laboratory Assistant (1989-1992)
Responsibilities included collecting samples and performing testing on raw material.
With Lancaster Laboratories since 1994
Senior Laboratory Technician, Water Quality (1994)
Responsibilities included routinely performing analytical testing using wet chemistry methods.
Chemist/Coordinator, Water Quality (1994)
Responsibilities included performing wet chemistry analyses, sample verification, and coordinating workflow within this department.
Senior Chemist/Coordinator, Water Quality (1994)
Responsibilities included coordinating workflow within the department, performing sample verification, back-up report signing, training new employees, revising standard operating procedures, writing annual job plans and reviews.
Senior Chemist Group Leader, Water Quality (2005)
Responsibilities include coordinating workflow within the department, performing sample verification, back-up report signing, training new employees, revising standard operating procedures, writing annual job plans and reviews.

Gwen A. Birchall, B.S., Senior Specialist, Environmental Client Services, Environmental Sciences

Education:

B.S. Geoenvironmental Studies, Shippensburg University (1996)

Continuing Education:

How to Deliver Exceptional Customer Service, Fred Pryor Seminars (1999)

Professional Experience:

Applause Productions, Associate (1997)
Responsibilities included helping to plan and organize special events; fundraising
Dave Loose Design, Executive Assistant (1997-1998)
Responsibilities included light bookkeeping; office management; greeting of clients; assisting designers
With Lancaster Laboratories since 1998
Specialist, Environmental Client Services (1998)
Responsibilities included acting as liaison between client and labs; preparing quotations for clients; scheduling bottle orders and pick ups; coordinating special requirement projects with technical departments; auditing client paperwork for new work received; reporting results to clients by phone or fax; investigating client concerns and work with lab personnel to solve these problems
Specialist, Data Deliverables (2001)
Responsibilities included tracking and prioritizing scheduled EDDs; generating/sending EDDs; overchecking/editing of EDDs to ensure quality and accuracy; file management of EDDs; working with technical groups and client services in identifying, communicating, and resolving EDD/data issues; meeting and/or speaking with clients regarding EDD concerns
Specialist, Environmental Client Services (2005)
Responsibilities included acting as liaison between client and labs; preparing quotations for clients; generating bottle orders and sample setup forms for incoming work; scheduling sample pick ups; understanding and coordinating client requirements, working with technical and support groups to meet them; auditing client paperwork for new work received; reporting results to clients by phone or fax; investigating client concerns and working with lab personnel to solve these problems; participating in client visits/audits as requested

Senior Specialist, Environmental Client Services (2007)

Responsibilities include acting as liaison between client and labs; preparing quotations for clients; generating bottle orders and sample setup forms for incoming work; scheduling sample pick ups; understanding and coordinating client requirements, working with technical and support groups to meet them; auditing client paperwork for new work received; reporting results to clients by phone or fax; investigating client concerns and working with lab personnel to solve these problems; participating in client visits/audits as requested; providing assistance to junior team members as needed

Kenneth Boley, Jr., B.S., Senior Chemist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Chemistry, Messiah College (1995)

Professional Experience:

Heritage Custom Kitchens, Inc., Face Frame Assembler (1997–2001)

Responsibilities included read and interpret job orders; oversee daily production of department; perform various manufacturing duties daily; member of the safety committee, first aid team, and security team.

With Lancaster Laboratories since 2001

Chemist, GC/MS Volatiles (2001)

Responsibilities included analyze samples and QC by purge and trap GC/MS; generate and review raw data; perform maintenance on GC/MS, purge and traps, and various autosamplers; follow methods and SOPs.

Senior Chemist, GC/MS Volatiles (2005)

Responsibilities perform routine and non-routine analyses; diagnose and solve technical problems; maintain and troubleshoot instrumentation; write and revise SOPs; train new analysts.

Nancy Bornholm, B.S., Principal Specialist, Environmental Client Services, Environmental Sciences

Education:

B.S. Chemistry (magna cum laude), Muhlenberg College (1981)

Continuing Education:

Instrumental Analysis of Paints and Polymers, FBI Academy (1984)
Analytical Chemistry of Contaminants in Surface and Groundwater, ACS Short Course (1986)

Professional Experience:

University of Connecticut Health Center, Laboratory Technician (1977-1980)
Institute for Cancer Research, Research Technician (1981)
Baltimore City Crime Laboratory, Mobile Crime Unit Trainee (1981-1982)
Maryland State Police Crime Laboratory, Forensic Chemist III (1982-1985)
With Lancaster Laboratories since 1985

Senior Specialist (1987)

Responsibilities included: project management; audit sample entries; answer client questions; communicate client requirements to lab areas; and schedule sample submissions and provide sampling containers.

Principal Specialist (2004)

Responsibilities include: project management; audit sample entries; answer client questions; communicate client requirements to lab areas; and schedule sample submissions and provide sampling containers.

Marianne Bragg, B.S., Principal Specialist, Environmental Business Development, Environmental Sciences

Education:

B.S. Biology, Millersville University (1987)

Professional Experience:

With Lancaster Laboratories since 1985

Coordinator
Group Leader (1990)
Principal Specialist (1994)

Responsibilities included: advise clients on testing; provide price quotes and proposals; answer client questions; schedule sample submissions and provide sampling containers; communicate client requirements to lab areas; and assist with client visits to the lab.

Principal Specialist/Coordinator, Environmental Business Development (2002)

In addition to the responsibilities listed above, manage workload and workflow among business development staff.

Principal Specialist/Group Leader, Environmental Business Development (2005)

In addition to the responsibilities listed above, manage workload and workflow among business development staff.

Principal Specialist, Environmental Business Development (2007)

Responsibilities include: advise clients on testing; provide price quotes and proposals; answer client questions; schedule sample submissions and provide sampling containers; communicate client requirements to lab areas; and assist with client visits to the lab.

Robert Brown, Principal Chemist Group Leader, EPH/Misc. GC, Environmental Sciences

Education:

Attended 2.5 years at Pennsylvania State University towards B.S. in Microbiology (1988)
Completed 20 credits towards B.S. in Environmental Biology, Millersville University (1993)

Professional Experience:

With Lancaster Laboratories since 1988
- Chemist (1993)
- Senior Chemist (1997)
  - Responsibilities included: perform extractable petroleum testing; operate multiple Hewlett-Packard gas chromatographs (GC) instruments; data interpretation and entry; and developing and evaluating new methods.
- Principal Chemist (2004)
  - Responsibilities included: perform extractable petroleum testing; operate multiple Hewlett-Packard gas chromatographs (GC) instruments; data interpretation and entry; and developing and evaluating new methods. Serve as primary technical contact for client service representatives and their clients.
- Principal Chemist Group Leader, EPH/Misc. GC (2005)
  - Responsibilities include: perform extractable petroleum testing; operate multiple Hewlett-Packard gas chromatographs (GC) instruments; data interpretation and entry; and developing and evaluating new methods. Serve as primary technical contact for client service representatives and their clients.

Ryan Byrne, B.S., Senior Chemist, GC/MS Semivolatiles, Environmental Sciences

Education:

B.S. Biology, College/University (2003)

Professional Experience:

With Lancaster Laboratories since 2003
- Chemist, GC/MS Semivolatiles (2003)
  - Responsibilities include preparing standards; performing maintenance and calibration of GC/MS systems; responding to audits
- Senior Chemist, GC/MS Semivolatiles (2007)
  - Responsibilities include performing analysis and review of all departmental analyses; responding to audits

Mark Clark, B.S., Principal Chemist, GC/MS Semivolatiles, Environmental Sciences

Education:

B.S. Biochemistry, Millersville University (1986)

Professional Experience:

With Lancaster Laboratories since 1985
- Senior Chemist
  - Responsibilities included: perform GC/MS semivolatiles testing; operate GC/MS instruments; data Interpretation and entry; developing and evaluating new methods; and calibrating and repairing instruments.
- Principal Chemist, GC/MS Semivolatiles (2001)
  - Responsibilities include: perform PAH by HPLC analysis and assist with GC/MS operations on third shift.

Harolyn M. Clow, M.S., SM (NRM), Manager, Microbiology, Environmental Sciences

Education:

B.S. Microbiology, Colorado State University (1986)
M.S. Quality Assurance/Regulatory Affairs, Temple University (1995)

Continuing Education:

Laboratory Identification of Gram Positive Bacteria, Colorado Association for Continuing Medical Laboratory Education (1989)
Enterobacteriaceae, Colorado Association for Continuing Medical Laboratory Education (1990)
Laboratory Management: Quality Assurance/Quality Control, Colorado Association for Continuing Medical Laboratory Education (1990)
Current Issues in the Pharmaceutical Microbiology Laboratory Seminar/Workshop, Applied Analytical Industries, Inc. (1992)
Entry Level Management, Lancaster Laboratories (1993)
MIDI Microbial Identification System Training (1993)
Moving Pharmaceutical Microbiology into the 21st Century, Seminar/Workshop, Applied Analytical Industries, Inc. (1997)
Bacteriology, Colorado Association for Continuing Medical Laboratory Education (2001)
Principles of Biosafety/ BBP Exposure Control Plan, LLU (2003)
ISPE Baseline Guide Series: Biopharmaceuticals Guide, Interphex (2004)

Professional Experience:

Benedict Nuclear Pharmaceuticals, Inc., Supervisor of Quality Control (1987-1990)
Responsibilities included managing Quality Control laboratory; supervised operations related to quality assurance and GMP compliance.
Cell Technology, Inc., Quality Assurance/Quality Control Analyst (1990-1991)
Responsibilities included development and implementation of environmental monitoring programs; evaluated systems for GMP compliance and performed testing of finished product.
With Lancaster Laboratories since 1991
Microbiologist II, Pharmaceutical Microbiology (1991)
Responsibilities included writing/revising operating procedures for sterility testing, microbial limit testing and related operations. Performed sterility testing, endotoxin testing, microbial limit testing, environmental monitoring and related testing associated with process/facility validation. Performed data entry, data verification and equipment maintenance.
Microbiologist III, Pharmaceutical Microbiology (1992)
Responsibilities included coordinating scheduling for microbial limit testing, performing sterility testing and tests associated with support of process validation and facility validation.
Coordinator, Pharmaceutical Microbiology (1993)
Responsibilities included managing and scheduling of personnel and verification of data. Supervised daily laboratory operations, coordinated and conducted client method transfers, evaluated compliance of operations with corporate requirements and GMP regulations, performed duties related to support of client facility validations and process validations/method development.
Group Leader, Pharmaceutical Microbiology (1996)
Responsibilities included managing daily operations of pharmaceutical microbiology department including personnel. Perform quality assurance and regulatory compliance functions to maintain departmental operations in accordance with corporate requirements and GMP regulations. Responsible for management of the Facility Validation group and Media Preparation group within the department.
Manager, Microbiology (2005)
Responsibilities include managing daily operations of pharmaceutical microbiology department including personnel. Perform quality assurance and regulatory compliance functions to maintain departmental operations in accordance with corporate requirements and GMP regulations. Responsible for management of the Facility Validation group and Media Preparation group within the department.

Awards, Citations, Honorary Societies & Publications:

Specialist Microbiologist in Consumer and Industrial Microbiology, National Registry of Microbiologists of the American Academy of Microbiology

Memberships & Appointments:

American Society for Microbiology
National Registry of Microbiologists

Rachel Cochis, B.A., Senior Specialist Group Leader, GC/MS Semivolatiles, Environmental Sciences

Education:

B.A. Science, Pennsylvania State University (1992)

Continuing Education:

Introduction to Mass Spec Interpretation, Hewlett-Packard (1995)
Gas Chromatography Principles & Practices (1994)

Professional Experience:

With Lancaster Laboratories since 1993
Chemist (1994)
Senior Chemist/Coordinator (1996)
Responsibilities included: schedule lab work; data interpretation and entry; review and approve data; revise and update SOPs and analytical methods; monitoring turnaround time; and communicate client requirements to lab areas.
Senior Specialist Group Leader, GC/MS Semivolatiles (2005)
Responsibilities include: schedule lab work; data interpretation and entry; review and approve data; revise and update SOPs and analytical methods; monitoring turnaround time; and communicate client requirements to lab areas.

Paul Cormier, B.A., Principal Specialist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Microbiology, Virginia Tech (1984)
B.A. Chemistry, Virginia Tech (1984)

Continuing Education:

Hewlett-Packard GC/MS Advance Operations/System Manager Course (1990)
Mass Spectral Interpretation, Finnigan MAT Institute (1991)
Technical Training, OI Analytical (1995)

Professional Experiences:

Environmental Testing & Certification (1985-1989)
Analytikem, Inc. (1989-1990)
With Lancaster Laboratories since 1990
Senior Chemist (1990)
Responsibilities included: operate GC/MS instruments; data interpretation; review and approve data; repairing instruments; and train other analysts.
Senior Specialist (2005)
Responsibilities included: operate GC/MS instruments; data interpretation; review and approve data; repairing instruments; and train other analysts.
Principal Specialist (2006)
Responsibilities include: operate GC/MS instruments; data interpretation; review and approve data; repairing instruments; and train other analysts.

Memberships & Appointments:

American Chemical Society

Hannah L. Cottman, B.S., Microbiologist, Environmental Microbiology, Environmental Sciences

Education:

B.S. Marine Biology, Millersville University (2005)
B.S. Oceanography/Biology, Millersville University (2005)

Professional Experience:

Covance, Animal Technician – Entry (2006-2007)
Responsibilities included performing small animal blood collection and inoculation; ascites fluid collection
With Lancaster Laboratories since 2007
Microbiologist, Environmental Microbiology (2007)
Responsibilities include performing analyses for environmental microbiology (routine and non-routine); reviewing and evaluating raw data for acceptability and entering data into the computer system; maintaining equipment and performing related quality assurance steps; performing routine lab housekeeping, stocking of supplies and destruction of biologicals; cross-training to Dept. 2004 FaVaWa Test Area

Teresa Cunningham, B.S., Manager, Environmental Client Services, Environmental Sciences

Education:

B.S. Biology, St. Joseph's University (1999)

Continuing Education:

Chemical Monitoring Assistance Program, Pennsylvania Rural Water Association (2000)
How to Deliver Exceptional Customer Service, Fred Pryor Seminars (2000)
Organizational Behavior, Penn State University (2005)

Professional Experience:

With Lancaster Laboratories since 1999
Specialist, Environmental Client Services (1999-2000)
Senior Specialist, Environmental Client Services (2001)
Senior Specialist Coordinator, Environmental Client Services (2001)
Responsibilities included serving as project manager for clients with petroleum-related testing accounts; coordinating client requests with laboratory groups to ensure that the client's needs are met; scheduling bottle shipments and sample pickups; preparing quotations; coordinating staff
Senior Specialist Group Leader, Environmental Client Services (2005)
Responsibilities included serving as project manager for clients with petroleum-related testing accounts; coordinating client requests with laboratory groups to ensure that the client's needs are met; scheduling bottle shipments and sample pickups; preparing quotations; coordinating staff
Manager, Environmental Client Services (2006)
Responsibilities include overseeing implementation of new projects; coordinating client requests with laboratory groups to ensure that the client's needs are met; coordinating staff

Carolyn Cyms, B.S., Senior Specialist Group Leader, Environmental Sample Administration, Environmental Sciences

Education:

B.S. Second Education/Chemistry, Bloomsburg University of Pennsylvania (1993)
Post Baccalaureate Certificate, Secondary Education/Chemistry, Millersville University (2002)

Continuing Education:

Accounting I, HACC (1996)
Introduction to the Internet, PC Focus (1996)
Self-Discipline & Emotional Control, Franklin-Covey (1997)
Child Growth & Development, HACC (1998)
Cell Biology, Millersville University (2000)
Botany; Genetics; Zoology; Biochemistry; Ecology & Ecology Lab, Millersville University (2001)
Immunology; Animal Behavior; Teaching Biological Issues; Entomology, Millersville University (2002)
Introduction to Computer Programming, Millersville University (2003)

Professional Experience:

Lancaster Theological Seminary, Field Education Assistant-Special Project Coordinator (1996-1999)
Responsibilities included assisting with mailings, organization of the field education program; creating and preparing a student field education manual for the ministerial studies program; acting as liaison between Field Ed Professor, Field Ed sites, and students; preparing all written correspondences for the field ed office; organizing and preparing materials for meetings; tracking student progress through the program; assisting with other special projects requiring computer skills of PageMaker, WordPerfect, Quattro Pro, and Envoy.
Self-Employed, Tutor (1994-2005)
Responsibilities included tutoring HACC students in Introduction to Chemistry, Chemistry, Biology, and Algebra.
Millersville University – Biology Department, Assistant (2003)
Responsibilities included preparing Power Point presentations for a stream restoration monitoring program; photographing various stages of the project.
With Lancaster Laboratories since 1994
Administrator III (1994)
Responsibilities included receiving samples, entering samples, auditing, filing, noting discrepancies, and unpacking samples.
Administrator III/Coordinator (1995)
Responsibilities included relaying technical/client information when it became available; answering questions from clients/technical areas when CSR was unavailable; coordinate/prioritize entry; supervising and evaluating work of 2nd Shift Environmental Entry Staff; training new personnel in the entry/interpretation process; preparing Job Plans on an as-needed basis.
Specialist I (1996)
Responsibilities included receiving samples; entering samples; auditing; filing; noting discrepancies; unpacking samples; and acting as project coordinator on an as-needed basis.
Senior Specialist (2000)
Responsibilities included receiving samples; entering samples; auditing; filing; noting discrepancies; unpacking samples; acting as project coordinator on an as-needed basis; training; preparing resource materials; working on special projects as needed.
Senior Specialist Coordinator (2004)
Responsibilities included receiving samples; entering samples; auditing; filing; noting discrepancies; unpacking samples; acting as project coordinator on an as-needed basis; training; preparing resource materials; working on special projects as needed.
Senior Specialist Group Leader, Environmental Sample Administration (2005)
Responsibilities include receiving samples; entering samples; auditing; filing; noting discrepancies; unpacking samples; acting as project coordinator on an as-needed basis; training; preparing resource materials; working on special projects as needed.

Awards, Citations, Honorary Societies & Publications:

Residential Life Award of Merit (1990)
Bloomsburg University Dean's List 6 of 8 semesters, graduated cum laude (1990-1993)
Kappa Delta Phi (National Co-Ed Honor Society) (1994)
Spirit of LLI (2001)

Memberships & Appointments:

Elizabethtown Fire Company (1993-present)
Safety Committee (1994-1998)
Alpha Phi Omega (National Co-Ed Service Fraternity) (1991-1993)
NSTA (2000-present)
Kappa Delta Phi (1994, 2001-2003)

Kimberly A. Davies, M.B.A., Manager, Flexible Staffing

Education:

B.S. Biology, Shippensburg University of Pennsylvania (1991)
M.B.A., Pennsylvania State University (1999)

Professional Experience:

Polybac Corporation, Technical Services (1991-1992)
Upper Saucon Township Wastewater Treatment Plant, Technician (1992-1993)
With Lancaster Laboratories since 1993
Client Services Senior Specialist (1996)
Senior Specialist/Coordinator, Pharmaceutical Project Management (1998)
Principal Specialist/Coordinator, Pharmaceutical Project Management (2000)
Group Leader, Pharmaceutical Project Management and Data Support (2001)
Responsibilities included managing pharmaceutical project management and data support staff. Facilitating group meetings to communicate with staff. Support company and division policies and provide information to department. Support employee development and acknowledge innovative ideas. Promote group and department teamwork and collaboration.

Manager (previously titled Group Leader), Pharmaceutical Project Management (2003)
Responsibilities included managing pharmaceutical project management staff. Facilitating group meetings to communicate with staff. Support company and division policies and provide information to department. Support employee development and acknowledge innovative ideas. Promote group and department teamwork and collaboration.
Manager, Flexible Staffing (2005)
Responsibilities include managing labor resources across departments and divisions, coordinating continuous improvement activities including Management Operating System (MOS) audits, new management MOS training, and MOS tool maintenance.
Manager, Flexible Staffing and Technical Training (2006)
Responsibilities include managing labor resources across departments and divisions, coordinating continuous improvement activities including Management Operating System (MOS) audits, new management MOS training, and MOS tool maintenance. Also managing the technical training staff responsible for designing and facilitating technical training.

Steve Davies, B.S., Manager, Transportation and Sample Bottles, Environmental Sciences

Education:

B.S. Elementary Education, Lancaster Bible College (1987)

Professional Experience:

With Lancaster Laboratories since 1990
Transportation Coordinator (1991)
Transportation Group Leader (1994)
Transportation and Sample Bottles Group Leader (1998)
Responsibilities included supervise personnel; schedule lab work; manage financial resources; answer client questions; communicate client requirements to lab areas; and schedule sample submissions and provide sampling containers.
Transportation and Sample Bottles Manager (2005)
Responsibilities include supervise personnel; schedule lab work; manage financial resources; answer client questions; communicate client requirements to lab areas; and schedule sample submissions and provide sampling containers.

Irene Lynn Dodd, M.B.A., Principal Specialist, Environmental Business Development, Environmental Sciences

Education:

B.A. Chemistry, Washington & Jefferson College (1988)
M.B.A. Pennsylvania State University (1993)

Continuing Education:

Mass Spectral Interpretation Course (1991)
High Impact Communication Skills (1992)
GC Troubleshooting Course (1993)
Selected courses at Millersville University (1996)
Effective Technical Communication (2000)
Business Writing for Results (2002)
Signature Service (2002)
The Counselor Salesperson (2004)
Pennsylvania Chamber Annual Environmental Laws and Regulations Conference (2004, 2005, 2006, 2007)

Professional Experience:

Stauffer Chemical Company, Food Chemist (1987 – 1988)
With Lancaster Laboratories since 1988
Chemist (1991)
Senior Chemist (1995)
Senior Specialist (1997)
Principal Specialist, Environmental Business Development (2003)
Responsibilities include: project management; review and approve data; consult with clients regarding testing needs; work with external auditors; assist with client visits to the lab, advise clients on testing; provide price quotes; monitoring turnaround time; audit sample entry; answer client questions; communicate client requirements to lab areas; provide status reports, including results, to clients; provide sampling containers; and schedule sample submissions.

Memberships and Appointments:

American Chemical Society
National Society of Collegiate Journalists
American Business Women's Association
President (1998-1999); Vice President (1994-1995, 1997-1998); Secretary (2000-2001); Newsletter Chair (1993-1994, 2001-2003); Business Associate Night Chair (2000); Woman of the Year (1999, 2004); Thelma Farley Memorial Award (1995); Hospitality Chair (2003-2004) with Wheatland Conestoga Chapter
Vice President of Communications (2006-2007, 2007-2008) and Formation committee (2006-2007); Woman of the Year (2007) for Lancaster Area Express Network

Amy L. Doupé, B.S., Senior Specialist, Quality Assurance, Environmental Sciences

Education:

B.S. Environmental Studies, Allegheny College (1989)

Professional Experience:

With Lancaster Laboratories since 1994
- Senior Technician, Volatiles by GC (1994)
  - Responsibilities included performing sample pre-screening.
- Senior Administrator, Quality Assurance (1995)
  - Responsibilities included performing administrative and certification support.
- Specialist, Quality Assurance (1997)
  - Responsibilities include maintaining documentation of agency certifications.
- Senior Specialist, Quality Assurance (2003)
  - Responsibilities include maintaining documentation of agency certifications.

Memberships & Appointments:

Pennsylvania Association of Accredited Laboratories
(1997-present)
Maryland Environmental Laboratory Association
(1999-present)

Christine Dulaney, B.A., Senior Review Specialist, GC/MS Volatiles, Environmental Sciences

Education:

B.A. Biology, Meredith College (1984)

Continuing Education:

Waters fundamentals of HPLC, Compuchem Laboratories (1989)

Professional Experience:

Compuchem Laboratories (1984-1998)
- Extraction Technician (1984-1986)
  - Responsibilities included extraction of various environmental matrices for pesticide GC analysis and semivolatile GC/MS analysis; extraction of quarterly PE samples.
- GC Technician (1986-1989)
  - Performed analysis of environmental extracts for pesticides, PAHs, and volatile organic compounds, using GC, HPLC and purge and trap, respectively. Performed routine instrument maintenance.
- Senior Chemist, Pesticide Review (1990-1995, 1996-1998)
  - Performed qualitative and quantitative review of pesticide, PAH, and volatile organic data. Reviewed instrument maintenance and standard logbooks.

With Lancaster Laboratories since 1998
- Chemist, Pesticide Residue (1998)
  - Responsibilities included review of GC pesticide residue data packages, responding to client inquiries, and ICARs.
- Project Management Specialist, Pharmaceutical Client Services (2003)
  - Managed details of various pharmaceutical client accounts using the laboratory information management system; acted as liaison between the client and internal laboratory personnel
- Senior Review Specialist, GC/MS Volatiles (2005)
  - Responsibilities include performing quality review on various GC/MS volatiles analyses. Review standard and instrument maintenance logbooks.

Eric Eby, B.S., Senior Chemist, Metals, Environmental Sciences

Education:

B.S. Biology, Millersville University (1988)

Continuing Education:

OSHA 40-hour Hazardous Waste Management, Phoenix Safety Associates (1991)
DX500 Maintenance and Troubleshooting, Dionex (1996)
The Chemistry Behind the Techniques, EAS, Inc. (1996)
Cleaning Validation Strategies, Applied Analytical Industries, Inc. (1997)
Gas Chromatography Practical Theory and Applications, Lancaster Laboratories (1998)

Professional Experience:

With Lancaster Laboratories since 1988
- Associate Chemist (1993)
  - Responsibilities included environmental wet chemistry testing and field sampling.
- Chemist (1997)

Senior Chemist, Pharmaceutical Raw Materials (1998)
Responsibilities included IC, TOC analysis, IC maintenance, USP purified water testing, raw materials testing, USP <661> container closure testing.
Senior Chemist, Pharmaceutical Product Testing (2000)
Responsibilities included pharmaceutical product testing per client specific methods, IC and HPLC maintenance.
Senior Chemist, Metals (2005)
Responsibilities include ICP analysis for environmental testing and ICP instrument maintenance.

Richard Entz, B.A., Principal Specialist, Environmental Client Services, Environmental Sciences

Education:

B.A. Chemistry, Wabash College (1972)

Continuing Education:

Graduate Work in Analytical Chemistry, Kansas State University (1972-1977)
Basic Gas Chromatography, American Chemical Society (1978)
Advanced Gas Chromatography, American Chemical Society (1979)
Basic Liquid Chromatography, American Chemical Society (1980)
Toxicology for Chemists, American Chemical Society (1983)
Rational Decision Making, Kepner-Tregoe (1984)
Managing Multiple Priorities, Dun & Bradstreet (1987)
Procedures for Sampling and Analysis of Air Toxics, American Chemical Society (1990)
Environmental Regulations, Executive Enterprises (1991)
Advanced Methods for Monitoring Air Toxics, EPA/Air and Waste Management Association (1992)

Professional Experience:

Teaching Assistant, Kansas State University (1972-1974)
U.S. Department of Agriculture, Research Assistant (1974-1977)
U.S. Food and Drug Administration, Division of Chemical Technology, Chemist (1977-1984)
With Lancaster Laboratories since 1984
Group Leader (1985)
Principal Specialist (1991)
Responsibilities include: project management; consulting about specialized sampling and analysis programs; answering technical questions; and providing status reports and results review to clients. Special emphasis on air analyses, analysis for hydrocarbon contaminants, and regulatory review.

Awards, Citations, Honorary Societies & Publications:

4 publications in areas of environmental analytical chemistry and volatile organic compounds
Undergraduate Chemistry Award, Wabash College (1972)
Phillips Petroleum Research Award (1976)
Phi Lambda Upsilon
Co-recipient of 1998 Dawson/Grundeman Technical Innovation Award

Memberships & Appointments:

American Chemical Society

Erik Frederiksen, B.A., Manager, Water Quality and Instrumental Water Quality, Environmental Sciences

Education:

B.A. Chemistry, University of Virginia (1990)

Continuing Education:

Infrared Spectral Interpretation (1993)

Professional Experience:

With Lancaster Laboratories since 1990
Chemist/Coordinator (1993)
Group Leader (1994)
Responsibilities included supervise personnel; manage laboratory operations; project management; manage financial resources; and review and approve data.
Manager (2005)
Responsibilities include supervise personnel; manage laboratory operations; project management; manage financial resources; and review and approve data.

Lynn Frederiksen, B.S., Senior Specialist Group Leader, Environmental Client Services, Environmental Sciences

Education:

B.S. Conservation and Resource Development, University of Maryland (1981)

Professional Experience:

University of Missouri, Senior Research Lab Technician (1982 – 1984)
GPU Nuclear Corporation, Data Analyst (1985 – 1989)
With Lancaster Laboratories since 1989
Senior Specialist (1989)/Team Leader, Environmental Client Services (2006)
Responsibilities included: consult with clients regarding testing needs; revise and update SOPs; provide price quotes; audit sample entry; answer client questions; communicate client requirements to lab areas; provide status reports, including results, to clients; schedule sample submissions and provide sampling containers; assist Group Leader with training of new employees and delegating new projects.
Senior Specialist Group Leader, Environmental Client Services (2007)
Responsibilities include: managing a team of client service representatives, training of new employees, setting up and delegating new projects, serving as primary project manager for several large petroleum clients and consultants.

Joseph M. Gambler, B.S., Senior Chemist, GC/MS Semivolatiles, Environmental Sciences

Education:

B.S. Chemistry, Millersville University (1996)

Professional Experience:

Wyeth, Biological Manufacturing Technician (1996)
With Lancaster Laboratories since 1996
Senior Chemist, GC/MS Semivolatiles (1996)
Responsibilities includes training new hires, maintaining GC/MS systems, preparing standards/stocks/spikes, maintaining Helium supply system, data interpretation, ordering supplies, auditing, and crosstrained in Pesticides Department.

Matthew Gehman, B.S., Senior Specialist, Environmental Health and Safety Officer, Human Resources, Environmental Sciences

Education:

B.S. Occupational Safety and Environmental Health, Millersville University (2002)

Continuing Education:

24-Hour Emergency Response (HAZWOPER), Lancaster Laboratories (2004)
IATA/DOT 49 CFR, DGI Training Center (2004)
American Red Cross First Aid/CPR/AED certified, Lancaster Laboratories, Inc. (2004)
Advanced RCRA, Environmental Resource Center (2004)
In-depth Environmental Compliance, PA Chamber (2005)
In-depth Environmental Compliance, PA Chamber (2006)
National Incident Command System, Command School, Inc. (2006)
Life Safety Code, NFPA (2006)
International Conference on Biocontainment Facilities, Tradeline (2006)
In-depth Environmental Compliance, PA Chamber (2007)

Professional Experience:

United States Army Reserve, Military Police, Staff Sergeant (1996-2004)
Responsibilities included supporting joint FBI and military intelligence operations in the Iraq Theater (2003); supervising law enforcement and force protection activities in support of Operation Noble Eagle (2002); ensuring team members met training standards; monitoring health and welfare of team members
With Lancaster Laboratories since 2004
Senior EHS Specialist, Environmental Health and Safety, Human Resources (2004-2007)
Responsibilities included employee health program administration; maintaining current and developing new safety programs; managing environmental compliance program
Senior Specialist, Environmental Health and Safety Officer, Human Resources (2007)
Responsibilities include managing employee health programs; maintaining current and developing new safety programs; managing environmental compliance program

Memberships and Appointments:

Central PA section of American Industrial Hygiene Association (AIHA)
Member (2004-present)
VFW, Post 7362
Member (2004-present)
American Biological Safety Association (ABSA)
Member (2007-present)

Susan Goshert, B.S., Senior Specialist Group Leader, EPH/Misc. GC, Environmental Sciences

Education:

B.S. Chemistry, Juniata College (1988)

Continuing Education:

Advanced Aquarius Report Training, Hewlett-Packard (1989)
How to Handle People with Tact and Skill, Harrisburg Area Community College (1992)
Positive Attitude and Peak Performance, Harrisburg Area Community College (1992)

Professional Experience:

With Lancaster Laboratories since 1988
- Chemist (1990)
- Senior Chemist Coordinator (1997)
  - Responsibilities include: supervise personnel; review and approve data; and monitoring turnaround time.
- Senior Specialist Group Leader, EPH/Misc. GC (2005)
  - Responsibilities include: supervise personnel; review and approve data; and monitoring turnaround time.

Brian K. Graham, B.S., Senior Chemist, GC/MS Semivolatiles, Environmental Sciences

Education:

B.S. Mathematics, Millersville University (1996)

Professional Experience:

With Lancaster Laboratories since 1989
- Chemist, GC/MS Semivolatiles.(1989-2006)
- Senior Chemist, GC/MS Semivolatiles (2006)
  - Responsibilities include maintain GC/MS Instrumentation; tune and calibrate GC/MS; analyze samples by GC/MS; review and assemble all supporting GC/MS data; prepare standards for calibrations; train new analysts.

Nina Haller, Senior Specialist Group Leader, Metals, Environmental Sciences

Continuing Education:

State Dairy Lab Cert., State of PA (1993)
Butterfat Testing License, State of PA (1995)
Seminar ICP/ICPMS, Fisons Instruments (1995)
Three-day ICP Trace Training Course, Thermo Jarrell Ash, MA (1996)

Professional Experience:

Hazelton Research Products, Lab Technician (1981-1984)
- Responsibilities included rabbit production facility, removal of ovaries, care and maintenance

With Lancaster Laboratories since 1987
- Technical Associate, Foods (1987)
  - Responsibilities included coordinating Listeria Testing Program; performing data entry and verification
- Chemist, Metals (1993)
  - Responsibilities included performing daily tracking of rushes; operating and maintaining ICP instrumentation; reviewing and verifying of ICP data, data package review
- Specialist Group Leader, Metals (2003)
  - Responsibilities included overseeing the ICP/ICPMS personnel and instrumentation workflow; verifying ICP/ICPMS/GFAA/Hg data
- Senior Specialist Group Leader, Metals (2006)
  - Responsibilities included overseeing the ICP/ICPMS personnel and instrumentation workflow; verifying ICP/ICPMS/GFAA/Hg data
- Senior Specialist Group Leader, Department (2007)
  - Responsibilities include overseeing metals instrument personnel and instrumentation workflow; verifying metals data

Michele Hamilton, B.S., Senior Chemist Group Leader, Pesticide Residue Analysis, Environmental Sciences

Education:

B.S. Chemistry, Temple University (1990)

Continuing Education:

Gas Chromatography: Practical Theory and Applications for LL (1993)
Practice of Modern HPLC, LC Resources (1996)

Professional Experience:

With Lancaster Laboratories since 1991
- Senior Chemist (1997)

Senior Chemist/Coordinator (2000)

Responsibilities included: supervise personnel; coach and develop new employees; sample tracking; review rush request; communicate client requirements; operate GC and HPLC instruments; data interpretation and entry; calibrating; repairing instruments and verifying data.

Senior Chemist Group Leader (2005)

Responsibilities include: supervise personnel; coach and develop new employees; sample tracking; review rush request; communicate client requirements; operate GC and HPLC instruments; data interpretation and entry; calibrating; repairing instruments and verifying data.

Linda Hartenstine, B.A., Senior Chemist, GC/MS Semivolatiles, Environmental Sciences

Education:

B.A. Chemistry, Millersville University (1994)

Professional Experience:

With Lancaster Laboratories since 1994

Associate Chemist (1994)

Chemist (1997)

Senior Chemist, GC/MS Semivolatiles (1998)

Responsibilities include: perform GC/MS semivolatiles testing; operate GC/MS instruments; data interpretation; developing and evaluating new methods; calibrating and repairing instruments; prepare standards; revise and update SOPs and analytical methods; and train other analysts.

Robert Heisey, Jr., B.A., Senior Specialist, Water Quality, Environmental Sciences

Education:

B.A. Chemistry, Millersville State College (1972)

Professional Experience:

RCA Corp., Engineering Technician (1972-1987)

With Lancaster Laboratories since 1988

Chemist/Coordinator (1989)

Senior Chemist/Coordinator (1997)

Responsibilities included: supervise personnel; schedule lab work; review and approve data; develop and evaluate new methods; prepare test standards.

Senior Chemist/Group Leader (2005)

Responsibilities included: supervise personnel; schedule lab work; review and approve data; develop and evaluate new methods; prepare test standards.

Senior Specialist (2006)

Responsibilities include: review and approve data; develop and evaluate new methods; prepare test standards; order laboratory supplies; maintain department's chemical inventory.

Tamara Heisel, Senior Specialist, Environmental Sample Administration, Environmental Sciences

Professional Experience:

Willow Valley Retirement Communities, Certified Nursing Assistant (2000-2001)

Responsibilities included assisting nursing home residents with their daily activities and personal hygiene

Bayada Nurses, Certified Nursing Assistant (2000-2001)

Responsibilities included assisting people with disabilities in their homes with their personal hygiene and daily activities

With Lancaster Laboratories since 2001

Senior Administrator, Environmental Sample Administration (2001)

Responsibilities included performing sample receipt, interpretation, and entry

Specialist, Environmental Sample Administration (2001)

Responsibilities included performing sample receipt, interpretation, and entry

Senior Specialist, Environmental Sample Administration (2007)

Responsibilities include performing sample receipt, interpretation, and entry

Memberships and Appointments:

Lancaster Laboratories Safety Committee (2003-2007)

J. Wilson Hershey, Ph.D., President, Lancaster Laboratories

Education:

B.A. Chemistry, Millersville State College (1972)
M.S. Chemistry, Villanova University (1983)
Ph.D. Analytical Chemistry, Villanova University (1985)
M.B.A., Villanova University (1991)

Professional Experience:

With Lancaster Laboratories since 1972
Director of Environmental Sciences (1986)
Executive Vice President (1991)
President (1995)
Responsibilities include presiding over all support and technical operations of Lancaster Laboratories; managing resources, and establishing priorities to insure the continued success of our business.

Awards, Citations, Honorary Societies & Publications:

12 publications in analytical chemistry and laboratory management

Memberships & Appointments:

PADEP Laboratory Accreditation Advisory Committee
INELA Quality Systems Committee

Jenifer Hess, B.S., Manager, Pesticide Residue Analysis, EPH/Misc. GC, Nitrosamines, Volatiles by GC, Environmental Sciences

Education:

B.S. Chemistry, University of Delaware (1984)

Continuing Education:

21 credits towards M.B.A., University of Delaware

Professional Experience:

J. M. Huber Corporation, Research Chemist (1984-1985)
With Lancaster Laboratories since 1985
Chemist/Coordinator, Pesticide Residue Analysis (1989)
Group Leader, Pesticide Residue Analysis (1992)
Responsibilities included supervising personnel; managing laboratory operations and financial resources; project management; reviewing and approving data; consulting with clients regarding testing needs
Manager, Pesticide Residue Analysis, EPH/Misc. GC, Nitrosamines, Volatiles by GC (2005)
Responsibilities include supervising personnel; managing laboratory operations and financial resources; project management; reviewing and approving data; consulting with clients regarding testing needs

John Hook, B.S., Senior Chemist, Metals, Environmental Sciences

Education:

B.S. General Science, Pennsylvania State University (2002)

Continuing Education:

ICP/ICP-MS Seminar, Perkin-Elmer (2003)
ICP-MS Seminar, Agilent (2004)
ICP-MS training, Perkin-Elmer (2005)

Professional Experience:

Sony Technology Corporation, Manufacturing Staff (2002-2003)
Responsibilities included assembly, final inspection, and packaging of television sets
ALCOA Primary Metals, Laboratory Technician (2003)
Responsibilities included observation and maintenance of aluminum production pilot test operation; analysis of product
With Lancaster Laboratories since 2003
Chemist, Metals (2003)
Senior Chemist, Metals (2006)
Responsibilities include performing setup, analysis, and review of ICP, ICP-MS runs; maintenance and troubleshooting of ICP, ICP-MS instruments; yearly and quarterly ICP instrument qualifications including IECs, MDLs, and LDRs; maintaining adequate laboratory supply inventory; disposal of acid waste, writing SOPs

Samuel Huber, B.S., Manager, Field Sampling/Physical Services/Equipment Maintenance & Repair, Environmental Sciences

Education:

B.S. Biology, Lebanon Valley College (1988)
Certificate of Business Administration, Penn State University (1995)

Continuing Education:

24-hour HAZWOPER (spill response) (1995-2004)
40-hour HAZWOPER (2005-present)
DOT/IATA training (2004-present)
Incident Command System IS-00100 (2006)
National Incident Management System IS-00700 (2006)

Professional Experience:

With Lancaster Laboratories since 1988
- Chemist/Coordinator (1991)
- Group Leader, Instrumental Wet Chemistry(1993)
  - Responsibilities included supervising personnel; scheduling lab work; managing laboratory operations and financial resources; project management
- Group Leader, Organic Extractions (1995), Leachate Preparation (1998)
  - Responsibilities included supervising personnel; scheduling lab work; managing laboratory operations and financial resources; project management; supervising method development
- Manager, Organic Extractions/Leachate Preparation/Field Sampling (2005)
  - Responsibilities included supervising personnel; scheduling lab work; managing laboratory operations and financial resources; project management; supervising method development
- Manager, Organic Extraction/Leachate Preparation/Nitrosamines/Field Sampling/Physical Services/Equipment Maintenance & Repair (2007)
  - Responsibilities include supervising personnel; scheduling lab work; managing laboratory operations and financial resources; project management; supervising method development
- Manager, Field Sampling/Physical Services/Equipment Maintenance & Repair (2008)
  - Responsibilities include supervising personnel; scheduling lab work; managing laboratory operations and financial resources; project management; supervising method development

Awards, Citations, Honorary Societies & Publications:

Dawson-Grundmann Innovation Award, Lancaster Laboratories (1999)
- Design and oversee installation of bulk solvent delivery system for organic extractions; annual savings in waste reduction and labor costs of greater than $12,000

Organizing the Laboratory to Efficiently and Accurately Process Soil Samples, Pittcon poster session (2006)

Mark Kaiser, Director; Pharmaceutical and Environmental Microbiology; Biopharmaceutical Services; Stability Services

Education:

Elizabethtown College, Biology 120 credits (1983)

Continuing Education:

Fundamentals of D, Z, and F Valves, PDA (1989)
Viable and Nonviable Environmental Monitoring, PDA (1990)
Validation in the Pharmaceutical Microbiology Laboratory, Applied Analytical Laboratories (1993)
Introduction to Capillary GC, Hewlett-Packard (1993)
HP5890 GC Troubleshooting and Maintenance, Hewlett-Packard (1993)
Design and Validation of Sterilization Processes, PDA (1998)
Introduction to Basic Laboratory Techniques in Biotechnology, PDA (1999)
Microbiology and Engineering of Sterilization Processes, PDA (2000)

Professional Experience:

With Lancaster Laboratories since 1983
- Technician, Food Microbiology (1983)
  - Responsibilities included performing microbiological testing of food and feed products
- Senior Technician, Bioassays (1984)
  - Responsibilities included performing antibiotic bioassays, schedule testing, supervise analysts, review and approve results, technical contact for clients
- Group Leader, Bioassays, Environmental Microbiology (1986)
  - Responsibilities included managing technical operations, quality, regulatory compliance, and financial performance of bioassays and environmental microbiology; developing new assays and services; acting as technical contact for clients
- Group Leader, Pharmaceutical Microbiology and Environmental Microbiology (1989)
  - Responsibilities included establishing pharmaceutical microbiology services at Lancaster Laboratories; developing and validating services for sterile and non-sterile product testing as well as support for facility validation and monitoring; establish GMP and compliance systems; managing technical operations, quality, regulatory compliance, and financial performance; acting as technical contact for clients; marketing new services to prospects and clients
- Manager, Pharmaceutical Microbiology and Pharmaceutical Sample Storage (1996)
  - Responsibilities included managing technical operations, quality, regulatory compliance, and financial performance for pharmaceutical microbiology; acting as technical and marketing contact for clients and prospects; managing centralized storage systems and facilities for pharmaceutical samples

Manager, Pharmaceutical and Environmental Microbiology, Stability Services, Pharmaceutical Sample Storage (2001)

Responsibilities included managing technical operations, quality, regulatory compliance, and financial performance for pharmaceutical and environmental microbiology and stability services; acting as technical and marketing contact for clients and prospects; managing centralized storage systems and facilities for pharmaceutical samples

Director (previously titled Manager), Pharmaceutical and Environmental Microbiology, Biopharmaceutical Services, Stability Services, Pharmaceutical Sample Storage (2004)

Responsibilities included managing technical operations, quality, regulatory compliance, and financial performance for pharmaceutical and environmental microbiology and stability service; acting as technical and marketing contact for clients and prospects; managing centralized storage systems and facilities for pharmaceutical samples; establishing biopharmaceutical services at Lancaster Laboratories; managing the development, set up, and validation of molecular, cell, and viral service offerings for the biopharmaceutical industry; establishing GMP and compliance systems; managing technical operations, quality, regulatory compliance, and financial performance for biopharmaceuticals

Director, Pharmaceutical and Environmental Microbiology, Biopharmaceutical Services, Stability Services, Pharmaceutical Sample Storage, Pharmaceutical Sample Entry (2006)

Responsibilities include managing technical operations, quality, regulatory compliance, and financial performance for pharmaceutical and environmental microbiology and stability service; acting as technical and marketing contact for clients and prospects; managing centralized sample entry, storage systems and facilities for pharmaceutical samples; establishing biopharmaceutical services at Lancaster Laboratories; managing the development, set up, and validation of molecular, cell, and viral service offerings for the biopharmaceutical industry; establishing GMP and compliance systems; managing technical operations, quality, regulatory compliance, and financial performance for biopharmaceuticals

Memberships & Appointments:

PDA, Delaware Valley Chapter, Past Vice President
PDA, Delaware Valley Chapter, Program Committee
PDA, Microbiology Interest Group
PDA, Container/Closure Task Force
Pharmaceutical Stability Discussion Group (PSDG) (2001)

Richard Karam, B.A., Manager, Organic Extraction/Leachate Preparation/GC/MS Semivolatiles, Environmental Sciences

Education:

B.A. Environmental Studies, Green Mountain College (2000)

Professional Experience:

Severn Trent Laboratories (2000-2006)

Project Manager (2005-2006)

Responsibilities included managing environmental projects; writing case narratives; project set up

Analytical Chemist (2000-2005)

Responsibilities included analyzing environmental samples for various general chemistry parameters, metals by ICP/ICPMS, pesticides/PCBs/herbicides by GC, and semivolatiles by GC/MS

With Lancaster Laboratories since 2006

Group Leader, GC/MS Semivolatiles (2006)

Responsibilities included coordinating production in GC/MS Semivolatiles; reviewing and signing reports

Manager, GC/MS Semivolatiles (2007)

Responsibilities included ensuring the accuracy and acceptability of all data generated by the GC/MS Semivolatiles group; coordinating daily prioritization of workload and monitoring the holding time and turnaround time status of samples; responding to client questions regarding GC/MS Semivolatiles data and methods and communicating technical issues or concerns about samples to project managers for clarification or resolution with the client

Manager, Organic Extraction/Leachate Preparation/GC/MS Semivolatiles (2008)

Responsibilities include ensuring the accuracy and acceptability of all data generated by the GC/MS Semivolatiles group; coordinating daily prioritization of workload and monitoring the holding time and turnaround time status of samples; responding to client questions regarding GC/MS Semivolatiles data and methods and communicating technical issues or concerns about samples to project managers for clarification or resolution with the client

Dana Kauffman, Manager, Sample Support and Data Deliverables, Environmental Sciences

Continuing Education:

Introduction to Electronics, Lancaster County Career & Technology Center, Brownstown (1994)
DOT Safe Transportation of Hazardous Materials, Lancaster Laboratories (1995, 1999)
Hazardous Waste Disposal Training LLU, (1995)
Word 6.0 Level I, PC Focus (1996)
Access, Level I, PC Focus (1998)
Hazardous Waste Discard Assessment Training, Lancaster Laboratories (2001)

Professional Experience:

With Lancaster Laboratories since 1994

Lab Technician (1995)
Senior Technician (1996)
Sample Support Coordinator (1997)

Group Leader, Sample Support (1999); Group Leader, Volatiles by GC (2002)
Responsibilities included: supervise personnel; manage laboratory operations; project management; sample preparation; developing and evaluating new methods; reagent preparation; revise and update SOPs; order supplies; train other analysts; run the automated storage and retrieval system; lab cleaning and maintenance; monitor laboratory activities; perform internal audits; enforce regulatory compliance requirements; maintain required certifications; and communicate client requirements to lab areas.
Manager, Sample Support and Data Deliverables (2005)
Responsibilities include: supervise personnel; manage laboratory operations; project management; sample preparation; developing and evaluating new methods; reagent preparation; revise and update SOPs; order supplies; train other analysts; run the automated storage and retrieval system; lab cleaning and maintenance; monitor laboratory activities; perform internal audits; enforce regulatory compliance requirements; maintain required certifications; and communicate client requirements to lab areas.

Nicole Kepley, B.S., Senior Chemist, Instrumental Water Quality, Environmental Sciences

Education:

AA Psychology, Harrisburg Area Community College (1997)
B.S. Psychobiology, Lebanon Valley College (2000)

Professional Experience:

With Lancaster Laboratories since 2000
Senior Technician, Instrumental Water Quality (2000)
Responsibilities included various prep analyses, data entry, TOC and TOX analyses.
Chemist, Instrumental Water Quality (2003)
Responsibilities included performing various analyses, verification, and review and revise SOPs.
Senior Chemist, Instrumental Water Quality (2006)
Responsibilities include performing various analyses, method development, verification, and review and revise SOPs.

Awards, Citations, Honorary Societies, and Publications:

Phi Theta Kappa National Honor Society (Alpha Nu Omega) (1996-2000)

Katherine Klinefelter, M.S., Principal Specialist, Environmental Client Services, Environmental Sciences

Education:

B.S. Chemistry, Rutgers University (1983)
M.S. Physiology, Rutgers University (1985)

Continuing Education:

Additional graduate work in Physiology, Rutgers University (1985-1989)

Professional Experience:

Rutgers University, Research and Teaching Assistant (1984-1989)
M. S. Hershey Medical Center of Penn State University, Senior Research Technician (1990-1993)
With Lancaster Laboratories since 1993
Environmental Project Management
Senior Specialist, Environmental Client Services (1993)
Senior Specialist/Coordinator, Environmental Client Services (1996)
Senior Specialist, Environmental Client Services (2000)
Principal Specialist, Environmental Client Services (2007)
Responsibilities include performing project management; training new client service representatives; auditing sample entry; answering client questions; communicating client requirements to lab areas

Awards, Citations, Honorary Societies & Publications:

Dean's Graduate Student Dissertation Research Award, Rutgers University
Dean's Graduate Student Travel Award, Rutgers University
Steinetz Memorial Fund Award, Department of Biological Sciences, Rutgers University
10 abstracts and 3 scientific papers on membrane transport physiology
4 presentations on membrane transport physiology

Wendy Kozma, B.S., Principal Specialist Group Leader, Environmental Client Services, Environmental Sciences

Education:

B.S. Environmental Science, Allegheny College (1991)

Professional Experience:

Roy F. Weston, Inc. (1992-1993)

With Lancaster Laboratories since 1993

Senior Specialist, Environmental Client Services (1996)

Responsibilities included performing project management; advising clients on testing; providing price quotes; monitoring turnaround time; auditing sample entries; answering client questions; communicating client requirements to lab areas; providing status reports, including results, to clients; scheduling sample submissions; ordering sampling containers

Principal Specialist, Environmental Client Services (2004)

Responsibilities included performing project management; advising clients on testing; providing price quotes; monitoring turnaround time; auditing sample entries; answering client questions; communicating client requirements to lab areas; providing status reports, including results, to clients; scheduling sample submissions; ordering sampling containers

Principal Specialist Group Leader, Environmental Client Services (2006)

Responsibilities include performing project management; advising clients on testing; providing price quotes; monitoring turnaround time; auditing sample entries; answering client questions; communicating client requirements to lab areas; providing status reports, including results, to clients; scheduling sample submissions; ordering sampling containers

Michael Kramer, B.A., Senior Specialist, Environmental Business Development//Sales, Environmental Sciences

Education:

B.A. Geoenvironmental Studies, Shippensburg University (1994)

Professional Experience:

Groundwater Services International, Field Technician/PM (1996-1999)

Responsibilities included design, build, and maintain petroleum remediation systems, collect soil, water, and air samples, manage data and reporting, design relevant site condition maps, and manage projects.

Earth Tech, Inc., Project Manager (1999-2002)

Responsibilities included the project management of characterization and remediation for 30 petroleum-contaminated sites to obtain PA ACT 2 closure and a release of liability.

With Lancaster Laboratories since 2002

Senior Specialist, Environmental Business Development/Sales (2002)

Responsibilities include develop long-term mutually beneficial relationships with new and existing clients. Present LL capabilities through formal presentations and personal account visits and coordinates project needs and information to achieve client satisfaction.

Memberships & Appointments:

National Groundwater Association (1999-present)

Robert Large, B.S., Director, Environmental Client Services/Business Development/Sample Administration and Bay Area Service Center, Environmental Sciences

Education:

B.S. Zoology, Pennsylvania State University (1973)

Continuing Education:

Chromatography/Mass Spectral Interpretation, Finnigan MAT Institute (1981)
Foundations of Management, Gilbert Associates (1982)
M.B.A. Program, St. Joseph's University (1984-1987)
How to Market Professional Services, ACIL (1990)

Professional Experience:

Gilbert Associates, Inc., Program Manager (1977-1984)
Spotts, Stevens, & McCoy, Director of Client Services (1984-1990)
With Lancaster Laboratories since 1990

Marketing Specialist, Environmental Client Services (1990)

Group Leader, Environmental Client Services (1994)

Manager, Environmental Client Services (1995)

Responsibilities included: supervise personnel; project management; various office tasks; interpret QC implications to data quality; and advise clients on testing. Set up and managed the Bay Area Service Center in Richmond, CA (2001). Manage Environmental Sample Administration (2002). Manage Inside Business Development (2003).

Director, Environmental Client Services/Business Development/Sample Administration and Bay Area Service Center (2005)

Responsibilities include: supervise personnel; project management; various office tasks; interpret QC implications to data quality; and advise clients on testing. Set up and managed the Bay Area Service Center in Richmond, CA (2001). Manage Environmental Sample Administration (2002). Manage Inside Business Development (2003). Assisted setting up Professional Scientific Staffing (PSS) for a major biotech client (2004).

Elizabeth Leonhardt, M.E.M., Senior Specialist Group Leader, Bay Area Service Center

Education:

A.S. Biology, Santa Rosa Junior College (2000)
B.S. Animal Physiology & Neuroscience, University of California, San Diego (2002)
M.E.M. Natural Resource Management, University of Queensland, St. Lucia (2004)

Professional Experience:

MEC Analytical, Benthic Laboratory Technician (2002–2003)
Responsibilities included benthic invertebrate assessment; water quality monitoring; field sampling; stormwater monitoring; rapid stream bioassessment; freshwater crustacean taxonomy; provided assistance in microbiology and bioassay laboratories.
With Lancaster Laboratories since 2005
Project Manager, Bay Area Service Center (2005)
Responsibilities included working as a liaison between the client and laboratory, as well as within the laboratory's departments, to ensure that projects are completed in a timely fashion and that the proper analyses are performed; provides technical and regulatory assistance to clients as needed; provides verbal and written quotations to clients; coordinates the efforts of assigned employees to provide coverage for all areas of responsibility; assists in packing and shipping as needed.
Senior Specialist Group Leader, Bay Area Service Center (2006)
Responsibilities include working as a liaison between the client and laboratory, as well as within the laboratory's departments, to ensure that projects are completed in a timely fashion and that the proper analyses are performed; provides technical and regulatory assistance to clients as needed; provides verbal and written quotations to clients; coordinates the efforts of assigned employees to provide coverage for all areas of responsibility; assists in packing and shipping as needed.

Parker Lindstrom, B.S., Senior Chemist, Metals, Environmental Sciences

Education:

B.S. Chemical Oceanography, Millersville University (2002)

Continuing Education:

Comprehensive Gas Chromatography Seminar, RESTEK (2002)
Comprehensive GC/MS Seminar, RESTEK (2002)
Statistics at Lancaster Laboratories, Lancaster Laboratories University (2005)
24 Hr. HAZWOPER, Lancaster Laboratories University (2006)

Professional Experience:

Fred Fiorentino, Assistant Laborer (1997-2002)
Responsibilities included roofing, painting, general construction, clean-up, installation of windows, doors, stairs, decking.
Dr. Kerper, Office Assistant (2000-2002)
Responsibilities included filing, cataloging children's books.
Millersville, IMC/IMS Media/Education Asst. (2000-2002)
Responsibilities included assisting teachers in creating media for the classroom, editing video and audio projects.
With Lancaster Laboratories since 2002
Associate Chemist/Senior Chemist, GC/MS Volatiles (2002)
Responsibilities included running purge and trap and GC/MS to analyze samples and QC for VOCs, purge and trap and GCMS maintenance.
Internal Staffer, Computer Services (2006)
Responsibilities included general computer help.
Senior Chemist, Metals (2006)
Responsibilities include running ICP/MS; verify samples; maintenance; prep samples; general troubleshooting for metals department; installation, maintenance and operation of CVAF low level Mercury.

Memberships and Appointments:

Emergency Response Team (Spill Team), Lancaster Laboratories (2006)

Diane L. Lockard, Principal Microbiologist Group Leader, Microbiology, Environmental Sciences

Continuing Education:

Mycotoxins, Neogene (1993)
Statistics, Lancaster Laboratories (1996)
Basic Calculations for P.C., Lancaster Laboratories (1999)
Analytical Chemistry for QA Professionals, MARSQA (1999)
Auditing Pharmaceutical Micro Labs, PDA (2000)
HPLC Principles and Practices, Lancaster Laboratories (2000)
ACS Technical Writing Workshop (2000)
Electronic Records and Electronic Signatures (2000)
GC Training, Principles, and Practices (2001)
General Microbiology – Independent study, Brigham Young University (2003)

Professional Experience:

R&S Manufacturing, Lab Technician (1978-1984)
Responsibilities included in-process inspection of fractional horsepower electric motors; checking for defects and analyzing longevity; statistical analysis
Pennfield Corporation, Associate Microbiologist (1988-1994)
Responsibilities included performing microbial analysis for total coliform, *Salmonella* species in feeds and ingredients, mycotoxin, Xanthophyll testing, pesticide residue testing by GPC/GC, crude fat and fiber analyses, AAS, and other wet chemistry; data entry/maintenance for client contacts
With Lancaster Laboratories since 1994
Environmental department responsibilities (1994-1999)
Cross-trained in Pharmaceutical Microbiology (1999)
Responsibilities included performing pharmaceutical water testing
QA Senior Specialist, Quality Assurance (1999)
Responsibilities included performing internal audits; hosting client audits; approving/reviewing SOPs and validation documents; reviewing investigations for GMP compliance; providing GMP training to Pharmaceutical Division staff; liaison to Division for GMP trends, changes, and requirements
Senior Microbiologist Coordinator, Pharmaceutical Microbiology (2001)
Responsibilities included managing pharmaceutical water testing area and personnel; reviewing procedures, data verification, and equipment maintenance; assisting with management of environmental monitoring and disinfectant studies, as needed
Senior Microbiologist Group Leader, Pharmaceutical Microbiology (2005)
Responsibilities included managing pharmaceutical water testing area; performing environmental monitoring and disinfectant studies, as needed; biological indicators; growth promotion; supervising personnel; reviewing procedures; performing data verification and equipment maintenance
Principal Microbiologist Group Leader, Microbiology (2007)
Responsibilities include managing pharmaceutical and environmental microbiology water testing; managing environmental monitoring, disinfectant studies and biological indicators; supervising personnel; reviewing procedures; performing data verification and equipment certification/validation; performing investigations, writing and revising procedures; managing resources according to management operating systems and process improvement initiatives

Gordon A. Lodde, B.S., Senior Chemist, EPH/Misc. GC, Environmental Sciences

Education:

B.S. I.H. & Safety Management, Millersville University (1987)

Professional Experience:

Phelps Dodge Morenci, Industrial Hygienist (1991-1994)
Responsibilities included performing duties as the site Industrial Hygienist.
With Lancaster Laboratories since 1987
Industrial Hygienist, Air Quality (1987-1991)
Responsibilities included performing Industrial Hygiene consulting.
Chemist, Nitrosamines (1995)
Responsibilities included performing petroleum hydrocarbon analysis (Gasoline and Diesel Range Organics), pesticides residue analysis, and nitrosamine analysis.
Senior Chemist, GC/MS Volatiles (2005)
Responsibilities included performing analyses for method specific lists of organic compounds.
Senior Chemist, Nitrosamines (2006)
Responsibilities included performing pesticides residue analysis by GC, and environmental analyses by LC MS/MS
Senior Chemist, EPH/Misc. GC (2007)
Responsibilities include performing pesticides residue analysis by GC, and environmental analyses by LC MS/MS

Kathleen Loewen, B.S., Director, Quality Assurance

Education:

B.S. Biology, West Virginia Wesleyan College (1969)

Continuing Education:

Environmental Analytical Quality, Hewlett Packard (1988)
Environmental Analytical Laboratory Services, NUS (1989)
Symposium on Waste Testing and Quality Assurance, USEPA (1990-1996 annual attendance)
RCRA Quality Assurance Workshop, USEPA (1990)
Quality Assurance Workshop, USEPA (1991)
Environmental Seminar Series on SPE, GPC, and HPLC, Millipore (1992)
Conference on Quality Assurance in Environmental Monitoring (1993)
Solid Phase Micro Extraction, Supelco (1994)
Analytical Strategy for the RCRA Program, USEPA (1995)
Guidance Course on SW-846 Chapter One, IAETL (1995)
The Environmental Regulation Course, Executive Enterprises (1996)
GMPs Today & Tomorrow, University of Rhode Island (1997)
Complying with Laboratory cGMP Requirements, American Society for Quality (1997)
The Management of Change, Society of Quality Assurance (1997)

Leadership Conference, James Madison University (1998)
Training the Trainer, Society of Quality Assurance (1998)
Advanced QA Techniques for Facility Inspections, Society of Quality Assurance (1998)
Auditing Computer Validation, Society of Quality Assurance (1999)
Required Quality Records (Under Critical Elements & NELAC) PAAEL (2000)
Advanced 'concepts in Computer Validation – "Maintaining the Validated State" SQACVC (2000)
ISO 17025: The New Standard for Laboratory Quality A2LA (2000)
Measurement Uncertainty A2LA (2000)
Application of ISO/IEC 17025: Uncertainty & Traceability, ILAC (2000)
Assuring Ethical Practices in the Laboratory, ACIL (2001)
Computer Validation, Part 11, Stelex University (2001)
Part 11 Meets CROMERRR, SQA (2001)
GAMP Computer Validation Initiative, SQA (2001)
Laboratory cGMP Compliance, FDA/PQI (2001)
Good Clinical Practices, SQA (2002)
Digging Deeper into Validation, SQA (2002)
Managing Process Deviation and Failure Investigations, CPT (2002)
Quality Responsibilities of Management, SQA (2003)
New Horizons in the Life of a GLP Auditor, SQA (2003)
FDA Inspection Etiquette, FDI (2004)
Biotechnology (Intro, Auditing Techniques, Data Review SQA (2004)
Change Control revisited, PDA (2005)
Analytical Instrument Qualification USP <1058>, LabCompliance (2005)
FDA/EU Compliance for Analytical Laboratories, LabCompliance (2005)
GMP Regulations for GLP Auditors, SQA (2006)
Preparing your Organization for the 'New' part 11, LabCompliance (2006)
FDA's Expectations for cGMPs for QC Laboratories, Analysts/Process Chemists, Compliance Solutions, LLC (2006)
Value Added Auditing, SQA (2007)
Bioanalytical-PK, Biomarkers, Method Validation, Auditing, SQA (2007)

Professional Experience:

Microbiological Associates, Biology Laboratory Technician (1969-1970)
Schuyler Laboratories, Laboratory Technician (1970-1971)
Victor F. Weaver, Inc., Labeling Specifications Supervisor/Liaison with USDA (1985-1988)
With Lancaster Laboratories since 1988
Quality Assurance Specialist (1988)
Quality Assurance Senior Specialist/Coordinator (1991)
Quality Assurance Director, previously titled Officer (1996)
Responsibilities include supervising the Quality Assurance Unit which includes monitoring of current GLP and GMP activities, review of procedures and analytical data, work with client and agency audits and correspondence, enforcement of regulatory compliance requirements, regulatory and client document review, quality improvement, QA policy development and maintenance, and prompt follow-up of any quality or corrective action issues

Memberships & Appointments:

American Society of Quality (ASQ)
Institute of Validation Technology (IVT)
Mid-Atlantic Region Society of Quality Assurance (MARSQA)
Computer Validation Committee
PDA
Society of Quality Assurance (SQA)
Regulatory Affairs Professional Society (RAPS)

Jason Long, B.S., Senior Chemist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Chemistry, Shippensburg University (2004)

Professional Experience:

EA Engineering Science & Technology, Lab Tech (2004)
Responsibilities included setting up and running tests in toxicology lab; cleaning glassware used in performing tests; titrating for alkalinity and pH of water samples
With Lancaster Laboratories since 2004
Chemist, GC/MS Volatiles (2004)
Responsibilities included analyzing water and soil samples by purge and trap GC/MS; generating and reviewing raw data; performing maintenance on GC/MS, purge and traps, and various autosamplers
Senior Chemist, GC/MS Volatiles (2007)
Responsibilities include analyzing water and soil samples by purge and trap GC/MS; generating and reviewing raw data; performing maintenance on GC/MS, purge and traps, and various autosamplers; troubleshooting problems on GC/MS, purge and traps, and autosamplers

Marla Lord, B.S., Senior Specialist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Industrial Hygiene, Purdue University (2000)

Continuing Education:

OSHA 8-Hour (2000)
Comprehensive GC/MS Seminar, Restek (2002)

Professional Experience:

ALCOA, Industrial Hygiene Intern (1999)
Responsibilities included performing air sampling for a variety of substances. Conducted noise survey including area and personal sampling. Tested plant environment for heat stress and evaluated reports. Assisted in formulation of written program.
BP-Amoco Refinery/Orr Professional Services, Industrial Hygiene Technician (2000)
Responsibilities included performing air sampling to reevaluate Benzene Exposure Surveillance Program. Conducted noise surveys including area and personal monitoring to reevaluate Hearing Conservation Program.
With Lancaster Laboratories since 2000
Senior Technician, Volatiles by GC (2000)
Responsibilities included prescreen analysis, sample prep, GC maintenance, and data review.
Chemist, GC/MS Volatiles (2001)
Responsibilities included analyze samples and QC by purge and trap GC/MS. Generate and review raw data. Perform maintenance on GC/MS, purge and traps, and various autosamplers.
Senior Specialist, GC/MS Volatiles (2006)
Responsibilities include GC/MS volatile data interpretation; review and approve data; sign reports; analyze samples; and generate raw data.

Dorothy Love, B.S., Principal Specialist Group Leader, Quality Assurance, Environmental Sciences

Education:

B.S. Environmental Health, Indiana University of Pennsylvania (1981)

Professional Experience:

Sun Transport, Inc., Safety Assistant (1980-1981)
Texas A & M University, Research Assistant (1982-1984)
Texas Water Commission, Chemist (1984-1986)
GHR Analytical, Chemist (1986-1987)
Clean Harbors, Inc., Senior Chemist (1987-1989)
With Lancaster Laboratories since 1989
Senior Specialist (1989)
Senior QA Specialist (1998) Coordinator (2000)
Principal Specialist/Coordinator, Quality Assurance (2003)
Responsibilities included supervise personnel; train other QA staff; revise and update analytical methods; monitor laboratory activities and corrective action for quality issues; perform internal audits; work with external auditors; review lab data and procedures; enforce regulatory compliance requirements; and review/write client/lab Quality Assurance Project Plans (QAPP).
Principal Specialist Group Leader, Quality Assurance (2005)
Responsibilities include supervise personnel; train other QA staff; revise and update analytical methods; monitor laboratory activities and corrective action for quality issues; perform internal audits; work with external auditors; review lab data and procedures; enforce regulatory compliance requirements; and review/write client/lab Quality Assurance Project Plans (QAPP).

Duane Luckenbill, B.S., Director, Environmental Sciences

Education:

B.S. Chemistry, Clarion University of PA (1989)

Continuing Education:

Introduction to Mass Spectral Interpretation, Hewlett-Packard (1995)
Technical Training, OI Analytical (1995)

Professional Experience:

ATEC Associates, Inc., GC/MS Analyst (1989)
With Lancaster Laboratories since 1989
Chemist (1991)
Chemist/Coordinator (1993)
Group Leader (1997)
Manager (2001)
Responsible for client satisfaction, safety and quality systems administration, and all aspects of financial, personnel, and operations management of the GC/MS Volatiles and GC/MS Semivolatiles groups.

Director (2005)

Responsible for client satisfaction, safety and quality systems administration, and all aspects of financial, personnel, and operations management of the GC/MS Volatiles, GC/MS Semivolatiles, Volatiles in Air, Organic Extraction, Leachate Preparation, Field Sampling, Pesticide Residue Analysis, Volatiles by GC, and EPH/Miscellaneous GC groups.

Awards, Citations, Honorary Societies & Publications:

Undergraduate Award in Analytical Chemistry, American Chemical Society (1988)
Department of Chemistry Competitive Award, Clarion University (1988 – 1989)
Outstanding Senior Chemistry Award, American Institute of Chemists Foundation (1989)
Senior College Award for Chemistry, Society for Analytical Chemists of Pittsburgh (1989)
1 publication on mass spectrometry

Amy MacKay, B.S., Senior Microbiologist, Microbiology, Environmental Sciences

Education:

B.S. Food and Nutrition Science (minor chemistry), Indiana University of Pennsylvania (1994)

Continuing Education:

Food Labeling Short Course, Food Processors Institute/NFPA (1996)
Exceptional Customer Service, Fred Pryor Seminars (1996)
Bloodborne Pathogens – Controlling Exposure, LLU (1998)
How to Manage Multiple Projects, Meet Deadlines, and Achieve Objectives, Fred Pryor Seminars (1999)
American Chemical Society Technical Writing Workshop, LLU (2000)
Everything You Wanted to Know about Environmental Monitoring but Were Afraid to Ask, PDA (2003)
Principles of Biosafety/ BBP Exposure Control Plan, LLU (2003, 2005)
ISPE Baseline Guide Series: Biopharmaceuticals Guide, Interphex (2004)
Microbiological Aspects of Cleaning Validation, IVT Teleseminar (2004)
Microbiology Event of the Year, IVT (2004)

Professional Experience:

With Lancaster Laboratories since 1995

Client Services Specialist (1995)

Responsibilities included acting as the pharmaceutical client liaison with the laboratory by communicating client's requirements to the technical staff.

Client Services Senior Specialist (1997)

Responsibilities included acting as the pharmaceutical client liaison with the laboratory by communicating client's requirements to the technical staff.

Project Management Senior Specialist (1998)

Responsibilities included overseeing the administration of pharmaceutical projects, auditing client paperwork, monitoring turn around times, preparing quotations, answering billing and reporting questions, and scheduling sample pickups.

Microbiologist, Pharmaceutical Microbiology (2000)

Responsibilities included performing water testing, environmental monitoring collection and testing, growth promotion, data entry and equipment maintenance.

Senior Microbiologist, Pharmaceutical Microbiology (2002)

Responsibilities included performing water testing, environmental monitoring, growth promotion, and disinfectant studies. Performed on-site environmental monitoring at client locations, performed media preparation overchecking as needed; performed laboratory investigations, SOP and databook revisions and daily culture maintenance. Duties also included data entry, data verification for specific analyses, and analyst training.

Senior Microbiologist/Coordinator, Pharmaceutical Microbiology (2004)

Responsibilities included coordinating testing for environmental monitoring, growth promotion, and disinfectant studies. Coordinate and perform environmental monitoring at client facilities, perform laboratory investigations, SOP and databook revisions, as needed. Perform data verification and equipment maintenance. Assist with coordinating water test area as needed.

Senior Microbiologist, Microbiology (2005)

Responsibilities include testing and administrative support for water testing, environmental monitoring, growth promotion, and disinfectant studies. Perform laboratory investigations and SOP and form revisions as needed. Perform data verification and equipment maintenance as needed.

Awards, Citations, Honorary Societies, and Publications:

Senior Leadership Group Team Achievement Award, Lancaster Laboratories (1998)

George Main, B.S., Principal Chemist, GC/MS Semivolatiles, Environmental Sciences

Education:

B.S. Chemistry, University of Pittsburgh (1991)

Professional Experience:

With Lancaster Laboratories since 1991

Chemist, Volatiles in Air (1993)
Senior Chemist/Coordinator, Volatiles in Air (1997)

Principal Chemist/Coordinator, Volatiles in Air (2002)

Responsibilities included: supervise personnel; schedule lab work; manage laboratory operations; project management; sample preparation; perform air testing; operate GC/MS, GC/FID/PID, instruments; data interpretation and entry; review and approve data; developing and evaluating new methods; calibrating and repairing instruments; prepare standards; revise and update SOPs and analytical methods; train other analysts; prepare data packages; work with external auditors; advise clients on testing; provide price quotes; monitoring turnaround time; answer client questions; and communicate client requirements to lab areas.

Principal Chemist Group Leader, Volatiles in Air (2005)

Responsibilities included: supervise personnel; schedule lab work; manage laboratory operations; project management; sample preparation; perform air testing; operate GC/MS, GC/FID/PID, instruments; data interpretation and entry; review and approve data; developing and evaluating new methods; calibrating and repairing instruments; prepare standards; revise and update SOPs and analytical methods; train other analysts; prepare data packages; work with external auditors; advise clients on testing; provide price quotes; monitoring turnaround time; answer client questions; and communicate client requirements to lab areas.

Principal Specialist, GC/MS Semivolatiles (2005)

Responsibilities included: operate GC/MS instruments; data interpretation and review and approve data; developing and evaluating new methods; calibrating and repairing instruments; and preparation of standards

Principal Chemist, GC/MS Semivolatiles (2007)

Responsibilities include: operate GC/MS instruments; data interpretation and review and approve data; developing and evaluating new methods; calibrating and repairing instruments; and preparation of standards

Nicole Maljovec, M.S., Senior Specialist Group Leader, Environmental Client Services, Environmental Sciences

Education:

B.S. Chemistry, St. Bonaventure University (2004)
M.S. Adolescence Education, D'Youville College (2005)

Professional Experience:

CYTEC Industries, Industrial Hygiene Internship (2003-2004)

Responsibilities included performing air monitoring and sampling; complying with OSHA standards; assisting R/D lab with the identification of unknown chemicals and wastes

Niagara Wheatfield, Environmental Science Teacher (2005-2006)

Responsibilities included teaching chemistry, chemistry lab, and environmental science; developing special education plans to assist students with learning disabilities

With Lancaster Laboratories since 2006

Senior Specialist, Environmental Client Services (2006)

Responsibilities included performing project management; advising clients on testing; providing price quotes; monitoring turnaround time; auditing sample entries; answering client questions; communicating client requirements to lab areas; providing status reports, including results, to clients; scheduling sample submissions; ordering sampling containers

Senior Specialist Group Leader, Environmental Client Services (2007)

Responsibilities include performing project management; advising clients on testing; providing price quotes; monitoring turnaround time; auditing sample entries; answering client questions; communicating client requirements to lab areas; providing status reports, including results, to clients; scheduling sample submissions; ordering sampling containers

Lauren Marzario, B.S., Senior Chemist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Chemistry, Shippensburg University (2003)

Continuing Education:

Intro to Interpretation of Mass Spectra, Lancaster Laboratories University (2005)

Professional Experience:

With Lancaster Laboratories since 2003

Chemist, GC/MS Volatiles (2003)

Responsibilities included analyzing water and soil samples using purge and trap GC/MS. Keep up with sample prepping and data review. Perform maintenance as needed on purge and traps, GC/MS, and autosamplers.

Senior Chemist, GC/MS Volatiles (2006)

Responsibilities include analyzing water and soil samples using purge and trap GC/MS. Keep up with sample prepping and data review. Perform maintenance as needed on purge and traps, GC/MS, and autosamplers. Assist in training new hires as needed.

Sherry L. Maurer, Senior Specialist, Electronic Data Deliverables, Environmental Sciences

Education:

Certification in Dental Assisting, Willow Street Vo-Tech (1989)

Continuing Education:

Introduction to Quattro Pro, LLU (1993)
Introduction to DOS, LLU (1994)
Math for Chemistry Course, LLU (1994)
Presentation Skills Seminar, LLU (1995)
Management Skills for Supervisors, Penn State(1995)
Introduction to Word Perfect 5.1, LLU (1995)
Word 6.0 – Level 1, PC Focus (1997)
Safe Transportation of Hazardous Materials, LLU (1997-2000)
Access 8.0 – Level 1, PC Focus (1999)
Access 97 – Level 2, PC Focus (1999)
Powered Industrial Truck Safety (Forklift), LLU (2001)
Bloodborne Pathogens – Exposure and Control, LLU (2000)
HAZWOPER, LLU (2003)
SCBA Training, LLU (2003)
Standard First Aid CPR and AED (2004)

Professional Experience:

Dr. David G. Schulman, Surgical Assistant (1989-1990)
Responsibilities included assisting in surgeries, taking X-rays, ordering medications, and performing sterilization of instruments.
With Lancaster Laboratories since 1990
Laboratory Technician to Laboratory Technician II, Leachate Preparation (1990)
Responsibilities included coordinating leachates; performing extractions, weighted average calculations, calibrations; verifying data. Helped in Dept. 27 – ran cyanides, phenols, and BTUs. Helped in Dept. 55 – running the ASRS and performing homogenization.
Specialist to Senior Specialist, Sample Bottles (1997)
Responsibilities included coordinating Bottles area (1997-1999); entering and packing bottle orders; performing inventory, ordering supplies; running end-of-month reports; Encore invoicing; tracking chemical certificates and testing; performing preservation; managing and updating department databases; writing Clarion reports; operating tow motor; setting up database for Transportation.
Senior Specialist, various departments (2000)
Responsibilities included generating EDDs with specific formats (Dept. 38); generating C of A's (Dept. 10); LIMS entry (Dept. 09); result entry and Data Packages (Dept. 12); Data Packages (Dept. 22); helped to set up new bottles program; helped the Pharmaceutical pricing group reformat generic projects according to all compendia; helped to set up Nautilus for Crystal reporting (Dept. 10).
Senior Specialist, Pharmaceutical Quality Systems (2004)
Responsibilities included generating EDDs with specific formats (Dept. 38); reformat projects according to compendia, setup reporting, LIMS entry, pharmaceutical quotes and creating sample forms for cambrex.
Senior Specialist, Electronic Data Deliverables (2005)
Responsibilities include generating EDDs with specific formats.

Memberships and Appointments:

LL Ethics Committee
Member (2003-present)

Melissa McDermott, B.A., Senior Specialist, Environmental Client Services, Environmental Sciences

Education:

B.A. Biology, Millersville University (1992)

Continuing Education:

Gas Chromatography Principles and Practices (1995)
Conflict Resolution and Confrontation Skills Seminar (1996)
Coaching Skills for Supervisors Seminar (1996)
Waste Testing and Quality Assurance Symposium (1996)
Entry Level Management (1997)
How to Deliver Exceptional Customer Service Seminar (1997)
Statistics at Lancaster Laboratories (2006)

Professional Experience:

With Lancaster Laboratories since 1992
Chemist, EPH/Misc. GC (1993)
Responsibilities included performing analysis of environmental samples for metals by AA flame and cold vapor generation; assembling client data packages
Chemist Coordinator, EPH/Misc. GC (1996)
Responsibilities included coordinating rush work; communicating with client service representatives regarding sample status; answering client questions; generating employee job plans; conducting employee evaluations
Senior Chemist, EPH/Misc. GC (1997)
Responsibilities included performing analysis of environmental samples for DRO and interpretive TPH analyses; verifying analyses performed by other analysts; preparing standards; revising departmental SOPs; method development; reviewing data packages
Senior Specialist, Environmental Client Services (1997)
Responsibilities included auditing sample entry; answering client questions; communicating client requirements to lab areas; providing status reports, including results, to clients; scheduling sample submissions and providing sampling containers

Senior Chemist, EPH/Misc. GC (2002)

Responsibilities included reviewing and approving data; writing departmental methods; reviewing and approving data packages; acting as technical resource within department; answering client questions; monitoring and performing QA metrics

Senior Specialist, Environmental Client Services (2007)

Responsibilities include acting as technical resource between client services and laboratories; scheduling sample submissions and providing sampling containers; communicating client requirements to lab areas

Roy R. Mellott Jr., B.S., Senior Chemist Group Leader, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Biology, Millersville University (1993)

Continuing Education:

Hazardous Waste Disposal, LLU (1996)
GC: Principles & Practices, LLU (1997)
GC/MS: Applications/Troubleshooting Seminar, ECS/MDL Systems, Inc. (1999)
GLP Training, LLU (1999)
Introduction to Interpretation of Mass Spectra, LLU (2005)
Interpretation of Mass Spectra, Intermediate, LLU (2005)

Professional Experience:

With Lancaster Laboratories since 1995

Senior Lab Tech I, GC/MS Volatiles (1995)

Responsibilities included requisitioning samples; performing sample storage, prescreening, discard, hazardous waste disposal; tracking down missing samples by various means.

Chemist/Auditor, GC/MS Volatiles (1996)

Responsibilities included performing analysis of waters, soils, and other matrices for VOCs via various analytical methods; evaluation of analytical data; calibrating and trouble shooting various GC/MS equipment; evaluation/review of analyst-generated data; corresponding with analysts about possible trends (whether analyst- or system-related) in generated data; evaluation/review of *corrections of problems with generated data.*

Senior Chemist, GC/MS Volatiles (2002)

Responsibilities included performing analysis of waters, soils, and other matrices for VOCs via various analytical methods; evaluation of analytical data; setting up, calibrating, and trouble shooting various GC/MS equipment; evaluation/review of analyst-generated data; corresponding with analysts about possible trends (whether analyst- or system-related) in generated data; evaluation/review of corrections of problems with generated data; updating/correcting SOPs and laboratory and analytical procedures; preparation, tracking and documentation of analytical standards used in the laboratory; training of new employees to the department.

Senior Chemist Group Leader, GC/MS Volatiles (2005)

Responsibilities include performing analysis of waters, soils, and other matrices for VOCs via various analytical methods; evaluation of analytical data; setting up, calibrating, and trouble shooting various GC/MS equipment; evaluation/review of analyst-generated data; corresponding with analysts about possible trends (whether analyst- or system-related) in generated data; evaluation/review of corrections of problems with generated data; updating/correcting SOPs and laboratory and analytical procedures; preparation, tracking and documentation of analytical standards used in the laboratory; training of new employees to the department.

Memberships & Appointments:

Nature Conservancy (1998-present)
Lancaster Laboratories Ethics Committee (1999-2003)
World Tang Soo Do Association (2001-present)
Lancaster Herpetological Society (2005-present)

Betsy Menefee, B.S., Senior Specialist, Data Deliverables, Environmental Sciences

Education:

B.S. Chemistry (cum laude), Salem College (1958)

Continuing Education:

Service Operations Process Optimization, Penn State University (1993)
Group Discussions (Management Course), Penn State University (1994)

Professional Experience:

Duke University, Research Assistant (1958-1959)
With Lancaster Laboratories since 1980

Senior Chemist, Metals (1985)

Senior Specialist, Metals (1999)

Responsibilities included: reviewing data packages for accuracy, preparing inorganic data packages, and assisting with electronic deliverables.

Senior Specialist, Data Deliverables (2006)

Responsibilities include: reviewing data packages for accuracy, preparing inorganic data packages, and assisting with electronic deliverables.

Awards, Citations, Honorary Societies & Publications:

2 scientific publications in analytical chemistry

Lietta Milton, B.S., Senior Specialist Group Leader, Data Deliverables, Environmental Sciences

Education:

B.S. Sociology, University of Illinois (1962)

Continuing Education:

Client Rep Training, General Telephone (1965)
Tax consultant training, H & R Block (1972)
Intro to DOS, Brownstown Vo-Tech (1992)
Microsoft Word Level I & II, PC Focus (1996)

Professional Experience:

With Lancaster Laboratories since 1986
Glassware washer/Data Entry, GC/MS Semivolatiles (1986-1987)
Responsibilities included cleaning, baking, storing glassware, some sample prep, dept. data entry into WANG system.
Data entry/Data Package Assembler, GC/MS Semivolatiles (1987)
Responsibilities included department data entry into WANG system, assembling department data into client packages, and archiving data.
Data Package Administrator I, II, III, GC/MS Semivolatiles (1988-1994)
Responsibilities included department data entry into WANG system, assembling department data into client packages, and archiving data.
Data Package Administrator III Coordinator, GC/MS Semivolatiles (1994)
Responsibilities included department data entry into WANG system, assembling department data into client packages, and archiving data.
Data Package Specialist Coordinator, GC/MS Semivolatiles (1994-2004)
Responsibilities included department data entry into WANG system, assembling department data into client packages, and archiving data.
Data Package Senior Specialist Coordinator, GC/MS Semivolatiles (2004-2006)
Responsibilities included department data entry into WANG system, assembling department data into client packages, and archiving data.
Senior Specialist Group Leader, Data Deliverables (2006)
Responsibilities include overseeing the assembly of the Environmental Division data packages.

Megan Moeller, B.S., Senior Specialist, Environmental Client Services

Education:

B.S. Environmental Science, University of Delaware (1999)

Professional Experience:

With Lancaster Laboratories since 1999
Sample Administration/Client Service Specialist, Environmental Client Services (2003)
Responsibilities included Interpretation and entry of incoming samples. Route samples to the correct locations. Assist Client Service representatives with auditing, reviewing reports, and reviewing invoices.
Specialist, Environmental Client Services (2004-2006)
Responsibilities included managing projects, prepare quotations, audit sample entries, answer client questions, communicate client requirements to lab areas, schedule sample submissions, and provide sample containers.
Senior Specialist, Environmental Client Services (2006)
Responsibilities include managing projects, prepare quotations, audit sample entries, answer client questions, communicate client requirements to lab areas, schedule sample submissions, and provide sample containers.

Chad Moline, B.S., Senior Chemist Group Leader, GC/MS Semivolatiles, Environmental Sciences

Education:

B.S. Environmental Studies, Slippery Rock University (1998)
Teaching Certification, Secondary Education, Millersville University (2003)

Professional Experience:

Centre Analytical Laboratories, Lab Technician (1999-2000)
Responsibilities included running various wet chemistry analyses
Lancaster Laboratories, Chemist/Senior Chemist (2000-2005)
Responsibilities included maintaining GC/MS instrumentation
Warwick School District, Science Teacher (2005-2006)
Responsibilities included teaching chemistry and physics to 8th grade students

Conestoga Valley School District, Science Teacher (2006-2007)
Responsibilities included teaching chemistry and earth science to 8th grade students
With Lancaster Laboratories since 2007
Senior Chemist Group Leader, GC/MS Semivolatiles (2007)
Responsibilities include monitoring workflow; meeting client turnaround times

Kevin T. Moran, M.B.A., Senior Specialist, Environmental Business Development/Sales, Environmental Sciences

Education:

B.S. Marine Engineering, U.S. Merchant Marine Academy (1972)
M.B.A. Marketing, Babson College (1981)

Professional Experience:

SAIC, Regional Sales Manager (1994-1999)
Responsibilities included selling process treatment equipment for groundwater remediation to environmental consulting companies and industrial end users; managing a staff of seven engineers and technicians engaged in operating and constructing groundwater treatment systems.
Mantech Environmental, Marketing Manager (1999-2000)
Responsibilities included developing strategy to target industrial customers with multiple sites for an innovative groundwater remediation technology.
Hazleton Environmental, Marketing Manager (2000-2003)
Responsibilities included developing marketing strategy for sales of process treatment equipment to industrial and municipal users; aiding company in breaking into DOD market for treatment equipment.
With Lancaster Laboratories since 2003
Senior Specialist, Environmental Business Development/Sales (2003)
Responsibilities include managing and growing revenue at assigned industrial accounts; using selling skills to add new industrial and environmental consulting firms for analytical services in New York, New Jersey, and New England.

John Morton, M.S., Principal Specialist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Biochemistry, California Polytechnic State University (1974)
M.S. Chemistry, University of Delaware (1977)

Continuing Education:

Introduction to Data Processing and Algorithm Design in BASIC, Gwynedd-Mercy College (1983)
The LC Short Course, Waters Associates (1983)
The Series 1020/OWA Operator Course, Finnigan MAT Institute (1985)
Operation of the Superincos Data System, Finnigan MAT Institute (1986)
MS/PC DOS: The Disk Operating System, West Chester University (1989)

Professional Experience:

BCM, Inc., Analytical Chemist (1978-1980)
Envirosafe Services, Inc., Q.C. Supervisor (1980-1981)
Copper Range Company, Chief Chemist (1982)
Q.C. Inc., Analytical Chemist (1983-1988)
With Lancaster Laboratories since 1988
Chemist (1988)
Principal Chemist (1998)
Responsibilities included: review and approve data; train other auditors; review lab data; and data package review.
Principal Specialist, GC/MS Volatiles (2005)
Responsibilities include: review and approve data; train other auditors; review lab data; and data package review.

Awards, Citations, Honorary Societies & Publications:

2 publications in polymer chemistry and pharmaceutical chemistry

Memberships & Appointments:

American Chemical Society

Jeffrey Moyer, B.S., Senior Specialist Group Leader, Sample Bottles, Environmental Sciences

Education:

B.S. Environmental Resource Management, Penn Valley College/University (1977)

Professional Experience:

Joseph A. Kodak, Carpenter's Helper (1977-1978)
Responsibilities included performing construction

BP Oil, Inc., Operations Supervisor (1978-1979)
Responsibilities included working on special projects in the regional operations office
Koch Hydrocarbon Company, Terminal Manager (1979-1997)
Responsibilities included managing the operation of a 24 hr/day, 365 day/year propane storage facility; coordinating inventory storage, product quality control, maintenance, safety, and personnel staffing and training; additional responsibilities included facility upgrades and expansion projects
With Lancaster Laboratories since 1997
Specialist, Environmental Sample Administration (1997)
Responsibilities included entering environmental samples for analysis; coordinating projects with client services; updating standard forms; filing client bottle orders; tracking change forms and forwarding updated info to SA department; tracking short hold/rush list; processing gold forms
Specialist, Environmental Client Services (1999)
Responsibilities included acting as technical resource for clients and SA entry; preparing quotes for clients; preparing bottle orders; scheduling sample pickups; auditing acknowledgements and client paperwork; troubleshooting client problems; updating standard forms; processing bottle orders, lab reports, acknowledgements, and COCs; handling reprint requests; preparing SDG reports
Senior Specialist Group Leader, Department (2004)
Responsibilities include managing bottles department; coordinating projects with client services; updating bottle code and preservation sheets; updating SOPs; working with purchasing to ensure inventory levels are adequate; backing up transportation coordination

Jennifer L. Moyer, B.S., Senior Specialist, Metals, Environmental Sciences

Education:

B.S. Chemistry, Lock Haven University (2000)

Professional Experience:

Lock Haven University, Lab Tech (1996-1998)
Responsibilities included setting up labs; stocking and setting up stock rooms; helping professors with projects
Croda Inc., Process Development Chemist (1998-2000)
Responsibilities included developing and improving procedures on existing products
With Lancaster Laboratories since 2000
Chemist, Metals (2000)
Responsibilities included running and maintaining ICP instruments
Chemist, Metals (2002)
Responsibilities included running and maintaining Graphite Furnace Atomic Absorption instruments
Group Leader/Specialist, Metals (2003)
Responsibilities included overseeing Graphite Furnace Atomic Absorption and Mercury analysts
Senior Specialist, Metals (2007)
Responsibilities include verifying ICP, GFAA, Mercury, and ICP-MS

Jonathan Nardelli, Senior Chemist, Volatiles in Air, Environmental Sciences

Continuing Education:

Pursuing B.S. Environmental Biology degree, Fort Lewis College

Professional Experience:

Severn Trent Laboratories
Metals ICP Analyst (2000-2002
Responsibilities included performing ICP analysis of soil and water samples, data review, instrument maintenance, and scheduling of sample analysis
GCVOA Analyst (2002-2005)
Responsibilities included day to day operation of the GCVOA Lab; assisting in Air Toxics Lab
Severn Trent Laboratories/Test America, Air Toxics analyst (2005-2007
Responsibilities included performing T014/15 analysis, data review, instrument maintenance, and scheduling of sample analysis
With Lancaster Laboratories since 2007
Senior Chemist, Volatiles in Air (2007)
Responsibilities include performing analysis of air and gas samples using TO14/15 and GC methods, data review, standards prep, filling can and flow controller orders, instrument maintenance, and troubleshooting

Marc Neal, B.S., Manager, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Chemistry, Gannon University (1997)

Professional Experience:

Severn Trent Laboratories, Chemist/Analyst III (2000-2001)
Responsibilities include: Maintenance and calibration of instruments, analyzing samples.

With Lancaster Laboratories since 1998
Chemist (1998-2000)
Senior Chemist (2001)
Senior Chemist/Coordinator (2001)
Responsibilities included: Tune and calibrate GC/MS systems, troubleshooting and maintaining of instruments, analyze and write-up samples, training of new employee, technical decisions concerning samples, revise and update department SOPs, implement procedural changes to increase quality or efficiency, new method validation.
Manager (2005)
Responsibilities include: Manage financial, personnel, and daily operations in GC/MS Volatiles department

Charles J. Neslund, B.S., Manager, Volatiles in Air and Specialty Services Group, Environmental Sciences

Education:

B.S. Chemistry, University of Pittsburgh (1982)

Continuing Education:

Graduate studies in organic chemistry, University of Pittsburgh (1983)

Professional Experience:

Lancaster Laboratories (1984-1996)
Chemist (1986)
Group Leader (1987)
Chemist (1991)
OI Analytical, Sales Representative (1996)
With Lancaster Laboratories since 1997
Group Leader, GC/MS Semivolatiles (1997)
Responsibilities included: supervise personnel; schedule lab work; manage laboratory operations and financial resources; project management; data interpretation; review and approve data; developing and evaluating new methods; consult with clients regarding testing needs; and revise and update SOPs and analytical methods.
Manager, GC/MS Semivolatiles and Volatiles in Air (2005)
Responsibilities included: supervise personnel; schedule lab work; manage laboratory operations and financial resources; project management; data interpretation; review and approve data; developing and evaluating new methods; consult with clients regarding testing needs; and revise and update SOPs and analytical methods.
Manager, Volatiles in Air and Specialty Services Group (2007)
Responsibilities include: supervise personnel; schedule lab work; manage laboratory operations and financial resources; project management; data interpretation; review and approve data; developing and evaluating new methods; consult with clients regarding testing needs; and revise and update SOPs and analytical methods.

Awards, Citations, Honorary Societies & Publications:

Dawson-Grundmann Innovation Award (1995)

Memberships & Appointments:

American Chemical Society (ACS)
Chromatography Forum of the Delaware Valley (CFDV)
Past member of Executive Committee of the Chromatography Forum of the Delaware Valley

Deborah A. Neslund, Senior Specialist Group Leader, Environmental Sample Administration, Environmental Sciences

Professional Experience:

Lancaster General Hospital, Phlebotomist (1976-1977)
Fairfax Hospital, LPN (1978)
Lancaster General Hospital, Phlebotomist/EKG Technician (1980-1986)
With Lancaster Laboratories since 1986
Senior Specialist Coordinator
Responsibilities included: Supervise personnel; direct flow of samples to include prioritization to meet hold times and standards set for rush and other samples; develop and improve systems for efficiency within SA; represent SA in communications with Technical Groups, Client Services, and other support areas; log-in samples.
Senior Specialist Group Leader (2005)
Responsibilities include: Supervise personnel; direct flow of samples to include prioritization to meet hold times and standards set for rush and other samples; develop and improve systems for efficiency within SA; represent SA in communications with Technical Groups, Client Services, and other support areas; log-in samples.

Ryan V. Nolt, B.S., Principal Chemist Group Leader, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Chemistry, Millersville University (1997)

Professional Experience:

With Lancaster Laboratories since 1996

Clerk II, Sample Support (1996)

Responsibilities included performing ASRS operations, preserving incoming samples, homogenizing samples, packing bottle orders, and performing sample discard.

Senior Technician, ExpressLAB (1997)

Responsibilities included performing sample dilutions, preparing standards, prepping samples, and setting up new instruments.

Chemist, GC/MS Volatiles (1998)

Responsibilities included performing purge and trap and GC/MS maintenance; tuning and calibrating GC/MS system; analyzing samples; reviewing, working up, and assembling all supporting data; and preparing new standards.

Senior Chemist Coordinator, GC/MS Volatiles (2000)

Responsibilities included performing routine and non-routine laboratory analysis; diagnosing and solving technical problems; implementing improvements to maximize quality; maintaining and troubleshooting instruments; writing and revising standard operating procedures; validating new methods and equipment; assigning new work to instrument groups and monitoring productivity; and training new analysts.

Principal Chemist Group Leader, GC/MS Volatiles (2005)

Responsibilities include performing routine and non-routine laboratory analysis; diagnosing and solving technical problems; implementing improvements to maximize quality; maintaining and troubleshooting instruments; writing and revising standard operating procedures; validating new methods and equipment; assigning new work to instrument groups and monitoring productivity; and training new analysts.

Timothy Oostdyk, Ph.D., Executive Vice President, COO

Education:

B.A. Chemistry (cum laude), Franklin and Marshall College (1985)
Ph.D. Analytical Chemistry, Villanova University (1993)

Continuing Education:

ICP Seminar (1985)
ASMS Interpretation of Mass Spectra (1989)
Service Operations Process Optimization, Pennsylvania State University (1992)

Professional Experience:

Nabisco Brands Technology Center, Technician (Summer 1983)
With Lancaster Laboratories since 1985

Chemist/Coordinator (1986)
Group Leader (1988)
Manager (1990)
Director (1995)
Executive Vice President, COO (previously titled Vice President) (2000)

Responsibilities include: supervise personnel and manage laboratory operations and financial resources.

Awards, Citations, Honorary Societies & Publications:

Spirit of LL Award (1989)
Phi Beta Kappa, Franklin and Marshall College
Sigma Xi
10 scientific publications in analytical chemistry

Memberships & Appointments:

ACIL Environmental Sciences Section, Board of Directors

Heidi Ortenzi, Senior Chemist, Organic Extraction, Environmental Sciences

Education:

B.S. Environmental Science/Biology, Kutztown University (1996)

Continuing Education:

P.E. Spectroscopy Seminar, Perkin Elmer (1998)
Statistics, LLU (1999)
Pharm. Calc. Class, LLU (1999)
LLI Leadership Training (2000)

Professional Experience:

M.J. Reider Associates, Lab Technician (1996-1997)

Responsibilities included organics prep/method development for HEM/various wet chemistry analyses.

With Lancaster Laboratories since 1997

Chemist, Metals (1998-2000)

Responsibilities included performing metals analyses, maintenance of instruments, verification of analyses, analyzed GMP samples, administered quad studies, MDL studies, IDL studies.

Coordinator, Metals (1999-2001)
Responsibilities included coordination of GFAA/FAA/Hg group, verification of analyses, instrument maintenance and operation, updating of SOPs, training records, quad studies, MDLs, and IDLs, performed GMP analyses.
Coordinator/Specialist, Environmental Client Services (2001-2005)
Responsibilities included supervising Commercial Account Team and administrators, handle miscellaneous and homeowner calls, prepare bottle orders, audit sample paperwork, monitor sample progress, and handle client concerns.
Group Leader/Senior Specialist, Environmental Client Services (2005)
Responsibilities included supervising Account Management Team and administrator, work with team members on continual process improvement, manage several large client accounts, prepare bottle orders, audit sample paperwork, monitor sample progress, and handle client concerns.
Senior Chemist, Organic Extraction (2007)
Responsibilities include performing non-routine extractions, scheduling prep work, verification of prepped batches, processing MOS reports, managing projects for tobacco analyses, point person for project rollouts.

Awards, Citations, Honorary Societies, and Publications:

Senior Leadership Group Award, Lancaster Laboratories (2001, 2005, 2007)
Superlative Service Award, Lancaster Laboratories (2004)

Memberships and Appointments:

Ethics Committee, Lancaster Laboratories (1998)
American Business Woman's Association (2001)
MOS Process Improvement Team, Lancaster Laboratories (2005)

Anneliese H. Owen, M.B.A., Manager, Environmental Sample Administration, Environmental Sciences

Education:

B.S. Molecular and Cell Biology, Pennsylvania State University (1986)
M.B.A. Pennsylvania State University (1993)

Professional Experience:

With Lancaster Laboratories since 1986
Coordinator (1987)
Client Services Specialist (1988)
Business Development Specialist (1990)
Group Leader, Environmental Sample Administration (1992)
Responsibilities included: supervise personnel; manage laboratory operations and financial resources; sample interpretation and entry; and monitor corrective action for quality issues.
Manager, Environmental Sample Administration (2005)
Responsibilities include: supervise personnel; manage laboratory operations and financial resources; sample interpretation and entry; and monitor corrective action for quality issues.

Linda Pape, B.A., Senior Chemist, Volatiles by GC, Environmental Sciences

Education:

B.A. Business Administration, Milsaps College (1985)

Professional Experience:

Rite Aid Pharmacy, Store Manager (1985-1989)
Responsibilities included being responsible for overall maintenance and security of merchandise, store, and property; ordering and display of all merchandise; auditing daily cash and inventory reports; scheduling employees; payroll accounting; training of new and prospective personnel
With Lancaster Laboratories since 1993
Chemist, Volatiles by GC (1993)
Responsibilities include analyzing client-submitted samples and their associated quality control samples by purge-and-trap gas chromatography; reviewing and uploading the corresponding data in an efficient manner with a high degree of accuracy and quality; evaluating current organizational and analytical systems; suggesting and implementing necessary corrective action to ensure the above can be performed in alignment with client and/or regulatory requirements; initiating and leading technical projects to a timely, accurate, and efficient conclusion while meeting client and/or regulatory requirements with a high degree of quality
Chemist, Water Quality (2000)
In addition to responsibilities listed above performed CN distillation, PO_4 digestion, and phenol distillation during a 3-month time frame
Senior Chemist, Volatiles by GC (2007)
Responsibilities include analyzing client-submitted samples and their associated quality control samples by purge-and-trap gas chromatography; reviewing and uploading the corresponding data in an efficient manner with a high degree of accuracy and quality; performing final review (verification) of data for clients (adding appropriate comments as necessary); evaluating current organizational and analytical systems; suggesting and implementing necessary corrective action to ensure the above can be performed in alignment with client and/or regulatory requirements; initiating and leading technical projects to a timely, accurate, and efficient conclusion while meeting client and/or regulatory requirements with a high degree of quality; training new employees in Volatiles by GC soils

Marlaina Raines, Microbiologist, Pharmaceutical Microbiology

Education:

Diploma in Animal Science, International Correspondence Schools (1998)

Professional Experience:

JRH Biosciences, Production Technician (2000-2002)

Responsibilities included performing all manufacturing procedures in accordance with SOPs and cGMPs; setting up, operating, and cleaning manufacturing equipment including CIP systems and facilities; completing cGMP and SOP documentation; actively participating in quality management; have extensive experience in aseptic gowning and dispensing of media in controlled environments within validated HEPA filtered class A filling stations; performing daily environmental monitoring of aseptic areas and weekly disinfection of the aseptic areas including all equipment; providing training of employees in all areas of the liquid media department, specifically in the controlled aseptic areas; monitoring of Water for Injection (WFI) on a regular basis for Endotoxin, Bioburden, pH, and Conductivity levels; assisting in the preparation of filters and equipment for sterilization through the use of a validated autoclave system; performing filter integrity tests using Bubble point testing; actively attended internal safety meetings; designated as "Lead Technician" when appropriate supervision was not available to oversee the department

With Lancaster Laboratories since 2002

Senior Technician, Environmental Microbiology (2002)

Responsibilities included performing analysis on water samples for both environmental and pharmaceutical clients to detect contaminants; performing Membrane Filtration, Heterotrophic Plate Count (solids and liquids), Multiple Tube Fermentation, Hydrocarbon Degrading Plate Count (solids and liquids), Total Coliform and *E. coli* (ONPG-MUG), Total Aerobic Microbial Count (MF), and Daily Culture Transfers; performing computer entry and verification of data; performing monthly QC and maintenance on equipment; assuring proper documentation of maintenance and cleaning; performing procedures while wearing proper PPE; assuring that SOPs are read, up-to-date, understood, and documented; assisting in the operation of the autoclave and removal of sterilized waste; reviewing departmental reports and assisting in other areas of the laboratory when needed

Microbiologist, Environmental Microbiology (2006)

Responsibilities included performing analysis on water samples for both environmental and pharmaceutical clients to detect contaminants; performing Membrane Filtration, Heterotrophic Plate Count (solids and liquids), Multiple Tube Fermentation, Hydrocarbon Degrading Plate Count (solids and liquids), Total Coliform and *E. coli* (ONPG-MUG), Total Aerobic Microbial Count (MF), and Daily Culture Transfers; performing computer entry and verification of data; performing monthly QC and maintenance on equipment; assuring proper documentation of maintenance and cleaning; performing procedures while wearing proper PPE; assuring that SOPs are read, up-to-date, understood, and documented; assisting in the operation of the autoclave and removal of sterilized waste; reviewing departmental reports and assisting in other areas of the laboratory when needed; performing growth promotion and culture maintenance

Microbiologist, Pharmaceutical Microbiology (2007)

Responsibilities included performing analysis on water samples for both environmental and pharmaceutical clients to detect contaminants; performing Membrane Filtration, Heterotrophic Plate Count (solids and liquids), Multiple Tube Fermentation, Hydrocarbon Degrading Plate Count (solids and liquids), Total Coliform and *E. coli* (ONPG-MUG), Total Aerobic Microbial Count (MF), and Daily Culture Transfers; performing computer entry and verification of data; performing monthly QC and maintenance on equipment; assuring proper documentation of maintenance and cleaning; performing procedures while wearing proper PPE; assuring that SOPs are read, up-to-date, understood, and documented; assisting in the operation of the autoclave and removal of sterilized waste; reviewing departmental reports and assisting in other areas of the laboratory when needed; performing growth promotion and culture maintenance

Christine Ratcliff, B.S., Senior Specialist, GC/MS Semivolatiles, Environmental Sciences

Education:

B.S. Chemistry, Shippensburg University (1988)

Continuing Education:

Mass Spectral Interpretation, Finnigan MAT Institute (1990)

Professional Experience:

With Lancaster Laboratories since 1988

Chemist (1991)
Coordinator (1994)
Group Leader (1996)
Senior Chemist/Coordinator (1997)
Senior Chemist (2002)

Responsibilities included review and approve data; revise and update SOPs and analytical methods; review lab data.

Senior Specialist, GC/MS Semivolatiles (2005)

Responsibilities include review and approve data; revise and update SOPs and analytical methods; review lab data.

Mark Ratcliff, B.A., Senior Specialist, GC/MS Semivolatiles, Environmental Sciences

Education:

B.A. Physics, Franklin & Marshall College (1988)

Continuing Education:

Finnegan Mass Spectral Interpretation Course (1991)

Professional Experience:

With Lancaster Laboratories since 1989
Chemist (1992)
Senior Chemist (1996)
Responsibilities included: perform GC/MS semivolatiles testing; operate GC/MS instruments; data interpretation; calibrating and repairing instruments; prepare standards; revise and update SOPs; and train other analysts.
Senior Specialist (2005)
Responsibilities include: perform GC/MS semivolatiles testing; operate GC/MS instruments; data interpretation; calibrating and repairing instruments; prepare standards; revise and update SOPs; and train other analysts.

Barbara F. Reedy, B.S., Senior Specialist, Quality Assurance, Environmental Sciences

Education:

B.S. Environmental Biology, Millersville University (1993)

Continuing Education:

Environmental GC Analysis Seminar, Restek (2001)
The Internet Audit A Quality Tool, PaAAEL (2001)
Advanced Gas Chromatography Mass Spectroscopy Seminar, PaAAEL (2002)
LC/MS/MS System Seminar, Applied Biosystems (2006)
Introduction to Root Cause Analysis, Patton Professional (2007)
When to Initiate Corrective Action, Patton Professional (2007)

Professional Experience:

Department of Environmental Resources, Division of Rivers and Wetlands, Scientific Intern (1993)
Responsibilities included reviewing wetland permits applications; inspecting and photographing wetland mitigation sites; determining hydrology, soil type, and the consistency of the mitigation with the approved project plans; researching records of the sites
With Lancaster Laboratories since 1993
Associate Chemist/Chemist, Volatiles by GC (1993)
Responsibilities included calibrating Capillary, VOA, BTEX, and FID instruments; performing routine maintenance; interpreting, reviewing, and uploading data
Senior Chemist, Volatiles by GC (1999)
Responsibilities included being primary verifier for the majority of data for Volatiles by GC for the ELCD/PID and FID for both waters and soils; signing of analytical reports; generating statistically determined QC windows; training new analysts to review and upload data into the LIMS
Senior Specialist, Quality Assurance (2001)
Responsibilities include ensuring quality of data being produced in the laboratories by performing data review, auditing laboratories, and reviewing written procedures; ensuring laboratory adherence to government regulations and client requirements; reviewing client and government documents for requirements outside our usual laboratory practices; setup and testing new analysis in the laboratory sample management system as required by the departments

Richard Rodgers, B.S., Principal Specialist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Chemistry, Millersville University (1975)

Continuing Education:

5985 Gas Chromatograph/Mass Users, Hewlett-Packard (1980)
GC/MS System Manager Course, Hewlett-Packard (1986)
Interpretation of Mass Spectra, ASMS-short course (1987)
OI Analytical Technical Training, OI Analytical (1995)

Professional Experience:

Millersville State College, Laboratory Assistant/Chemistry Technician (1971-1972)
Responsibilities included analysis for wet chemical and trace metals on environmental water samples.
Commonwealth of Pennsylvania, Chemistry Technician (1971-1975)
Responsibilities included performing various wet chemical and trace metals analyses.
Icthyological Associates, Inc., Analytical Chemist (1975-1977)
Responsibilities included analysis of environmental samples by atomic adsorption, chromatographic and wet chemical methods.
Radiation Management Corporation, GC/MS Operator/Manager (1978-1985)
Responsibilities included daily management of small environmental chemistry laboratory; GC/MS analysis on soils, water, etc.
With Lancaster Laboratories since 1985
Chemist III, GC/MS Volatiles (1985-1987)
Responsibilities included performing GC/MS semi-volatiles and volatiles analysis on various matrices by USEPA methodologies.
Group Leader, GC/MS Volatiles (1987-1989)
Responsibilities included overseeing day to day operations in the GC/MS volatiles group.
Chemist IV/Coordinator, GC/MS Volatiles (1989-1992)
Responsibilities included performing GC/MS volatiles analysis on various matrices by USEPA methodologies.

Chemist IV/Coordinator, Environmental Sciences (1992-1996)
Responsibilities included performing trace metals analysis using graphite furnace atomic adsorption techniques.
Chemist IV/Coordinator, GC/MS Volatiles (1996-1997)
Responsibilities included performing GC/MS volatiles analysis on various matrices by USEPA methodologies.
Principal Chemist, GC/MS Volatiles (1997-2005)
Responsibilities included reviewing GC/MS data for adherence to published requirements and act as a resource in problem solving.
Principal Specialist, GC/MS Volatiles (2005-2006)
Responsibilities included reviewing GC/MS data for adherence to published requirements and act as a resource in problem solving.
Principal Specialist, Flexible Staffing (2006)
Responsibilities included assisting in pharmaceutical and environmental divisions with data review and other various duties.
Principal Specialist, GC/MS Volatiles (2007)
Responsibilities include reviewing GC/MS data for adherence to published requirements and act as a resource in problem solving.

Awards, Citations, Honorary Societies, and Publications:

"Prescreening Analysis for GC/MS Volatile Organics" (1993)

Robin Runkle, B.S., Senior Specialist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Chemistry, State University of New York at Oneonta (1988)

Continuing Education:

Introduction to Mass Spectral Interpretation, Finnigan Mat (1991)
Gas Chromatography: Practical Theory and Applications for LL (1993)
HP5890 GC Troubleshooting and Maintenance, Hewlett-Packard (1993)
Technical Training, OI Analytical (1995)

Professional Experience:

With Lancaster Laboratories since 1989
Senior Chemist (1993)
Responsibilities included: sample preparation; perform GC/MS volatile testing; operate GC/MS instruments; data interpretation; review and approve data; developing and evaluating new methods; calibrating and repairing instruments; prepare standards; reagent preparation; revise and update SOPs and analytical methods; order supplies; train other analysts; and prepare and test trip blank water.
Senior Specialist (2005)
Responsibilities include: sample preparation; perform GC/MS volatile testing; operate GC/MS instruments; data interpretation; review and approve data; developing and evaluating new methods; calibrating and repairing instruments; prepare standards; reagent preparation; revise and update SOPs and analytical methods; order supplies; train other analysts; and prepare and test trip blank water.

Martha Seidel, B.S., Senior Chemist, Volatiles by GC, Environmental Sciences

Education:

B.S. Biology, Elizabethtown College (1997)

Continuing Education:

Gas Chromatography, Lancaster Laboratories University (1999)

Professional Experience:

With Lancaster Laboratories since 1997
Senior Chemist, Volatiles by GC (2002)
Responsibilities include running instruments, calibrating, prepping standrds, uploading, verifying, training other analysts.

Douglas Seitz, B.S., Senior Chemist, Flexible Staffing

Education:

B.S. Horticulture, Pennsylvania State University (1993)

Professional Experience:

With Lancaster Laboratories since 1993
Chemist, Pesticide Residue Analysis (1993-1998)
Responsibilities included performing pesticide and PCB analysis; operating GC instruments; data interpretation and entry.
Senior Chemist, Pesticide Residue Analysis (1998-2005)
Responsibilities included performing pesticide and PCB analysis; operate and maintain GC instruments; data interpretation; review and update SOPs; MDL tabulation.

Senior Chemist, Flexible Staffing (2006)
Responsibilities include preparing, running, and reviewing samples according to client compendia and industry methods using various wet chemistry techniques and instrumentation including but not limited to gas chromatography, liquid chromatography, IC and TOC instrumentation; performing analysis for various departments as determined by work volume and staffing needs.

Stephanie Sells, B.S.E., Senior Chemist, GC/MS Volatiles, Environmental Sciences

Education:

B.S.E. Biology, Chemistry Minor, Millersville University (1996)

Professional Experience:

Access I, Access II, PC Focus (1997)
Emergency Evacuation Coordinator (1998)
Gas Chromatography Principles and Practices, Lancaster Laboratories University (1998)
GC/MS Theories and Applications, MDL Systems (1999)
Statistics, Lancaster Laboratories University (2000)

Professional Experience:

With Lancaster Laboratories since 1996
Chemist (1996)
Senior Chemist, Volatiles by GC (2000)
Responsibilities included: Sample analysis, troubleshooting and maintenance, system calibration, establish QC windows for soil analysis, write SOPs, data entry, prepare standards, sample verification, analyst training.
Senior Chemist, GC/MS Volatiles (2005)
Responsibilities include: Sample analysis, troubleshooting and maintenance, system calibration, establish QC windows for soil analysis, write SOPs, data entry, prepare standards, sample verification, analyst training.

Richard Shober, B.S., Principal Chemist, Pesticide Residue Analysis, Environmental Sciences

Education:

B.S. Chemistry, Muhlenberg College (1984)

Continuing Education:

Inductively Coupled Plasma Spectroscopy, Allied Analytical (1985)
ACS Short Course, Analytical Chemistry of Contaminants in Surface and Groundwater (1986)
Gas Chromatography: Practical Theory & Application, Lancaster Laboratories (1994)
Mass Spectral Interpretation, Hewlett-Packard (1995)

Professional Experience:

With Lancaster Laboratories since 1984
Principal Chemist, Pesticide Residue Analysis (1999)
Responsibilities include: perform pesticide residue testing; operate gas chromatography instruments; data interpretation; repairing instruments; and develop and maintain computer systems/programs for lab use.

Awards, Citations, Honorary Societies & Publications:

Poster paper on computer applications for analytical chemistry
Poster paper on tobacco specific nitrosamine analysis

Biographical Listings:

Who's Who in Environmental Science

Steven Skiles, B.S., Senior Chemist, Volatiles by GC, Environmental Sciences

Education:

B.S. Biology, University of Pittsburgh (1996)

Professional Experience:

With Lancaster Laboratories since 1997
Senior Chemist/Coordinator, Volatiles by GC (1997)
Responsibilities included performing analysis, verification of data, method development, instrument troubleshooting and repair, and coordination of employees.
Senior Chemist/Group Leader, Volatiles by GC (2005)
Responsibilities included performing analysis, verification of data, method development, instrument troubleshooting and repair, and coordination of employees.
Senior Chemist, Volatiles by GC (2006)
Responsibilities include performing analysis, verification of data, method development, instrument troubleshooting and repair.

Julie Slaughenhoupt, B.S., Senior Specialist, Metals, Environmental Sciences

Education:

B.S. Chemistry, Gannon University (1991)

Continuing Education:

Short Course on Modern Furnace AA, FACSS (1994)
TJA 61E Trace, TJA (1998)

Professional Experience:

With Lancaster Laboratories since 1992
- Associate Chemist, Metals (1992)
  - Responsibilities included operation and maintenance of GFAA, AA, and Hydride instruments. Review of GFAA, AA, and Hydride data. Preparation of standards.
- Chemist, Metals (1995)
  - Responsibilities included operation and maintenance of GFAA, AA, and Hydride instruments. Review of GFAA, AA, and Hydride data. Preparation of standards. Verification of data.
- Chemist, Metals (1995)
  - Responsibilities included operation and maintenance of GFAA, AA, and Hydride instruments. Review of GFAA, AA, and Hydride data. Preparation of standards. Verification of data.
- Chemist, Metals (1996)
  - Responsibilities included operation and maintenance of trace and regular ICP. Verification of data, review of data. ICP IDL and LR data (evaluate and enter). Verification of data. Preparation of standards. QC Outliers.
- Chemist, Metals (1998)
  - Responsibilities included operation and maintenance of GFAA, AA, trace, and regular ICP instrumentation. Verification of data. Review data for ICP IDL/LR. Preparation of standards.
- Chemist/Coordinator, Metals (1999)
  - Responsibilities included coordinating the work for the prep room. Assign samples and digests. Review CLP spike results, expiration dates for standards and salts, order 1000 ppm standards and salts. Write Job Plans and Reviews.
- Chemist, Metals (2003)
  - Responsibilities included operate ICP and GFAA instrumentation as needed. Verify ICP, GFAA, and Hg data as needed. Prep samples as needed. Review data packages as needed. Track and enter annual quads and get DOCs ready for signatures. Assist with internal and external audits.
- Specialist, Metals (2005)
  - Responsibilities included operate ICP and GFAA instrumentation as needed. Verify ICP, GFAA, and Hg data as needed. Prep samples as needed. Review data packages as needed. Track and enter annual quads and get DOCs ready for signatures. Assist with internal and external audits.
- Senior Specialist, Metals (2006)
  - Responsibilities include operate ICP and GFAA instrumentation as needed. Verify ICP, GFAA, and Hg data as needed. Prep samples as needed. Review data packages as needed. Track and enter annual quads and get DOCs ready for signatures. Assist with internal and external audits.

Memberships and Appointments:

Wheatland Conestoga ABWA (2001-2006)
- Vice President (2003-2004)
- President (2004-2005 and 2005-2006)

Kimberly A. Small, B.A., Senior Microbiologist, Microbiology, Environmental Sciences

Education:

B.A. Biology, Bloomsburg University (2000)

Professional Experience:

Insalaco's Supermarket, Kiosk Attendant (1996-1997)
- Responsibilities included preparing daily food, monitoring temperatures, maintaining a clean environment, dealing with customer problems/questions; responsible for cash register, making sure all food was fresh, discarding expired items

The Children's Museum, Intern (1999-2000)
- Responsibilities included constructing a permanent exhibit for the museum/traveling exhibit; organizing a team of volunteers; designating jobs and overseeing their work; drawing up construction plans; carving 3-D objects, painting; creating ID plaques; performing various office/fund-raising work

Thomson Consumer Electronics, Production Worker (2000-2001)
- Responsibilities included mask/frame welding, press, inspection, ensure equipment is running properly and notify maintenance if not; keeping up with a production line, simultaneously work with multiple types of product, and heavy lifting (up to 25 lb, 110 times per hour)

With Lancaster Laboratories since 2001
- Microbiologist, Pharmaceutical Microbiology (2001)
  - Responsibilities included performing water testing, disinfectant efficacy testing, environmental monitoring, sample collection, data entry, and equipment maintenance

Senior Microbiologist, Microbiology (2007)
Responsibilities include performing water testing, disinfectant efficacy testing, environmental monitoring, sample collection, data entry, and equipment maintenance

Jeffrey Smith, B.A., Senior Chemist Group Leader, Volatiles in Air, Environmental Sciences

Education:

B.A. Biology, University of Delaware (1991)

Professional Experience:

Roy F. Weston, Inc., Chemist (1991-1997)
Merck, Chemist (1997-2000)
With Lancaster Laboratories since 2001
Senior Chemist, GC/MS Semivolatiles (2001)
Responsibilities included performing GC/MS analysis of semivolatile organics
Senior Chemist Group Leader, Volatiles in Air (2005)
Responsibilities include performing GC/MS analysis of semivolatile organics

Michele J. Smith, B.S., Senior Specialist Group Leader, GC/MS Semivolatiles, Environmental Sciences

Education:

B.S. Chemistry, St. Mary's College, Notre Dame, Indiana (1998)
22 credits master's study with Penn State University (2000-2002)

Continuing Education:

Gas Chromatography Principles and Practices, Lancaster Laboratories University (1999)
Statistics, Lancaster Laboratories University (2000)

Professional Experience:

St. Mary's College, Laboratory Teaching Assistant (1996-1998)
Responsibilities included: assisted professor in the laboratory—responsible for experiment demonstrations, answered student's questions, and graded lab reports.
With Lancaster Laboratories since 1998
Chemist (1998)
Responsibilities included: maintain GC/MS instrumentation, tune and calibrate GC/MS, analyze samples by GC/MS, review and assemble all supporting GC/MS data, review daily QC outliers.
Senior Chemist (2001)
Responsibilities included: maintain GC/MS instrumentation, tune and calibrate GC/MS, analyze samples by GC/MS, review and assemble all supporting GC/MS data, perform technical audit of GC/MS and HPLC, sign analysis reports, track samples to meet turn around time.
Senior Chemist Coordinator (2004)
Responsibilities included: maintain GC/MS instrumentation, tune and calibrate GC/MS, analyze samples by GC/MS, review and assemble all supporting GC/MS data, perform technical audit of GC/MS and HPLC, sign analysis reports, track samples to meet turn around time.
Senior Specialist Group Leader, GC/MS Semivolatiles (2005)
Responsibilities include: review and assemble GC/MS data, perform technical audit of GC/MS and HPLC, sign analysis reports, schedule and track samples to meet turn around time.

Memberships and Appointments:

American Chemical Society (1998-2002)

Max Snavely, B.S., Senior Specialist, Metals, Environmental Sciences

Education:

B.S. Chemistry, Lebanon Valley College (1977)

Continuing Education:

Inductively Coupled Plasma Spectroscopy, Thermo Jarrell Ash (1991)

Professional Experience:

Sterling Drug, Inc., Quality Control Chemist (1977-1980)
Andrew S. McCreath & Sons, Inc., Analytical Chemist (1980-1987)
With Lancaster Laboratories since 1987
Senior Chemist (1990)
Responsibilities included: operate ICP instruments; data interpretation; review and approve data; train other analysts; and coordinate performance evaluation samples.

Senior Specialist, Metals (2005)
Responsibilities include: operate ICP instruments; data interpretation; review and approve data; train other analysts; and coordinate performance evaluation samples.

Tara Spaide, Senior Specialist, Environmental Client Services, Environmental Sciences

Continuing Education:

Algebra and Analytical Geometry, Pennsylvania State University (1993)
Chemistry, Pennsylvania State University (1993)

Professional Experience:

With Lancaster Laboratories since 1986
Senior Specialist Coordinator, Organic Extraction (1997)
Responsibilities included supervising personnel; scheduling lab work; managing laboratory operations; reviewing and approving data; and revising and updating analytical methods
Senior Chemist Coordinator, Organic Extraction (2003)
Responsibilities included supervising personnel; scheduling lab work; managing laboratory operations; reviewing and approving data; and revising and updating analytical methods
Senior Chemist Group Leader, Organic Extraction (2005)
Responsibilities included supervising personnel; scheduling lab work; managing laboratory operations; reviewing and approving data; and revising and updating analytical methods
Senior Specialist, Environmental Client Services (2007)
Responsibilities include auditing sample paperwork; setting up standard forms; generating bottle orders; preparing quotes

Andrew Strebel, Principal Chemist, GC/MS Semivolatiles, Environmental Sciences

Continuing Education:

Advanced Aquarius Programmers Course, Hewlett-Packard (1989)
Environmental Applications of GC/MS, Indiana University (1989)
Environmental GC-MS (DOS) Operation, Hewlett-Packard (1995)
Unix Module 1, Albright College (1995)
Unix Module 2, Albright College (1995)
Unix Shell Scripts, Albright College (1995)
Unix AWK Programming, Albright College (1995)
Target Training, Thru-Put Systems, Inc. (1995)
Report Writer Training, Thru-Put Systems, Inc. (1998)
HP-UX System Administration for HP 9000s, Hewlett Packard (1998)
HP-UX Troubleshooting for HP 9000s, Hewlett Packard (1998)
GC/MS Training Course, MDL Systems (1999)
LC/MS/MS 101 Training Course, Basic Mass Spec Solutions, Inc. (2001)

Professional Experience:

With Lancaster Laboratories since 1986
Technical Specialist (1991)
Chemist (1994)
Senior Chemist (1997)
Principal Chemist, GC/MS Semivolatiles (2001)
Responsibilities include: perform routine semivolatile testing; operate GC/MS semivolatile instruments; data interpretation; review and approve data; developing and evaluating new methods; calibrating and repairing instruments; prepare standards; revise and update SOPs and analytical methods; train other analysts; develop and maintain computer systems/programs for lab use; and computer validation testing.

Robert Strocko, Jr., B.S., Manager, Metals, Environmental Sciences

Education:

B.S. Biology, York College of Pennsylvania (1988)

Continuing Education:

Thermo Jarrel I ASA ICP Course, Thermo Jarrell ASA (1993)

Professional Experience:

Springettsbury Waste Water Treatment Facility, Chemistry Technician (1986-1988)
Responsibilities included running NPDES tests on wastewater, % solids, NH4, pH, BOD, suspended solids, coliform, dissolved solids, temperature, and Hexa-Chrome testing.
Penn Dairies, Laboratory Technician (1988-1989)
Responsibilities included testing raw milk for coliform bacteria for acceptance, perform milk-fat percent solids on milk products, and calculate sugar content in sweetened milk.

Pennsylvania Department of Environmental Resources, Chemistry Technician (1989-1992)
Responsibilities included sample receipt, log data for analysis to computer, handle field sampling questions, operate flame AA, and ship cooler to field samples.
With Lancaster Laboratories since 1992
Chemist, Metals (1992)
Responsibilities included set up, pour, and run samples on ICP, review and verify ICP data, instrument maintenance, calculate IDLs, MDLs, and linear ranges, and wrote SOPs
Chemist Coordinator, Metals (1996)
Responsibilities included over seeing preproom personnel and work flow, schedule work flow through preproom, job plans, job reviews, order standards and reagents, and overchecking notebooks.
Manager, Metals (1998)
Responsibilities include overseeing technical areas in ICP, GFAA, ICP-MS, and mercury, writing SOPs, ICARs, etc., job plans, job reviews, handle technical questions for clients/client services, verify ICP data, and sign reports.

Russell Sturnick, B.S., Senior Specialist, Environmental Sample Administration, Environmental Sciences

Education:

B.S. Secondary Education/Chemistry, Slippery Rock University (1988)
Graduate Course Credits/Environmental Pollution Control, Penn State University (1991-1993)

Continuing Education:

Adult CPR+AED; First Aid; Emergency Spill Response; Client Services
Social Styles, Blood Born Pathogens, GMP/GLP, Entry Level Pharmaceutical
Fire Extinguisher, Fire Alarm, Fire Panel, Fume Hood Calibration

Professional Experience:

Harrisburg Area Community College, Adjunct Faculty Chemistry, Environmental Sciences (1993-present)
Acting Chemistry Lab/Department Coordinator, Lancaster Campus (1993-2002)
Responsibilities included teaching classes; advising students; maintaining laboratory supplies; performing laboratory waste disposal; coordinating/evaluating other adjunct faculty; interviewing and training student workers; evaluating student performance
Adjunct Faculty, Chemistry (2002-present)
Responsibilities included teaching classes; advising students; tutoring students as required; evaluating student performance
With Lancaster Laboratories since 1989
Administrator III, Sample Storage (1989)
Responsibilities included pulling orders and returning samples to storage; performing homogenization, sub-sampling, and preservation of samples; performing regular and hazardous sample discard; training and supervising persons as necessary; locating misplaced samples
Administrator III, Environmental Sample Administration (1990)
Specialist, Environmental Sample Administration (1995)
Senior Specialist, Environmental Sample Administration (2000)
Responsibilities include performing project management; training new entry personnel; interpreting and entering samples; advising clients on testing; communicating client requirements to lab areas; evaluating system performance; off hours external client contact when necessary; reporting results; scheduling pick-ups; general services inquiries; processing bottle orders; serving as off-hours Emergency Response Coordinator, first aid responder, hazardous spill responder, and fire responder; performing work in technical centers to level of training (PCB pre-screen, annual thermal and humidity sensor calibrations, fume hood calibration); performing basic supervision of personnel as required

Christiane S. Sweigart, B.S., Senior Specialist, Electronic Data Deliverables, Environmental Sciences

Education:

B.S. Science, Elizabethtown College (1985)
Medical/Technology Degree, St. Joseph School of Medical Technology (1985)

Continuing Education:

The Principals of Gas Chromatography (1993)
Statistics Course (1993)
Creative Training Techniques Conference (1997)

Professional Experience:

With Lancaster Laboratories since 1985
Chemist, GC/MS (1985)
Responsibilities included GC/MS operation targeting both VOA and BNA compounds, instrument maintenance, sample handling, and data handling (interpretation and documentation)
Chemist, GC/VOA (1986)
Responsibilities included GC operation targeting both aromatic and halogenated compounds, FID operation, instrument maintenance, sample handling, and data handling (interpretation and documentation). Training of others on FID methods, development of training/reference manual for FID, development of internal Operating Manual, standard documentation, definition and maintenance of Statistically defined windows, and temporary coordinator in Department 25.

Chemist Coordinator, GC/VOA (1993)
Responsibilities included coordination of sample analysis and data management; job plans and feedback for several personnel; communication both internal and external, and data handling (interpretation and documentation; and combination of existing department with another (personnel, instrumentation, sample volume).
Senior Specialist, Human Resources (1997)
Responsibilities included recruiting, training, and professional development.
Senior Specialist, Electronic Data Deliverables (2001)
Responsibilities include EDD generation, EDD content review, and communication (internal and external).

Awards, Citations, Honorary Societies & Publications:

Recognition for the implementation of a revamped New Hire Orientation (1999)
Recognition for the development and presentation of the Ethic's Refresher (2001)

Memberships & Appointments:

LCAHRM (1997-2001)

Lawrence Taylor, B.S., Senior Specialist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Chemistry, Shippensburg University (1989)

Continuing Education:

QA Report Operator Training Course, Finnigan Mat Institute (1990)
Technical Training, OI Analytical (1995)
Mass Spectral Interpretation Course, Hewlett-Packard (1995)
Archon Training Course, PTS (1997)

Professional Experience:

With Lancaster Laboratories since 1989
Senior Chemist (1992)
Responsibilities included GC/MS volatile data interpretation; review and approve data; verify sample results, and sign reports.
Senior Specialist (2005)
Responsibilities include GC/MS volatile data interpretation; review and approve data; verify sample results, and sign reports.

Valerie Tomayko, B.S., Senior Specialist Group Leader, Volatiles by GC, Environmental Sciences

Education:

A.S. Chemical Engineering Technology, Pennsylvania State University (1977)
B.S. Human Resource Management, Geneva College (1993)

Professional Experience:

Hercules Inc., Laboratory Technician (1977-1983)
Antech Ltd., Associate Chemist, (1985-1989)
Quanterra (formerly Wadsworth/Alert), Chemist, (1989-1997)
UEC (United States Steel Engineering Consultants), Chemist (1997)
With Lancaster Laboratories since 1997
Senior Chemist, Pesticide Residue Analysis (1997)
Responsibilities included: data interpretation; review and approve data; review data packages; and generate statistical QC limits for Pesticide Residue Analysis and Extractable Petroleum Hydrocarbons/MBC GC and Nitrosamines departments.
Senior Chemist Coordinator, Pesticide Residue Analysis (2001)
Responsibilities included: Monitor turnaround time and status of samples and packages; coordinate work flow; track employees' progress; assist in implementing procedures/protocols for meeting QA requirements, data package requirements, and special client or project-specific requests. In addition to data interpretation; review and approve data; review data packages; and generate statistical QC limits for Pesticide Residue Analysis and Extractable Petroleum Hydrocarbons/MBC GC and Nitrosamines departments.
Senior Specialist Group Leader, Pesticide Residue Analysis (2005)
Responsibilities included: Monitor turnaround time and status of samples and packages; coordinate work flow; track employees' progress; assist in implementing procedures/protocols for meeting QA requirements, data package requirements, and special client or project-specific requests. In addition to data interpretation; review and approve data; review data packages; and generate statistical QC limits for Pesticide Residue Analysis and Extractable Petroleum Hydrocarbons/MBC GC and Nitrosamines departments.
Senior Specialist Group Leader, Volatiles by GC (2006)
Responsibilities include: Monitor turnaround time and status of samples; coordinate work flow; track employees' progress; assist in implementing procedures/protocols for meeting QA requirements, data package requirements, and special client or project-specific requests. In addition to data interpretation; review and approve data; review data packages; and generate statistical QC limits for GC Volatile analysis.

Luz C. Torres, B.S., Senior Specialist Group Leader, Data Deliverables, Environmental Sciences

Education:

B.S. Secretarial Sciences, Catholic University of Puerto Rico (1982)

Continuing Education:

English as a Second Language, Spanish American Civic Association (1988)
Computer Literacy, Spanish American Civic Association (1989)

Professional Experience:

Dr. Jose Moro, Pediatrician, Administrative Secretary (1976-1986)
Responsibilities included customer service, answering phone, collecting payment, billing medical insurance, dictation, transcription, writing letters, filing, archiving, account receivables, ordering supplies.
With Lancaster Laboratories since 1988
Laboratory Assistant, Water Quality (1988)
Responsibilities included washing glassware, assisting technical staff by performing Odor and TDS analyses.
Clerk II, Data Deliverables (1991)
Responsibilities included data package assembly, tracking/preparing/sending QC summary reports, processing and sending data packages, generating and sending Lotus Text file disks, and DP content review.
Administrator I, II, III, Data Deliverables (1992)
Responsibilities included DP assembly, DP content review, review of analytical data, DP processing and sending, training new hires and current staff learning new tasks, DP corrections follow up.
Specialist Coordinator, Data Deliverables (1996)
Responsibilities included technical data review, package correction and problems investigation, Package TAT monitoring, oversee data package assembly, content review, and data package processing, documentation of departmental procedures, maintenance of database, interviewing, supervision of personnel
Senior Specialist Coordinator, Data Deliverables (2003)
Responsibilities included QA review, interviewing, supervision of personnel including writing job plan and performance evaluation, package correction and problems investigation, package TAT monitoring, documentation of departmental procedures, training new hires and cross-training employee from other areas, maintenance of method summary database, oversee data package assembly, content review, and data package processing.
Senior Specialist Group Leader, Data Deliverables (2005)
Responsibilities include QA review, interviewing, supervision of personnel including writing job plan and performance evaluation, package correction and problems investigation, package TAT monitoring, documentation of departmental procedures, training new hires and cross-training employee from other areas, maintenance of method summary database, oversee data package review and data package processing.

Timothy Trees, A.A.S., Principal Chemist, GC/MS Semivolatiles, Environmental Sciences

Education:

Certificate, N.Y.S. Water/Wastewater Treatment Operations, Columbia Greene Community College (1985)
A.A.S. Environmental Control of Hazardous Waste/Water Quality, Ulster County Community College (1986)

Continuing Education:

Water Treatment Operations, NYS License Board (1984)
Wastewater Treatment Operations, NYS License Board (1986)
Varian AA Course (1992)
Service Operations Process Optimization, Pennsylvania State University (1992)
24-hour HAZWOPER (spill response) (1995)
Atomic Spectroscopy Workshop, Perkin-Elmer (1997)
Hitachi GFAA Workshop, Hitachi, CT (1994)

Professional Experience:

York Wastewater Management (1985-1986)
Rider Engineering (1986-1988)
With Lancaster Laboratories since 1988
Senior Technician, Metals (1988-1990)
Responsibilities included: operation, maintenance, and sample preparation of mercury cold vapor and hydride generation instrumentation for the determination of mercury, arsenic, and selenium; data entry; troubleshooting instruments; repair of instrumentations' electronic system.
Chemist I, Metals (1990-1992)
Responsibilities included: operation and maintenance of graphite furnace instrumentation; verification of mercury cold vapor and hydride generation data; coaching and training of personnel in the operation of mercury and hydride instrumentation; troubleshooting and repair of instrumentations' mechanical and electronic system.
Chemist I/Coordinator, Metals (1992-1993)
Responsibilities included: operation and maintenance of graphite furnace instrumentation; ICP operation; verification of mercury cold vapor and hydride generation data; coaching and training of personnel in the operation of mercury, hydride, and graphite furnace instrumentation; troubleshooting and repair of instrumentations' mechanical and electronic system; systems operation optimization to increase production; scheduling of personnel for department operation; job plan and review with employees.

Chemist II/Coordinator, Metals (1993-1994)

Responsibilities included: coaching and training of personnel in the operation of mercury, hydride, and graphite furnace instrumentation; assist clients with data interpretation and process improvement; ICP operation; verification of graphite furnace, mercury cold vapor, and hydride generation data; data package review; troubleshooting and repair of instrumentations' mechanical and electronic systems; system operations optimization to increase production; scheduling of personnel for department operation; job plan and review with employees.

Senior Chemist/Coordinator, Metals (1994-1996)

Responsibilities included: operation, maintenance, repair, and troubleshooting of department graphite furnaces; flame atomic *absorption, mercury cold vapor, hydride generation, and Inductively Coupled Plasma Instrumentation as well as computer* systems used in the operation with these instruments; data qualification, interpretation, and verification of department workload; assist clients with interpretation of data, cause and effect; coaching and training of department personnel in areas of sample preparation, instrument setup, maintenance, and analysis using these instruments; job plan, review, and evaluation with employees; ordering of supplies; maintained operation of Metals Atomic Absorption for the department; method development for both environmental and pharmaceutical divisions for graphite furnace and ICP work; Set up and maintain, all SOPs and documentation for computer systems and instrumentation to comply with GMP regulations; data package review for metals analysis; review and verification of ICP data as needed.

Principal Chemist/Coordinator, Metals (1996-1998)

Responsibilities included: operation, maintenance, repair, and troubleshooting of department graphite furnaces; flame atomic absorption, mercury cold vapor, hydride generation, and Inductively Coupled Plasma Instrumentation as well as computer systems used in the operation with these instruments; data qualification, interpretation, and verification of department workload; assist clients with interpretation of data, cause and effect; coaching and training of department personnel in areas of sample preparation, instrument setup, maintenance, and analysis using these instruments; job plan, review, and evaluation with employees; ordering of supplies; maintained operation of Metals Atomic Absorption for the department; method development for both environmental and pharmaceutical divisions for graphite furnace and ICP work; Set up and maintain, all SOPs and documentation for computer systems and instrumentation to comply with GMP regulations; data package review for metals analysis; review and verification of ICP data as needed.

Senior Chemist, GC/MS Semivolatiles (1998-2001)

Responsibilities included: operation, maintenance, and troubleshooting of GC/MS instrumentation; HP5890 GC, 5971, 5972, 5973 Mass Spec; review and data interpretation of various analyses including but not limited to, 8270C, Appendix IX, 625, CLP 3/90, and 2/88; standards preparation for various methods; data interpretation and data package assembly of batch data; evaluation and review of system procedures.

Principal Chemist, GC/MS Semivolatiles (2001-2005)

Responsibilities included: operation, maintenance, and troubleshooting of GC/MS instrumentation; HP5890 GC, 5971,5972, 5973 Mass Spec; method development, research, and development of GC/MS procedures; review and data interpretation of various analyses including but not limited to 8270C, Appendix IX, 625, CLP 3/90 and 2/88; standards preparation for various methods; data interpretation and data package assembly of batch data; evaluation and review of system procedures; analysis and troubleshooting of HPLC and analysis of PAHs; coaching and training of analysts to assist with troubleshooting; working in Pharmaceutical Method Development and Validation, operating LC/MS, LC/MS/MS, and GC/MS instrumentation, and performing instrument qualifications since June 2003.

Principal Chemist, Flexible Staffing (2006)

Responsibilities included working in GC/MS Volatiles in Air department; operation, maintenance, and troubleshooting GC//MS instrumentation; HP5890 GC, 5971, 5972, 5973 Mass Spec; method development, research, and development of GC/MS procedures; review and data interpretation of various analyses including but not limited to TO-15 and TO-14; standards preparation for various methods; data interpretation and data package assembly of batch data; evaluation and review of system procedures; ability to operate a variety of instrumentation and data systems.

Principal Chemist, GC/MS Semivolatiles (2007)

Responsibilities included operating, performing maintenance on, and troubleshooting GC/MS instrumentation; HP5890 GC, 5971,5972, 5973, 5975 Mass Spec; method development, research, and development of GC/MS procedures; review and data interpretation of various analyses including, but not limited to, 8270C, Appendix IX, 625, CLP 3/90 and 2/88; standards preparation for various methods; data interpretation and data package assembly of batch data; evaluation and review of system procedures; analysis and troubleshooting of HPLC and analysis of PAHs; coaching and training of analysts to assist with troubleshooting; Including working in GC/MS Volatiles in Air department; operation, maintenance, and troubleshooting GC/MS instrumentation; HP5890 GC, 5971, 5972, 5973 Mass Spec; method development, research, and development of GC/MS procedures; review and data interpretation of various analyses including but not limited to TO-15 and TO-14; standards preparation for various methods; data interpretation and data package assembly of batch data; evaluation and review of system procedures; ability to operate a variety of instrumentation and data systems.

Michele Turner, B.A., Director, Environmental Sciences

Education:

B.A. Chemistry, East Stroudsburg University (1987)

Continuing Education:

Interpretation of Mass Spectra, ASMS (1989)
Service Operations Process Optimization, Pennsylvania State University (1992)
Survey of Management, Pennsylvania State University (1992)
Organization, Design, and Development, Pennsylvania State University (1993)
Group Facilitation and Leadership Skills, Pennsylvania State University (1994)
Organizational Behavior, Pennsylvania State University (1995)
Presentation Skills, Pennsylvania State University (1995)

Professional Experience:

With Lancaster Laboratories since 1987
Chemist/Coordinator (1989)
Group Leader (1991)
Manager (1997)
Responsibilities included: personnel, operations, and financial management; resource allocation; intradepartmental collaboration; interaction with clients, auditors, and internal staff to ensure requirements are understood and met.
Director (2005)
Responsibilities include: personnel, operations, and financial management; resource allocation; intradepartmental collaboration; interaction with clients, auditors, and internal staff to ensure requirements are understood and met.

Awards, Citations, Honorary Societies & Publications:

American Institute of Chemists Award (1987)

Memberships:

American Business Women's Association

Abraham H. Uysal, M.S., Senior Data Review Specialist, GC/MS Volatiles, Environmental Sciences

Education:

B.S. Chemistry, M.E. Tech. University-Turkey (1979)
M.S. Chemistry, M.E. Tech. University-Turkey (1982)

Professional Experience:

Aerotek, Senior Chemist (1997-1998)
Responsibilities included analysis of semivolatiles by GC/MS and analysis of volatile organics by GC/PID/ELCD.
Wastex Inc., Lead Supervisor (1998-1999)
Responsibilities included analysis of semivolatiles by GC/MS and analysis of pesticides/PCBs by GC/ECD.
M.J.Reider Assoc. Inc., Senior Chemist (1999-005)
Responsibilities included analysis of pesticides and PCBs by GC/ECD: Preparation, analysis, and data review.
With Lancaster Laboratories since 2005
Senior Data Review Specialist, GC/MS Volatiles (2005)
Responsibilities include auditing GC/MS volatiles data for accuracy and integrity.

Robert Todd Vincent, B.S., Senior Chemist, Organic Extraction, Environmental Sciences

Education:

B.S. Chemistry, West Virginia Wesleyan College (2001)

Professional Experience:

With Lancaster Laboratories since 2001
Chemist, Organic Extraction (2001)
Responsibilities included analyzing samples; performing equipment repair; GC method development
Chemist, Organic Extraction (2005)
Responsibilities included performing method development; equipment repair
Senior Chemist, Organic Extraction (2007)
Responsibilities include performing method development; equipment repair; vendor relations; technology evaluation

Jia Wang, Ph.D., Principal Chemist, Specialty Services Group, Environmental Sciences

Education:

B.S. Organic Chemistry, Sichuan University (1990)
M.S. Organic Synthesis, Sichuan University (1993)
Ph.D. Natural Production Chemistry, Kunming Institute of Botany (1996)

Continuing Education:

High Performance Liquid Chromatography, The Chromatograph Forum of Delaware Valley (2001)
Agilent GC-MSD ChemStation and Instrument Operation, Agilent Technologies (2002)
Shimadzu GC/MS Training, Shimadzu/Philip Morris USA (2005)
LECO GC×GC-TOFMS, LECO Corporation (2005)
TSQ Quantum Operations, ThermoFisher Scientific (2007)
QQQ LC/MS Techniques & Operations, Agilent Technologies (2007)

Professional Experience:

Yunnan Academy of Tobacco Sciences, Research Scientist (1996-1998)
Responsibilities included studying the chemical constituents in tobacco

University of Kentucky, Postdoctoral Fellow (1998-2000)
Responsibilities included studying nornicotine and nitrosamine formation in tobacco
Philip Morris USA, Postdoctoral Research Associate (2000-2003)
Responsibilities included conducting research on nitroso compounds in tobacco and free radicals in cigarette smoke
With Lancaster Laboratories since 2003
Principal Chemist, Professional Scientific Staffing – VA (2003)
Responsibilities included working on a variety of projects associated with tobacco compounds
Principal Chemist, Specialty Services Group (2007)
Responsibilities include determining selected perfluorinated alkyl acids in drinking water by LC/MS/MS

Awards, Citations, Honorary Societies, and Publications:

20 publications

Memberships and Appointments:

American Society of Pharmacognosy (2002-present)
American Chemical Society (2002-2006)
Botanical Society of China (2005)
Sigma Xi, The Scientific Research Society (2005)

Barbara B. Weaver, B.S, Senior Specialist, GC/MS Semivolatiles, Environmental Sciences

Education:

B.S. Biology, Guilford College (1979)

Continuing Education:

Graduate Courses in Biology, University of North Carolina (1980-1982)
Mass Spectral Interpretation, Hewlett-Packard (1995)
Technical Training, OI Analytical (1995)

Professional Experience:

Roche Biomedical Laboratories, *Medical Technologist (1983-1985)*
Responsibilities included in-vitro immunoassay testing; interpret/report results; use various laboratory techniques and instrumentation.
Carolina Biological Supply Company, Medical Technologist/Department Head-1987 (1985-1988)
Responsibilities included develop secondary science education materials; teach science workshops and product exhibits.
E.I. Du Pont de Nemours & Company, Laboratory Technician (1989-1990)
Responsibilities included perform laboratory assays in support of new cardiovascular drug development; various techniques and instrumentation.
With Lancaster Laboratories since 1991
Chemist, GC/MS Volatiles (1991-1997)
Responsibilities included prepare and analyze samples according to client and industry methods using Gas Chromatography/Mass Spectroscopy; interpret data; review and approve data; train other analysts.
Senior Chemist, GC/MS Semi-volatiles (1997-2005)
Responsibilities included data interpretation; review and approve data; revise and update SOPs; train other data reviewers; review data packages; sign and approve final analytical reports.
Senior Chemist, Pharmaceutical Quality (2004-2005)
Responsibilities included data review of instrument qualifications including, but not limited to, HPLC and GC instrumentation.
Senior Specialist, Flexible Staffing (2006)
Responsibilities included review data according to client compendia and industry methods; review various chemistry techniques and instrumentation including, but not limited to, gas chromatography, liquid chromatography, IC and TOC instrumentation; review *data for various departments as determined by work volume and staffing needs.*
Senior Specialist, GC/MS Semivolatiles (2007)
Responsibilities include review data according to client compendia and industry methods; review various chemistry techniques and instrumentation including, but not limited to, gas chromatography, liquid chromatography, IC and TOC instrumentation; review data for various departments as determined by work volume and staffing needs.

Awards, Citations, Honorary Societies, and Publications:

Sigma Xi, Grant-in-Aid of Research (1982)
Three educational articles on biological subjects.

Donald Wyand, B.S., Director, Environmental Business Development/Sales, Environmental Sciences

Education:

B.S. Chemistry, Lebanon Valley College (1989)

Continuing Education:

Graduate Chemistry, Villanova University

Professional Experience:

With Lancaster Laboratories since 1989
Client Services Specialist (1990)

Business Development Specialist (1993)
Principal Specialist/Account Manager (1995)
Principal Specialist/Sales (1998) Principal Specialist/Coordinator/Sales, Environmental Sciences (2001)

Responsibilities included: National Account Manager; project management; evaluating new methods; consult with clients regarding testing needs; develop long-term, mutually beneficial relationships with new and existing clients by maximizing our clients' efficiency and effectiveness in managing analytical projects; present relevant market information to senior management and technical operations staff to develop new services for our clients; organize and manage National Account teams; prepare, organize, and manage project planning for target accounts; present Lancaster Labs' capabilities through formal presentations, personal account visits, and marketing campaigns; develop and maintain marketing programs within assigned geographic territory; maintain and communicate knowledge of regulatory issues, analytical methodology, and industry requirements to new and existing clients; prepare proposals and quotations; advise clients on testing; communicate client requirements to lab areas; perform technical presentation to inform our clients of new environmental regulations; and lead client teams to offer analytical solutions to client problems.

Principal Specialist/Group Leader/Sales (2005)

Responsibilities included: National Account Manager; project management; evaluating new methods; consult with clients regarding testing needs; develop long-term, mutually beneficial relationships with new and existing clients by maximizing our clients' efficiency and effectiveness in managing analytical projects; present relevant market information to senior management and technical operations staff to develop new services for our clients; organize and manage National Account teams; prepare, organize, and manage project planning for target accounts; present Lancaster Labs' capabilities through formal presentations, personal account visits, and marketing campaigns; develop and maintain marketing programs within assigned geographic territory; maintain and communicate knowledge of regulatory issues, analytical methodology, and industry requirements to new and existing clients; prepare proposals and quotations; advise clients on testing; communicate client requirements to lab areas; perform technical presentation to inform our clients of new environmental regulations; and lead client teams to offer analytical solutions to client problems.

Director, Environmental Business Development/Sales (2006)

Responsibilities include: National Account Manager; project management; evaluating new methods; consult with clients regarding testing needs; develop long-term, mutually beneficial relationships with new and existing clients by maximizing our clients' efficiency and effectiveness in managing analytical projects; present relevant market information to senior management and technical operations staff to develop new services for our clients; organize and manage National Account teams; prepare, organize, and manage project planning for target accounts; present Lancaster Labs' capabilities through formal presentations, personal account visits, and marketing campaigns; develop and maintain marketing programs within assigned geographic territory; maintain and communicate knowledge of regulatory issues, analytical methodology, and industry requirements to new and existing clients; prepare proposals and quotations; advise clients on testing; communicate client requirements to lab areas; perform technical presentation to inform our clients of new environmental regulations; and lead client teams to offer analytical solutions to client problems.

Memberships & Appointments:

American Chemical Society
Society of American Military Engineers
Society for Applied Spectroscopy

Lancaster Laboratories

Environmental Quality Policy Manual

Appendix E
SOPs and Analytical Methods

Current as of January 25, 2008
23 Total Pages (including this coversheet)

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2266	Nitrite Nitrogen Analysis in Tobacco
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2808	Nitrate Nitrogen in Tobacco (Colorimetric, Automated Cadmium Reduction)
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5102	Analysis of Tobacco Specific Nitrosamines (TSNA) in Tobacco Leaf by LC/MS/MS
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SOP-TR-003	Sampling Swimming Pool Water
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MC-AL-003	Routine Instrument Maintenance for Volatiles in Air by GC and GC/MS
SOP-AL-001	Cleaning and Handling of Summa Canisters
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0201, 0202	Analysis #0201 Alkalinity to pH 8.3 (titrimetric) Analysis #202 Alkalinity to pH 4.5 (titrimetric)
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0204, 0205	Total Fixed Solids (#0204) Total Volatile Solids (#205)
0206	Total Suspended Solids (Gravimetric)

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0209	Total Dissolved Solids (Calculation)
0210	Fixed Dissolved Solids (Calculation)
0211	Volatile Dissolved Solids (Calculation)
0212	Total Dissolved Solids (Gravimetric)
0215	Settleable Solids
0216	Total Hardness (Titrimetric Determination)
0221	Ammonia-Nitrogen for Waters (Titrimetric Distillation Procedure)
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0226	*Orthophosphate*
0229	Sulfite
0230	Colorimetric Sulfide
0231	Total Recoverable Oil and Grease (Extraction, Gravimetric)
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0276	Hexavalent Chromium (colorimetric)
0277	Color
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0475, 0476	Acidity to pH 3.7 and pH 8.3 (titrimetric)
0521	Total Residue
0522, 1029	Volatile Residue (#0522) Total Fixed Residue/Ash (#1029)
0541	Soluble Biochemical Oxygen Demand Determination
0542	Ignitability of Solids
0559	Dissolved Silica (Colorimetric)
0573	Ammonia-Nitrogen for Soils (Tritrimetric Distillation Procedure)
1121	Reactivity
1122	Reactive Sulfide
1124	Chloride (titrimetric determination)
1125	*Sulfate (turbidimetric)*
1126, 8140, 8124	Petroleum Hydrocarbons Total Recoverable from Waters
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1553	Chemical Oxygen Demand (COD) (Dichromate Reflux Method) (Titrimetric, Low-Level)
1554	Oil and Grease/Petroleum Hydrocarbons
1562, 8125	Total Petroleum Hydrocarbons (SW), Sonication Extraction
1630	Acid Volatile Sulfide
1820	Paint Filter Liquids Test (Free Liquids Test)
1821, 7552	Oxidation-Reduction Potential
1962, 7825	Hexavalent Chromium in Solids by CTRCP (Alkaline Digestion and Analysis Methods)
1968	Hexavalent Chromium (Colorimetric) in Waters by CTRCP
2365	Percent Solids for GC/MS
2446	Total Petroleum Hydrocarbons (Gravimetric)
2562, 6598	n-Hexane Extractable Material (HEM) in Solids and Silica Gel Treated n-Hexane Extractable Material (SGT-HEM)
4001	Chemical Oxygen Demand (COD) (Dichromatic Reflux Method) (Colorimetric)
4530	Total Acidity for Wastewater
6628	Dissolved Silica (Low Level, Colorimetric)
6649	Total Dissolved Solids (Gravimetric)
6866	Moisture (Gravimetric)
6914, 4219, 2593	(#6914) Ammonia - Nitrogen by Ion-Selective Electrode Method (ISE) (#4219) Ammonia Distillation (#2593) Un-ionized Ammonia
7103	Particle Size Distribution of Soils and Solids
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8344	Ferrous Iron
MC-WQ-002	Spectronic Genesys 2 Spectrophotometer
MC-WQ-003	Thermometer Calibration
MC-WQ-004	Accumet Model 50 pH/Ion/Conductivity & Orion Model 550 pH/Conductivity Meters
MC-WQ-006	Equipment Incubators and Refrigerators
MC-WQ-007	pH Probes and Meters
MC-WQ-009	Equipment Muffle Furnaces and Ovens
MC-WQ-010	Calibration of Hach 2100AN Turbidimeter
MC-WQ-012	Maintenance of Desiccators
MC-WQ-013	Fixed Volume Hand-Held Pipettes
MC-WQ-014	Adjustable Volume Handheld Pipettes
MC-WQ-016	Maintenance and Calibration of YSI Model 59 Dissolved Oxygen Meter
MC-WQ-017	Hach DR 2800 Spectrophotometer
MC-WQ-019	Winkler Titration Procedure
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MC-WQ-021	Model XL2020 Sonicators
MC-WQ-022	Orion 960 Autotitration System
MC-WQ-023	YSI Model 5100 Dissolved Oxygen Meter
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SOP-WQ-014	Instructions for Collecting Data on the LLENS System
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Appendix F
Instrument and Equipment List

Current as of January 25, 2008
4 Total Pages (including this coversheet)

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Instrument	# of Units	Manufacturer/Model #
Liquid Chromatography/Gas Chromatography/Mass Spectrometry (LC/GC/MS)		
LC/MS/MS	2	Waters 2795 LC with Micromass Quattro micro MS/MS and Waters 2996 Photodiode Array UV-Vis Detector
LC/MS/MS	1	Agilent 1100MSD
LC/MS/MS	1	Agilent 1200 LC with Agilent 6410 MS/MS
GC/MS	5	Agilent 5971
GC/MS	4	Agilent 5972
GC/MS	18	Agilent 5973
GC/MS	5	Agilent 5975
GC/MS	2	Shimadzu QP-5000/GC-17A
Gas Chromatograph	8	Agilent 5890
Gas Chromatograph	10	Agilent 6890
Auxiliary Equipment for Gas Chromatographs		
Most of the GC/MS and GC systems include autosamplers and approximately half are fitted with purge and trap concentrators for analysis of volatiles.		
Purge/Trap Concentrators	1	Agilent G1900
Purge/Trap Concentrators	12	OI 4550
Purge/Trap Concentrators	27	OI 4560/4660
Purge/Trap Concentrators	1	Tekmar LCS2000
Autosamplers	4	Archon 5100/5100A
Autosamplers	4	Agilent 7673/7673A
Autosamplers	6	Agilent 7683
Autosamplers	2	Agilent GI512A
Autosamplers	19	OI 4551/4552
Autosamplers	1	EST Centruion
Automated Sampling System (Tedlar Bags)	1	Tekmar 2016/2032/LSC2000
Automated Sampling System (Summa Canisters)	3	Entech 7016CR Autosamplers
Automated Sampling System (Tedlar Bags/Summa Canisters)	1	Entech 7032A
Automated Concentrator	3	Entech 7100
Automated Concentrator/Sampling System	1	Tekmar Autocan
Headspace Sampler	2	Leap Technologies CTC HS500
Detectors available for GC: Electron Capture, Flame Ionization, Photoionization, Hall Electrolytic Conductivity, Nitrogen/Phosphorus, and Thermal Conductivity. All of the chromatographs are connected to electronic integration systems.		
High Performance Liquid Chromatography		
High Performance Liquid Chromatograph	1	Agilent 1100 LC
High Performance Liquid Chromatograph	1	Agilent 1100
High Performance Liquid Chromatograph	1	Agilent 1200 HPLC
High Performance Liquid Chromatograph	1	Agilent 1200 with triple quad mass spec
High Performance Liquid Chromatograph	1	Hitachi L7000
High Performance Liquid Chromatograph	2	Shimadzu LC-10
High Performance Liquid Chromatograph	2	Shimadzu LC-6A or 6B
Auxiliary Equipment for High Performance Liquid Chromatography		
Post Column Reaction Unit	1	Pickering EC-500
Detectors available for HPLC: Ultraviolet and Fluorescence		
Gel Permeation Chromatography		
Gel Permeation Chromatograph	1	Zymark J2
Gel Permeation Chromatograph	1	ABC Lab 1000
Ion Chromatography		
Ion Chromatograph	1	Dionex DX320
Ion Chromatograph	1	Dionex ICS1000
Ion Chromatograph	2	Dionex 500
Ion Chromatograph	1	Dionex ICS1500

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Instrument	# of Units	Manufacturer/Model #
Atomic Absorption/Emission Spectrophotometry		
Trace Vacuum ICP	4	Thermal Jarrell Ash 61E
ICAP™ 600 Duo ICP Analyzer	1	Thermal Garrel Ash
Graphite Furnace Atomic Absorption Spectrophotometer (GFAA)	1	Perkin-Elmer 5100ZL
ICP/MS	2	P/E Sciex Elan 9000
GFAA	1	Perkin Elmer AAnalyst 600
GFAA	1	Varian SpectrAA 800/SpectrAA 400
Mercury Analyzer	2	Leeman Labs PS 200II
Mercury Analyzer	1	Leeman Labs HYDRA AF_{GOLD+}
Mercury Prep Station	1	Leeman Labs AP200II
UV Vis/IR Spectrophotometry:		
Fourier Transform Infrared Spectrophotometer	1	Varian Scimitar 800
UV-Vis Spectrophotometer	3	Spectronic Genesys
UV-Vis Spectrophotomenter	1	Hach DR2800
Miscellaneous Chemistry Instrumentation		
Air Flow Calibration Device	1	Gilian Gillibrator
Automated Composite Water Sampler	5	American Sigma
Automated Extractors	2	Fast PSE units
Autotitrator System	1	Orion 960
Block Digestion Systems	6	Environmental Express SC150
Centrifuge	8	Various
Chilled water recirculators	4	Various
Closed Cup Flashpoint Apparatus, Pensky-Martin	1	Fisher Scientific TA6
Cyanide Midi Distillation Kits	6	Various
Dissolved Oxygen Meter	1	YSI Model 59
Flow Solution Autoanalyzer	2	Alpkem
Gas Sorption Analyzer	1	Coulter 360CX
Glassware washer - automated	3	Miele – (2) G7827 & (1) G7704
High Purity Solvent Recycling System	2	B/R Instrument 8600
Hydrogen generator	2	Packard
Kjehldal Distillation Apparatus	2	Fisher
MicroTIP	1	Photovac MP-100
Microwave Digestion System	2	OI Analytical 7195
Octagon Sieve Shaker	1	CSC Scientific 200
Personal Sampling Pump	10	Various
pH meters	8	Various
Phenol Midi Distillation	2	Andrews Glass
Pressurized Solvent Extractor	4	Dionex ASE200/Applied Separations PSE
Sonicators	22	Various
Submersible Pump (Upgraded for 300 foot depth)	1	Hajoca Corp. P050-2W
Total Organic Carbon Analyzer	1	O.I. Corp. 1030
Total Organic Carbon Analyzer	1	Tekmar-Dohrmann Apollo 9000
Total Organic Carbon Combustion Analyzer	2	O.I. Corp. 1010
Turbidimeter	1	Hach 2100AN
Ultrasonic Flowmeter	1	ISCO 3210
Zero Headspace Extractor	76	Various Models
Microbiology Equipment		
Autoclave	2	Steris – Amsco,
Balance	5	Mettler, PB 3002
Balance	1	Mettler-Toledo, AT200
Balance	2	Mettler-Toledo, PR2002
Balance	1	Sartorius BP4100
Biological Safety Cabinet	4	NuAire NU-425-600 Type A/B 3

Instrument	# of Units	Manufacturer/Model #
Biological Safety Cabinet	1	NuAire NU-435-600 Type B2 Fume Hood
Colony Counter	3	Quebec Dark Field
Incubator	1	PGC 9311-1127
Incubator	1	PS WFY20SAWI
Microscope	1	Stereoscope with Zoom, AO Model 570
Microscope	1	Zeiss
pH Meter	2	Orion Model 410A
Quanti-Tray Sealer	1	IDEXX Model 2X
Water Bath	1	Boekel Grant with Removal Heater Circulator
Water Bath	1	Thermo Electron Corp.
Water Bath	1	Precision Coliform Incubator Bath
Water Bath	1	VWR 1275PC
UV Light	2	Spectronics
UV Sterilizer	1	Millipore

Computer Equipment

Our laboratories make extensive use of computers for business applications, technical operations (e.g., our sample management system), and QA Program (see section on Quality Assurance). The following is a list of the major components of our computer systems.

Dell PowerEdge 6300 server with Windows Server 2000 for Atlas Chromatography Server

Five IBM P5-510 Servers running AIX UNIX 5.3L with 2-way 1.90GHz cpu's

One IBM P5-520 Server running AIX UNIX 5.3L with 4-way 1.90GHz cpu's.

- 8 GB RAM in each Alpha
- 16-24 GB RAM in IBM servers
- Two DS4300 SAN's running at array level 5 with dual 2GB Fibre Channel ports and online spare drives. Automatic failover of failed drives and switches.
- 6.7+ Terra Btyes of disk storage
- 20/40 GB tape backup
- 200/400 GB tape backup
- 400/800 GB tape backup
- On-line fail over databases are available for all corporate production Oracle databases.

Networks/Telecommunication:

- TCP/IP based network
- One Gigabit backbone to accommodate company server farm
- 3Com 7700 network core with 3Com Switches in the wiring closets

Personal Computers/Servers:

- 3 T1s for Internet access through Cisco ASDM firewall
- ArcServe backup server
- Microsoft Exchange server
- Dell PowerEdge file and print servers
- More than 30 Network File Servers
- More than 800 Personal Computers

Power Systems:

- 3 Phase Uninterrupted Power System

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Appendix G
Preventative Maintenance Schedules

Current as of January 16, 2008
3 Total Pages (including this coversheet)

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Preventive Maintenance Schedule

Instrument	Preventive Maintenance	Frequency
GC/MS	Change septum	AN* : Min. weekly
	Clean/replace injection port seal & liner	AN
	Check fans	Monthly
	Check cool flow	Monthly
	Clean source	Bimonthly or AN
	Change oil in diffusion pump	Annually
	Change oil in rough pump	Annually
GC Volatiles	Check propanol level in ELCD reservoir	AN: Min. semiweekly
	Check all liquid and gas flows	Prior to calib. or AN
	Clean ELCD cell, change reaction tube	AN
	Change ELCD Teflon line, resin tube	AN
	Replace adsorbent trap in concentrators	AN
	Change PID lamp	AN
	Precalibration instrument settings check	Prior to each calibration
GC	Septum change	Each run
	Column/injection port maintenance	AN
	Clean detector	AN
	Leak check ECDs	Semiannually
GFAA	Inspect/clean furnace head	AN
	Clean windows	AN
	Check Cool-Flow water level	AN
	Inspect sample introduction capillary & graphite tube	AN
	Adjust/replace electrodes/shroud	AN
Cold Vapor AA and Cold Vapor AF	Replace pump tubing	AN
	Lubricate pump head & autosampler	AN
	Clean optical cells and windows	AN
ICP	Replace pump winding	AN
	Lubricate autosampler	AN
	Vacuum instrument airfilters and air intakes	AN
	Change vacuum pump oil	Semiannually
	Clean optics and lenses	AN
	Clean Torch and injector tip	AN
	Clean nebulizer and spray chamber	AN
Infrared Spectrometer (FTIR)	Check on-demand diagnostics	Weekly
	Change dessicant	AN
LC/MS/MS	Change rough pump (vacuum) oil	Semiannually
	Clean cones and spray chamber	Daily
	Clean source and ion lenses	Annually
	Check electrospray capillary	AN
	Empty waste liquid reservoir	AN
	Tune and calibrate MS	AN

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Instrument	Preventive Maintenance	Frequency
HPLC	Pump lubrication	Annually
	Check pump seals	Annually
	Check-valves cleaned or rebuilt	AN
	Replace and/or adjust detector bulb	AN
	Clean detector flow cell	AN
	Replace Teflon lines	AN
	Autosampler septa replacement	AN
	In-line filter sonication/cleaning	AN
	System passivation	AN
	PCRS pump lubrication	AN
	Empty waste liquid reservoir	Daily
ICP/MS	Change interface rough pump oil	Quarterly
	Change MS rough pump oil	Semiannually
	Clean cones and ion lenses	AN
	Clean Torch, injector tip, nebulizer and spray chamber	AN
	Change peristaltic tubing	Weekly
	Vacuum instrument airfilters and air intakes	AN
	Empty waste liquid reservoir	Daily
Total Organic Carbon Analyzer	Check for leaks	AN
	Inspect rotary valve	AN
	Clean gas permeation tube	AN
	Check halide scrubber	AN
	Check dessicant tube	AN
	Dust back and clean circuit boards	AN
Autoanalyzer spectrophotometer	Clean sample probe	AN
	Clean proportioning pump	AN
	Inspect pump tubing, replace if worn	AN
	Clean wash receptacles	Monthly

*AN = as needed. These actions may be performed more frequently as required by the instrument's operational response.

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Appendix H
Calibration Schedules

Current as of January 25, 2008
13 Total Pages (including this coversheet)

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Calibration Summary for SW-846 Methods

	Initial Calibration			Continuing Calibration Verification		
Instrument	Frequency	# Std Conc	Acceptance Criteria	Frequency	# Std Conc	Acceptance Criteria
GC/MS Volatiles*	After C-cal fails	6	RF for SPCCs >0.300 for chlorobenzene and 1,1,2,2-tetrachloroethane, and >0.100 for 1,1-dichloroethene, bromoform and chloromethane %RSD CCCs <30%	Every 12 hours	1	RF for SPCCs >0.300 for chlorobenzene and 1,1,2,2-tetrachloro-ethane, and >0.100 for 1,1-dichloroethene, bromoform and chloromethane %Drift for CCCs <20
GC/MS Semivolatiles*	After C-cal fails	6	RF for SPCC's >0.050 Max %RSD for CCC's <30%	Every 12 hours	1	RF for SPCCs 0.050 %Drift for CCCs <20
GC/MS Semivolatiles SIM	After C-cal Fails	6	% RSD for all compounds ≤20%	Every 12 hours	1	%Drift ± 20%
GC VOA Halocarbons *and/or* Aromatics	After C-cal fails	At least 5	% RSD ≤20% for individual compounds. Alternatively, if the average of the %RSDs of all compounds in the calibration standard is ≤20% then the average RF can be used for all compounds.	Every 10 samples	1	%Drift ± 15% for individual compounds or average % drift for all compounds in the standard ± 15%
GC Pesticides	Each new run or After C-cal fails	5	20% RSD of RFs of initial calibration to use avg. RF, otherwise use curve fit. Degradation for DDT, endrin 15% Alternatively, if the average of the %RSDs of all compounds in the calibration standard is ≤20%, then the AVG RF can be used for all compounds.	Every 10 samples Every 20 samples or 12 hours for Method 8081A, 8082	1	≤15% drift from initial response for quantitation C-cal - A CCV is also compliant if the average % difference is ≤15% for all compounds in the CCV standard. DDT/Endrin breakdown check 15% every 12 hours or 20 injections (8081A)
HPLC	Each new run or after C-cal fails	5	20% RSD of RFs of initial calibration to use average RF, otherwise use curve fit Alternatively, if the average of the %RSDs of all compounds in the calibration standard is ≤20%, then the AVG RF can be used for all compounds.	Every 10 samples	1	≤15% drift from initial response for quantitation C-cal - A CCV is also compliant if the average % difference is ≤15% for all compounds in the CCV standard.

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Calibration Summary for SW-846 Methods

	Initial Calibration			Continuing Calibration Verification		
Instrument	Frequency	# Std Conc	Acceptance Criteria	Frequency	# Std Conc	Acceptance Criteria
GC TPH-GRO	After C-cal fails	At least 5	% RSD of <20% to use the average CF, otherwise use calibration curve	Every 12 hours	1	%Drift ±15%
GC TPH-DRO	After C-cal fails	5	20% RSD of RFs of initial calibration to use average RF, otherwise use curve fit.	Every 12 hours	1	% Drift ±15%
ICP/MS	Each new run	1	Independent calibration verification (ICV) within ±10%	Every 10 samples	1	±10% of true value
ICP	Each new run	1	Independent calibration verification within ±10%, standards <5%RSD	Every 10 samples	1	Same as initial
CVAA	Each new run	5	Independent calibration verification within ±10% Correlation coefficient >0.995	Every 10 samples	1	±20% of true value
GFAA	Each new run	5	Independent calibration verification within ±10% Correlation coefficient >0.995	Every 10 samples	1	±20% of true value
Autoanalyzer	Daily	6	Correlation coefficient >0.995	Every 10 samples	1	±10% of true value
FTIR Spectro-photometer	Monthly	5	Correlation coefficient >0.995	Every 10 samples/ each day	1	±10% of true value
TOC Analyzer (w) Inst # 2 (s) Inst # 3	Monthly	 6 5	 Corr. Coeff. > 0.995 Corr. Coeff. > 0.995	Every 10 samples	1	±10% of true value
Balance	Daily	4	Top-loading ±.5%, Analytical ± .1% for weights >.1 g 50 mg ± .5%, 20 mg ± 1.0% 10 mg and 5 mg ± 2.0%	N/A	N/A	N/A

*All compounds with %RSD >15 must use first or second order regression fit of the six calibration points. Alternatively, if average of the %RSD of all compounds in calibration standard is ≤15%, the AVG RF can be used for all compounds.

Abbreviations

Std Conc - The number of standard concentrations used

%RSD - Percent Relative Standard Deviation CF – Calibration Factor

SPCCs - System Performance Check Compounds

CCCs - Calibration Check Compounds C-cal - Continuing Calibration

RF - Response factor GFAA - Graphite Furnace Atomic Absorption
CVAA - Cold Vapor Atomic Absorption

ICP - Inductively Coupled Plasma spectrophotometer; ICP run also includes inter-element correction check standard (at beginning and end of run)

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Calibration Summary for CLP Methods						
	Initial Calibration			Continuing Calibration Verification		
Instrument	Frequency	# Std Conc	Acceptance Criteria	Frequency	# Std Conc	Acceptance Criteria
GC/MS Volatiles	After C-cal fails	5	Specified compounds must meet contract minimum RRF criteria and max %RSD of ≤20.5%	Every 12 hours	1	Specified compounds must meet contract minimum RRF criteria and max %D of ≤25%
GC/MS Semivolatiles	After C-cal fails	5	Specified compounds must meet contract minimum RRF criteria and max %RSD of ≤20.5%. Up to 4 compounds may fail, but must be <40%.	Every 12 hours	1	Specified compounds must meet contract minimum RRF criteria max %D of ≤ 25%. Up to four compounds may fail, but must be <40%.
GC Pesticides	After C-cal fails	3	%RSD for compounds ≤20% (alpha-BHC and delta-BHC ≤25%) %RSD for surrogates ≤30%	Every 12 hours	1	IND A & B/PEM alternate every 12 hours with %D ≤25. Degradation for DDT, endrin ≤20%, combined ≤30% IBLK every 12 hours with CCV
Cold Vapor AA	Each new run	5	Independent calibration verification within ±20%	Every 10 samples	1	Same as initial
ICP	Each new run & < 60 samples/run	1	Independent calibration verification within ±10%	Every 10 samples	1	Same as initial
GFAA	Every new run	5	Independent calibration verification within ±10%	Every 10 samples	1	Same as initial
Autoanalyzer (cyanide)	Daily	5	Correlation coefficient >0.995	Every 10 samples	1	±10% of original response
Balance	Daily	4	±.5%	N/A	N/A	N/A

Abbreviations

RRF – Relative Response Factor

%RSD – Percent Relative Standard Deviation

%D – Percent difference IND – Individual standard mix

RPD – Relative Percent Difference PEM – Performance Evaluation Mix

C-cal – Continuing Calibration

ICP – Inductively Coupled Plasma spectrophotometer

GFAA – Graphite Furnace Atomic Absorption spectrophotometer

IBLK – Instrument Blank

For volatiles, up to two compounds may be outside criteria providing the RRF is ≥0.010 and %RSD ≤40%.

For semivolatiles, up to four compounds may be outside criteria providing the RRF is ≥0.010 and %RSD ≤40%.

For both volatile and semivolatile compounds with no established RRF criteria, the minimum RRF is ≥0.010.

For pesticides, up to two target compounds may have %RSD >20% but ≤ 30%.

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GC/MS Tuning Criteria

BFB Key Ions and Ion Abundance Criteria:

Mass	CLP Methods	Method 8260B	Method 524.2
50	8% to 40% of mass 95	15% to 40% of mass 95	15% to 40% of mass 95
75	30% to 66% of mass 95	30% to 60% of mass 95	30% to 80% of mass 95
95	Base peak = 100%	Base peak = 100%	Base peak = 100%
96	5% to 9% of mass 95	5% to 9% of mass 95	5% to 9% of mass 95
173	<2% of mass 174	<2% of mass 174	<2% of mass 174
174	50% to 120% of mass 95	>50% of mass 95	>50% of mass 95
175	4% to 9% of mass 174	5% to 9% of mass 174	5% to 9% of mass 174
176	93% to 101% of mass 174	>95% but <101% of mass 174	>95% but <101% of mass 174
177	5% to 9% of mass 176	5% to 9% of mass 176	5% to 9% of mass 176

DFTPP Key Ions and Ion Abundance Critieria:

Mass	CLP Methods	Method 8270C	Method 525.2
51	30 % to 80 % of mass 198	30 % to 60 % of mass 198	10 % to 80 % of base peak
68	<2% of mass 69	<2% of mass 69	<2% of mass 69
69	mass 69 relative abundance	mass 69 relative abundance	mass 69 relative abundance
70	<2% of mass 69	<2% of mass 69	<2% of mass 69
127	25 % to 75 % of mass 198	40% to 60 % of mass 198	10% to 80 % of base peak
197	<1% of mass 198	<1% of mass 198	<2% of mass 198
198	Base Peak = 100%	Base Peak = 100%	Base peak or >50 % of mass 442
199	5% to 9% of mass 198	5% to 9% of mass 198	5% to 9% of mass 198
275	10% to 30% of mass 198	10% to 30% of mass 198	10% to 60% of base peak
365	>0.75% of mass 198	>1% of mass 198	>1% of base peak
441	Present but < mass 443	Present but < mass 443	Present but < mass 443
442	40% to 110% of mass 198	>40% of mass 198	Base peak or >50% of mass 198
443	15% to 24% of mass 442	17% to 23% of mass 442	15% to 24% of mass 442

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Calibration Summary for Drinking Water Method						
	Initial Calibration			Continuing Calibration Verification		
Instrument	*Frequency*	*# Std Conc*	*Acceptance Criteria*	*Frequency*	*# Std Conc*	*Acceptance Criteria*
GC/MS 525.2	After C-cal fails	6	The RSD for each analyte mean RF must be ≤30%. Or a linear regression calibration curve may be used.	Every 12 hours	1	%D for RF must be ≤30%. If curve used, the point must fall on curve from I-cal.
GC 504.1	After C-cal fails	5	% RSD <20% to use Average RF, otherwise use calibration curve.	Every 10 samples or each batch if <10 samples	1	70% to 130% of expected value
GC/MS 524.2	After C-cal fails	4	% RSD <20% otherwise use calibration curve	Every 12 hours	1	%D for RF must be ≤30%. If curved used, the % recovery based on the concentration spiked must be 70% to 130% of expected value.
GC 507 508 515.1	Each new run, or after C-cal fails	3	≤20% RSD of RFs of Initial Calibration to use avg. RF, otherwise use curve fit. (Degradation for DDT, Endrin ≤20% initially - Method 508.)	Every 10 samples	1	≤20% drift from initial response for both quantitation and confirmation.
HPLC 531.1	Each new run, or after C-cal fails	3	≤20% RSD of RFs of initial calibration to use avg. RF, otherwise use curve fit	Every 10 samples and/or blanks	1	≤20% drift from initial response.
Mercury auto-analyzer	Each new run	5	Initial calibration verification with ±5%	Every 10 samples	1	±10% of true value
Auto-analyzer	Daily	6	Correlation coefficient >0.995	Every 10 samples	1	±10% of true value
FTIR Infrared spectro-photometer	Monthly	6	Correlation coefficient > 0.995	Every 10 samples	1	±10% of true value
Balance	Daily	4	See SOP	N/A	N/A	N/A
ICP	Each new run	1	Initial calibration verification ±5%	Every 10 samples	1	±10% of true value
pH meter	Daily	3	See SOP	Every 10 samples	1	Statistical limits

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Calibration Summary for Drinking Water Method

	Initial Calibration			Continuing Calibration Verification		
Instrument	Frequency	# Std Conc	Acceptance Criteria	Frequency	# Std Conc	Acceptance Criteria
IC	Monthly	5	Correlation coefficient >0.995	Every 10 samples	1	±10% of true value
ISE	Every 3 months	5	Correlation coefficient >0.995	Every 10 samples	1	±10% of true value

Abbreviations

Std Conc - The number of standard concentrations used

SPCCs - System Performance Check Compounds

CCCs - Calibration Check Compounds

RF - Response Factor

%RSD - Percent Relative Standard Deviation

%D - Percent Difference

C-cal - Continuing Calibration

GFAA - Graphite Furnace Atomic Absorption spectrophotometer

CVAF – Cold Vapor Atomic Fluorescence

HPLC - High Performance Liquid Chromatography

GC - Gas Chromatograph

GC/MS - Gas Chromatography/Mass Spectrometry

ICP - Inductively Coupled Plasma spectrophotometer

IC - Ion Chromatograph

ISE - Ion Specific Electrode

Method 507 Laboratory Performance Check Solution (analyzed prior to system calibration)			
Test	Analyte	Conc. µg/mL	Requirements
Sensitivity	Vernolate	0.05	Detection of analyte; S/N > 3
Chromatographic performance	Bromacil	5.0	0.80 < PGF[a] <1.20
Column performance	Prometon Atrazine	0.30 0.15	Resolution[b] > 0.7

[a]PGF - Peak Gaussian factor. Calculated using the equation:

$$PGF = \frac{1.83 \times W(1/2)}{W(1/10)}$$

Where W(1/2) is the peak width at half height and W(1/10) is the peak width at 10% peak height.

[b]Resolution between the two peaks as defined by the equation:

$$R = \frac{t}{W}$$

Where t is the difference in elution times between the two peaks and W is the average peak width, at the baseline, of the two peaks.

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Method 508

Laboratory Performance Check Solution
(analyzed prior to system calibration)

Test	Analyte	Conc. µg/mL	Requirements
Sensitivity	Chlorpyrifos	0.0020	Detection of analyte; S/N > 3
Chromatographic performance	DCPA	0.0500	0.80 < PGF[a] < 1.15
Column performance	Chlorothalonil HCH-delta	0.0500 0.0400	Resolution[b] > 0.50

[a]PGF - Peak Gaussian factor. Calculated using the equation:

$$PGF = \frac{1.83 \times W(1/2)}{W(1/10)}$$

Where W(1/2) is the peak width at half height and W(1/10) is the peak width at 10% peak height.

[b]Resolution between the two peaks as defined by the equation:

$$R = \frac{t}{W}$$

Where t is the difference in elution times between the two peaks and W is the average peak width, at the baseline, of the two peaks.

Method 515 Laboratory Performance Check Solution (analyzed prior to system calibration)			
Test	Analyte	Conc. µg/mL	Requirements
Sensitivity	Dinoseb	0.004	Detection of analyte; S/N >3
Chromatographic performance	4-Nitrophenol	1.6	0.70 < PGF[a] < 1.05
Column performance	3,5-Dichlorobenzoic acid 4-Nitrophenol	0.6 1.6	Resolution[b] >0.40

[a]PGF - Peak Gaussian factor. Calculated using the equation:

$$PGF = \frac{1.83 \times W(1/2)}{W(1/10)}$$

Where W(1/2) is the peak width at half height and W(1/10) is the peak width at tenth height.

[b]Resolution between the two peaks as defined by the equation:

$$R = \frac{t}{W}$$

Where t is the difference in elution times between the two peaks and W is the average peak width, at the baseline, of the two peaks.

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Calibration Summary for EPA 600 Series Methods

	Initial Calibration			Continuing Calibration Verification		
Instrument	Frequency	# Std Conc	Acceptance Criteria	Frequency	# Std Conc	Acceptance Criteria
GC/MS Volatiles*	After C-cal fails	5	RSD ≤35% for all compounds*, or a linear regression may be used	Every 24 hours	1	All compounds must meet the QC acceptance criteria as stated in the method. Compounds not stated must meet a 65% -135% recovery criteria.
GC/MS Semivolatiles**	After C-cal fails	5	RSD ≤35% for all compounds**, or a linear regression may be used Tailing factors: Benzidine < 3 Pentachlorophenol < 5	Every 24 hours	1	All compounds calibrating for <20
GC Pesticides & PCBs (Method 608)	Each new run After C-cal fails	5	10% RSD of RFs of initial calibration to use avg. RF, otherwise use curve fit. Degradation for DDT, Endrin 15%	Every 10 samples	1	≤15% drift from initial response for quantitation
GC VOA Halocarbons and/or Aromatics	After C-cal fails	At least 5	%RSD of ≤10% for individual compounds to use average RFs. If %RSD >10%, a quadratic fit type is used if correlation coefficient is >0.995.	Every 12 hours, or every 10 samples	1	Method defined limits
HPLC	Each new run or after C-cal fails	5	10% RSD of RFs of initial calibration to use average RF, otherwise use curve fit	Every 10 samples	1	≤15% difference from initial response for quantitation
ICP/MS	Each new run	1	Independent calibration verification (ICV) within ±10%	Every 10 samples	1	±10% of true value
ICP	Each new run	1	Independent calibration verification within ±10%, standards <5%RSD	Every 10 samples	1	Same as initial

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Calibration Summary for EPA 600 Series Methods

	Initial Calibration			Continuing Calibration Verification		
Instrument	Frequency	# Std Conc	Acceptance Criteria	Frequency	# Std Conc	Acceptance Criteria
CVAA	Each new run	5	Independent calibration verification within ±10% Correlation coefficient >0.995	Every 10 samples	1	±20% of true value
CVAF	Each new run	5	The RSD ≤ 15%, and the low standard recovers 75-125% of the true value	After the calibration and at the end of the analytical batch	1	±23% of the true value
GFAA	Each new run	5	Independent calibration verification within ±10% Correlation coefficient >0.995	Every 10 samples	1	±10% of true value
Auto-analyzer	Daily	6	Correlation coefficient >0.995	Every 10 samples	1	±10% of true value
FTIR Infrared Spectro-photometer	Monthly	5	Correlation coefficient >0.995	Every 10 samples/ each day	1	±10% of true value
TOC Analyzer (w) Inst # 2 (s) Inst # 3	Monthly	 6 5	 Corr. Coeff. > 0.995 Corr. Coeff. > 0.995	Every 10 samples	1	±10% of true value
Balance	Daily	4	Top-loading ±.5%, Analytical ± .1% for weights >.1 g 50 mg ± .5%, 20 mg ± 1.0% 10 mg and 5 mg ± 2.0%	N/A	N/A	N/A

*All compounds with %RSD >35 must use first or second order regression fit of the five calibration points. The first order regression may only be used if the correlation coefficient r ≥0.990. The second order regression may only be used if the coefficient of determination $r^2 \geq 0.990$.

* * All compounds with % RSD >35 must use first order regression fit of the five calibration points. The first order regression may only be used if the correlation coefficient r ≥0.990.

Abbreviations

Std Conc - The number of standard concentrations used

SPCCs - System Performance Check Compounds

CCCs - Calibration Check Compounds

RF - Response Factor

%RSD - Percent Relative Standard Deviation

C-cal - Continuing Calibration

CVAA - Cold Vapor Atomic Absorption spectrophotometer

HPLC - High Performance Liquid Chromatography

ICP - Inductively Coupled Plasma spectrophotometer; ICP run also includes inter-element correction check standard (beginning and end of run)

GFAA - Graphite Furnace Atomic Absorption spectrophotometer

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Calibration Summary for EPA TO Series Methods						
	Initial Calibration			Continuing Calibration Verification		
Instrument	Frequency	# Std Conc	Acceptance Criteria	Frequency	# Std Conc	Acceptance Criteria
GC/MS Volatiles TO-15	After C-cal fails	5	RSD ≤30% for all compounds, 2 allowed to be >30% as long as <40%.	Every 24 hours	1	All compounds ≤30 difference, 2 compounds allowed to be >30% as long as ≤40%.
GC/MS Volatiles TO-14A	After C-cal fails	3	RSD ≤30% for all compounds, 2 allowed to be >30% as long as <40%.	Every 24 hours	1	All compounds ≤30 difference, 2 compounds allowed to be >30% as long as ≤40%.

Lancaster Laboratories

Environmental Quality Policy Manual

Appendix I
NELAP Scope of Testing

Current as of January 28, 2008
50 Total Pages (including this coversheet)

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

OFFICE OF FIELD OPERATIONS

BUREAU OF LABORATORIES

Certifies that

36-00037
LANCASTER LABORATORIES INC
2425 NEW HOLLAND PIKE
LANCASTER, PA 17601-5994

Having duly met the requirement of
The Act of June 29, 2002 (P.L. 596, No. 90)
dealing with Environmental Laboratory Accreditation
(27 Pa. C.S. §§4101-4113) and the
National Environmental Laboratory Accreditation Conference Standard

is hereby approved as an

Accredited Laboratory

As more fully described in the attached Scope of Accreditation

Expiration Date: **1/31/2009**
Certificate Number: **006**

Certificate not transferable Surrender upon revocation
To Be Conspicuously Displayed at the Laboratory
Not valid unless accompanied by a valid Scope of Accreditation
Shall not be used to imply endorsement by the Commonwealth of Pennsylvania
Customers are urged to verify the laboratory's current accreditation status
PA DEP is a NELAP recognized accrediting authority

Aaren S. Alger, Chief
Laboratory Accreditation Program
Bureau of Laboratories

1500-FM-LAB0016 Rev. 10/2007

Attachment to Certificate of Accreditation 006, expiration date January 31, 2009. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 36-00037 **EPA Lab Code: PA00009** **(717) 656-2300**

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Lancaster, PA 17601-5994

Program Drinking Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 110.2	Color	NELAP	PA	4/4/2005
EPA 150.1	pH	NELAP	PA	2/28/2002
EPA 180.1	Turbidity	NELAP	PA	4/4/2005
EPA 200.7	Aluminum	NELAP	PA	4/4/2005
EPA 200.7	Barium	NELAP	PA	1/22/2001
EPA 200.7	Beryllium	NELAP	PA	6/2/2004
EPA 200.7	Cadmium	NELAP	PA	1/22/2001
EPA 200.7	Calcium	NELAP	PA	11/28/2001
EPA 200.7	Chromium	NELAP	PA	1/22/2001
EPA 200.7	Copper	NELAP	PA	1/22/2001
EPA 200.7	Iron	NELAP	PA	4/4/2005
EPA 200.7	Magnesium	NELAP	PA	12/4/2007
EPA 200.7	Manganese	NELAP	PA	4/4/2005
EPA 200.7	Nickel	NELAP	PA	1/22/2001
EPA 200.7	Silver	NELAP	PA	1/26/2001
EPA 200.7	Sodium	NELAP	PA	1/22/2001
EPA 200.7	Zinc	NELAP	PA	4/4/2005
EPA 200.8	Antimony	NELAP	PA	2/10/2005
EPA 200.8	Arsenic	NELAP	PA	2/10/2005
EPA 200.8	Barium	NELAP	PA	2/10/2005
EPA 200.8	Beryllium	NELAP	PA	2/10/2005
EPA 200.8	Cadmium	NELAP	PA	2/10/2005
EPA 200.8	Chromium	NELAP	PA	2/10/2005
EPA 200.8	Copper	NELAP	PA	3/9/2007
EPA 200.8	Lead	NELAP	PA	2/10/2005
EPA 200.8	Nickel	NELAP	PA	2/10/2005
EPA 200.8	Selenium	NELAP	PA	2/10/2005
EPA 200.8	Thallium	NELAP	PA	2/10/2005
EPA 245.1	Mercury	NELAP	PA	8/29/2001
EPA 300.0	Chloride	NELAP	PA	5/17/2005
EPA 300.0	Fluoride	NELAP	PA	1/22/2004
EPA 300.0	Nitrate	NELAP	PA	10/31/2002
EPA 300.0	Nitrite	NELAP	PA	10/31/2002
EPA 300.0	Sulfate	NELAP	PA	7/7/2003
EPA 314.0	Perchlorate	NELAP	PA	5/24/2007
EPA 335.4	Cyanide	NELAP	PA	7/11/2006

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State Laboratory ID: 36-00037 **EPA Lab Code: PA00009** **(717) 656-2300**

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Lancaster, PA 17601-5994

Program Drinking Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 353.2	Nitrate as N	NELAP	PA	2/28/2002
EPA 353.2	Nitrite	NELAP	PA	2/28/2002
EPA 504.1	1 2 3-Trichloropropane	NELAP	PA	5/17/2005
EPA 504.1	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	2/28/2002
EPA 504.1	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	1/26/2001
EPA 507	Alachlor (Lasso)	NELAP	PA	2/28/2002
EPA 507	Atrazine	NELAP	PA	2/28/2002
EPA 507	Simazine	NELAP	PA	2/28/2002
EPA 508	Hexachlorobenzene	NELAP	PA	2/28/2002
EPA 508	Hexachlorocyclopentadiene	NELAP	PA	2/28/2002
EPA 508	Aroclor-1016 (PCB-1016)	NELAP	PA	4/24/2007
EPA 508	Aroclor-1221 (PCB-1221)	NELAP	PA	4/24/2007
EPA 508	Aroclor-1232 (PCB-1232)	NELAP	PA	4/24/2007
EPA 508	Aroclor-1242 (PCB-1242)	NELAP	PA	4/24/2007
EPA 508	Aroclor-1248 (PCB-1248)	NELAP	PA	4/24/2007
EPA 508	Aroclor-1254 (PCB-1254)	NELAP	PA	4/24/2007
EPA 508	Aroclor-1260 (PCB-1260)	NELAP	PA	4/24/2007
EPA 508	Aldrin	NELAP	PA	5/18/2005
EPA 508	Chlordane (tech.)	NELAP	PA	2/28/2002
EPA 508	Dieldrin	NELAP	PA	1/3/2002
EPA 508	Endrin	NELAP	PA	2/28/2002
EPA 508	Heptachlor	NELAP	PA	2/28/2002
EPA 508	Heptachlor epoxide	NELAP	PA	2/28/2002
EPA 508	Methoxychlor	NELAP	PA	2/28/2002
EPA 508	Toxaphene (Chlorinated camphene)	NELAP	PA	5/25/2007
EPA 508	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	2/28/2002
EPA 515.1	Pentachlorophenol	NELAP	PA	1/24/2001
EPA 515.1	2 4-D	NELAP	PA	1/24/2001
EPA 515.1	Dalapon	NELAP	PA	1/24/2001
EPA 515.1	Dicamba	NELAP	PA	1/24/2001
EPA 515.1	Dinoseb (2-sec-butyl-4 6-dinitrophenol DNBP)	NELAP	PA	1/24/2001
EPA 515.1	Picloram	NELAP	PA	1/24/2001
EPA 515.1	Silvex (2 4 5-TP)	NELAP	PA	1/24/2001
EPA 524.2	1 1-Dichloro-2-propanone	NELAP	PA	5/17/2005
EPA 524.2	1 1 1 2-Tetrachloroethane	NELAP	PA	10/31/2002
EPA 524.2	1 1 1-Trichloroethane	NELAP	PA	10/31/2002

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State Laboratory ID: 36-00037 **EPA Lab Code: PA00009** **(717) 656-2300**

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Lancaster, PA 17601-5994

Program Drinking Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 524.2	1 1 2 2-Tetrachloroethane	NELAP	PA	10/31/2002
EPA 524.2	1 1 2-Trichloroethane	NELAP	PA	10/31/2002
EPA 524.2	1 1-Dichloroethane	NELAP	PA	10/31/2002
EPA 524.2	1 1-Dichloroethene	NELAP	PA	10/31/2002
EPA 524.2	1 1-Dichloropropanone	NELAP	PA	5/24/2007
EPA 524.2	1 1-Dichloropropene	NELAP	PA	10/31/2002
EPA 524.2	1 2 3-Trichlorobenzene	NELAP	PA	4/4/2005
EPA 524.2	1 2 3-Trichloropropane	NELAP	PA	10/31/2002
EPA 524.2	1 2 4-Trichlorobenzene	NELAP	PA	10/31/2002
EPA 524.2	1 2 4-Trimethylbenzene	NELAP	PA	4/4/2005
EPA 524.2	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	5/24/2007
EPA 524.2	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	5/24/2007
EPA 524.2	1 2-Dichlorobenzene	NELAP	PA	10/31/2002
EPA 524.2	1 2-Dichloroethane	NELAP	PA	10/31/2002
EPA 524.2	1 2-Dichloropropane	NELAP	PA	10/31/2002
EPA 524.2	1 3 5-Trimethylbenzene	NELAP	PA	5/17/2005
EPA 524.2	1 3-Dichlorobenzene	NELAP	PA	10/31/2002
EPA 524.2	1 3-Dichloropropane	NELAP	PA	10/31/2002
EPA 524.2	1 4-Dichlorobenzene	NELAP	PA	10/31/2002
EPA 524.2	1-Chlorobutane	NELAP	PA	5/24/2007
EPA 524.2	2 2-Dichloropropane	NELAP	PA	10/31/2002
EPA 524.2	2-Butanone (Methyl ethyl ketone MEK)	NELAP	PA	5/24/2007
EPA 524.2	2-Chlorotoluene	NELAP	PA	10/31/2002
EPA 524.2	2-Hexanone	NELAP	PA	5/24/2007
EPA 524.2	2-Nitropropane	NELAP	PA	5/24/2007
EPA 524.2	4-Chlorotoluene	NELAP	PA	10/31/2002
EPA 524.2	4-Isopropyltoluene (p-Isopropyltoluene)	NELAP	PA	5/17/2005
EPA 524.2	4-Methyl-2-pentanone (MIBK)	NELAP	PA	5/24/2007
EPA 524.2	Acetone	NELAP	PA	5/24/2007
EPA 524.2	Acrylonitrile	NELAP	PA	5/24/2007
EPA 524.2	Allyl chloride (3-Chloropropene)	NELAP	PA	5/24/2007
EPA 524.2	Benzene	NELAP	PA	10/31/2002
EPA 524.2	Bromobenzene	NELAP	PA	10/31/2002
EPA 524.2	Bromochloromethane	NELAP	PA	4/4/2005
EPA 524.2	Bromodichloromethane	NELAP	PA	10/31/2002
EPA 524.2	Bromoform	NELAP	PA	10/31/2002

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EPA 524.2	Carbon disulfide	NELAP	PA	5/24/2007
EPA 524.2	Carbon tetrachloride	NELAP	PA	10/31/2002
EPA 524.2	Chloroacetonitrile	NELAP	PA	5/24/2007
EPA 524.2	Chlorobenzene	NELAP	PA	10/31/2002
EPA 524.2	Chloroethane	NELAP	PA	10/31/2002
EPA 524.2	Chloroform	NELAP	PA	10/31/2002
EPA 524.2	Dibromochloromethane	NELAP	PA	10/31/2002
EPA 524.2	Dibromomethane	NELAP	PA	10/31/2002
EPA 524.2	Dichlorodifluoromethane	NELAP	PA	4/4/2005
EPA 524.2	Dichloromethane (DCM Methylene chloride)	NELAP	PA	10/31/2002
EPA 524.2	Diethyl ether	NELAP	PA	5/24/2007
EPA 524.2	Ethyl methacrylate	NELAP	PA	5/24/2007
EPA 524.2	Ethylbenzene	NELAP	PA	10/31/2002
EPA 524.2	Hexachlorobutadiene	NELAP	PA	4/4/2005
EPA 524.2	Hexachloroethane	NELAP	PA	5/24/2007
EPA 524.2	Isopropylbenzene	NELAP	PA	4/4/2005
EPA 524.2	Methacrylonitrile	NELAP	PA	5/24/2007
EPA 524.2	Methyl acrylate	NELAP	PA	5/24/2007
EPA 524.2	Methyl bromide (Bromomethane)	NELAP	PA	10/31/2002
EPA 524.2	Methyl chloride (Chloromethane)	NELAP	PA	10/31/2002
EPA 524.2	Methyl methacrylate	NELAP	PA	5/24/2007
EPA 524.2	Methyl tert-butyl ether (MTBE)	NELAP	PA	4/4/2005
EPA 524.2	Naphthalene	NELAP	PA	5/17/2005
EPA 524.2	Nitrobenzene	NELAP	PA	5/17/2005
EPA 524.2	Pentachloroethane	NELAP	PA	5/24/2007
EPA 524.2	Propionitrile (Ethyl cyanide)	NELAP	PA	5/24/2007
EPA 524.2	Styrene	NELAP	PA	10/31/2002
EPA 524.2	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	10/31/2002
EPA 524.2	Tetrahydrofuran (THF)	NELAP	PA	5/24/2007
EPA 524.2	Toluene	NELAP	PA	10/31/2002
EPA 524.2	Total trihalomethanes	NELAP	PA	10/31/2002
EPA 524.2	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	10/31/2002
EPA 524.2	Trichlorofluoromethane	NELAP	PA	4/4/2005
EPA 524.2	Vinyl chloride	NELAP	PA	10/31/2002
EPA 524.2	Xylene (total)	NELAP	PA	10/31/2002
EPA 524.2	cis- & trans-1 2-Dichloroethene	NELAP	PA	10/31/2002

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EPA 524.2	cis-1 3-Dichloropropene	NELAP	PA	10/31/2002
EPA 524.2	n-Butylbenzene	NELAP	PA	4/4/2005
EPA 524.2	n-Propylbenzene	NELAP	PA	5/17/2005
EPA 524.2	sec-Butylbenzene	NELAP	PA	4/4/2005
EPA 524.2	tert-Butylbenzene	NELAP	PA	4/4/2005
EPA 524.2	trans-1 2-Dichloroethene	NELAP	PA	10/31/2002
EPA 524.2	trans-1 3-Dichloropropene	NELAP	PA	10/31/2002
EPA 524.2	trans-1 4-Dichloro-2-butene	NELAP	PA	5/24/2007
EPA 524.2	Methyl Iodide (Iodomethane)	NELAP	PA	5/24/2007
EPA 524.2-Extended	1 3 5-Trichlorobenzene	NELAP	PA	5/2/2006
EPA 524.2-Extended	Allyl chloride (3-Chloropropene)	NELAP	PA	7/3/2007
EPA 524.2-Extended	Ethyl tert-butyl ether	NELAP	PA	1/24/2007
EPA 524.2-Extended	t-Amyl methyl ether (TAME)	NELAP	PA	1/24/2007
EPA 524.2-Extended	tert-Butyl alcohol	NELAP	PA	5/24/2007
EPA 525.2	Anthracene	NELAP	PA	5/25/2007
EPA 525.2	Benzo(a)anthracene	NELAP	PA	5/25/2007
EPA 525.2	Benzo(a)pyrene	NELAP	PA	1/24/2001
EPA 525.2	Benzo(b)fluoranthene	NELAP	PA	6/4/2007
EPA 525.2	Benzo(g h i)perylene	NELAP	PA	7/3/2007
EPA 525.2	Benzo(k)fluoranthene	NELAP	PA	6/4/2007
EPA 525.2	Benzyl butyl phthalate (Butyl benzyl phthalate)	NELAP	PA	5/25/2007
EPA 525.2	Chrysene	NELAP	PA	5/25/2007
EPA 525.2	Di-n-butyl phthalate	NELAP	PA	5/25/2007
EPA 525.2	Dibenz(a h)anthracene	NELAP	PA	5/25/2007
EPA 525.2	Diethyl phthalate	NELAP	PA	5/25/2007
EPA 525.2	Dimethyl phthalate	NELAP	PA	5/25/2007
EPA 525.2	Hexachlorobenzene	NELAP	PA	2/11/2005
EPA 525.2	Hexachlorocyclopentadiene	NELAP	PA	1/24/2001
EPA 525.2	Phenanthrene	NELAP	PA	5/25/2007
EPA 525.2	Pyrene	NELAP	PA	5/25/2007
EPA 525.2	bis(2-Ethylhexyl) adipate	NELAP	PA	1/24/2001
EPA 525.2	bis(2-Ethylhexyl) phthalate (DEHP)	NELAP	PA	1/24/2001
EPA 525.2	2 3-Dichlorobiphenyl (BZ 5)	NELAP	PA	5/17/2005
EPA 525.2	Alachlor (Lasso)	NELAP	PA	2/28/2002
EPA 525.2	Atrazine	NELAP	PA	1/3/2002
EPA 525.2	Butachlor	NELAP	PA	12/19/2002

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EPA 525.2	Dieldrin	NELAP	PA	5/17/2005
EPA 525.2	Endrin	NELAP	PA	5/17/2005
EPA 525.2	Heptachlor	NELAP	PA	5/17/2005
EPA 525.2	Heptachlor epoxide	NELAP	PA	5/17/2005
EPA 525.2	Methoxychlor	NELAP	PA	1/24/2001
EPA 525.2	Metolachlor	NELAP	PA	12/19/2002
EPA 525.2	Metribuzin	NELAP	PA	12/19/2002
EPA 525.2	Propachlor (Ramrod)	NELAP	PA	1/24/2001
EPA 525.2	Simazine	NELAP	PA	1/3/2002
EPA 525.2	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	1/24/2001
EPA 525.2-Extended	Acenaphthene	NELAP	PA	5/25/2007
EPA 531.1	3-Hydroxycarbofuran	NELAP	PA	11/7/2006
EPA 531.1	Aldicarb (Temik)	NELAP	PA	1/24/2001
EPA 531.1	Aldicarb sulfone	NELAP	PA	1/24/2001
EPA 531.1	Aldicarb sulfoxide	NELAP	PA	1/24/2001
EPA 531.1	Carbaryl (Sevin)	NELAP	PA	10/9/2002
EPA 531.1	Carbofuran (Furaden)	NELAP	PA	1/24/2001
EPA 531.1	Methomyl (Lannate)	NELAP	PA	1/24/2001
EPA 531.1	Oxamyl (Vydate)	NELAP	PA	1/24/2001
SM 2120 B	Color	NELAP	PA	5/25/2005
SM 2130 B	Turbidity	NELAP	PA	5/17/2005
SM 2320 B	Alkalinity as CaCO3	NELAP	PA	1/24/2001
SM 2340 B	Total hardness as CaCO3	NELAP	PA	4/4/2005
SM 2510 B	Conductivity	NELAP	PA	5/17/2005
SM 2540 C	Total dissolved solids	NELAP	PA	6/2/2004
SM 2550 B	Temperature deg. C	NELAP	PA	4/4/2005
SM 4500-Cl F	Residual free chlorine	NELAP	PA	4/4/2005
SM 4500-F- C	Fluoride	NELAP	PA	10/15/2003
SM 4500-H+ B	pH	NELAP	PA	5/16/2007
SM 4500-P E	Orthophosphate as P	NELAP	PA	6/12/2007
SM 4500-SiO2 C (20th ed.)	Silica-dissolved	NELAP	PA	5/24/2007
SM 5540 C	Surfactants - MBAS	NELAP	PA	5/24/2007
SM 9215 B	Heterotrophic plate count	NELAP	PA	2/5/2003
SM 9221 B	Total coliforms	NELAP	PA	1/26/2001
SM 9221 E	Fecal coliforms	NELAP	PA	1/26/2001
SM 9223 B	Escherichia coli	NELAP	PA	1/26/2001

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Method	Analyte	Accreditation Type	Primary	Effective Date
SM 9223 B	Total coliforms	NELAP	PA	1/26/2001

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Method	Analyte	Accreditation Type	Primary	Effective Date
AK-101	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
AK-102	Diesel range organics (DRO)	NELAP	PA	12/12/2005
EPA 1010	Ignitability	NELAP	PA	12/12/2005
EPA 110.2	Color	NELAP	PA	4/4/2005
EPA 120.1	Conductivity	NELAP	PA	4/1/2005
EPA 130.2	Hardness	NELAP	PA	1/19/2005
EPA 1311	Toxicity Characteristic Leaching Procedure (TCLP)	NELAP	PA	12/12/2005
EPA 1312	Synthetic Precipitation Leaching Procedure (SPLP)	NELAP	PA	12/12/2005
EPA 150.1	pH	NELAP	PA	1/19/2005
EPA 160.1	Residue-filterable (TDS)	NELAP	PA	1/19/2005
EPA 160.2	Residue-nonfilterable (TSS)	NELAP	PA	1/19/2005
EPA 160.3	Residue-total	NELAP	PA	1/19/2005
EPA 160.4	Residue-volatile	NELAP	PA	1/19/2005
EPA 160.5	Residue-settleable	NELAP	PA	1/19/2005
EPA 1631	Mercury	NELAP	PA	6/11/2007
EPA 1664 Rev A	Non-polar Material	NELAP	PA	11/17/2006
EPA 1664 Rev A	Oil and Grease	NELAP	PA	1/19/2005
EPA 1666 Rev A	4-Methyl-2-pentanone (MIBK)	NELAP	PA	12/12/2005
EPA 1666 Rev A	Ethyl acetate	NELAP	PA	1/19/2005
EPA 1666 Rev A	Isobutyraldehyde	NELAP	PA	1/19/2005
EPA 1666 Rev A	Isopropanol	NELAP	PA	1/19/2005
EPA 1666 Rev A	Isopropyl acetate	NELAP	PA	1/19/2005
EPA 1666 Rev A	Isopropyl ether	NELAP	PA	1/19/2005
EPA 1666 Rev A	Methyl formate	NELAP	PA	1/19/2005
EPA 1666 Rev A	Tetrahydrofuran (THF)	NELAP	PA	1/19/2005
EPA 1666 Rev A	Xylene (total)	NELAP	PA	1/19/2005
EPA 1666 Rev A	n-Amyl acetate (n-Pentyl acetate)	NELAP	PA	4/4/2005
EPA 1666 Rev A	n-Amyl alcohol (1-Pentanol)	NELAP	PA	4/4/2005
EPA 1666 Rev A	n-Butyl-acetate	NELAP	PA	4/4/2005
EPA 1666 Rev A	n-Heptane	NELAP	PA	1/19/2005
EPA 1666 Rev A	n-Hexane	NELAP	PA	1/19/2005
EPA 1666 Rev A	n-Propanol	NELAP	PA	1/19/2005
EPA 1666 Rev A	tert-Butyl alcohol	NELAP	PA	4/4/2005
EPA 1671 Rev A	Acetonitrile	NELAP	PA	1/19/2005
EPA 1671 Rev A	Diethylamine	NELAP	PA	1/19/2005
EPA 1671 Rev A	Dimethyl sulfoxide	NELAP	PA	1/19/2005

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EPA 1671 Rev A	Ethanol	NELAP	PA	1/19/2005
EPA 1671 Rev A	Methanol	NELAP	PA	1/19/2005
EPA 1671 Rev A	Methyl Cellosolve (2-Methoxyethanol)	NELAP	PA	1/19/2005
EPA 1671 Rev A	Triethylamine	NELAP	PA	1/19/2005
EPA 1671 Rev A	n-Propanol	NELAP	PA	1/19/2005
EPA 170.1	Temperature deg. C	NELAP	PA	4/4/2005
EPA 180.1	Turbidity	NELAP	PA	1/19/2005
EPA 200.2	Metals Sample Preparation	NELAP	PA	1/24/2007
EPA 200.7	Aluminum	NELAP	PA	1/19/2005
EPA 200.7	Antimony	NELAP	PA	1/19/2005
EPA 200.7	Arsenic	NELAP	PA	1/19/2005
EPA 200.7	Barium	NELAP	PA	1/19/2005
EPA 200.7	Beryllium	NELAP	PA	1/19/2005
EPA 200.7	Boron	NELAP	PA	1/19/2005
EPA 200.7	Cadmium	NELAP	PA	1/19/2005
EPA 200.7	Calcium	NELAP	PA	1/19/2005
EPA 200.7	Chromium	NELAP	PA	1/19/2005
EPA 200.7	Cobalt	NELAP	PA	1/19/2005
EPA 200.7	Copper	NELAP	PA	1/19/2005
EPA 200.7	Iron	NELAP	PA	1/19/2005
EPA 200.7	Lead	NELAP	PA	1/19/2005
EPA 200.7	Magnesium	NELAP	PA	1/19/2005
EPA 200.7	Manganese	NELAP	PA	1/19/2005
EPA 200.7	Molybdenum	NELAP	PA	1/19/2005
EPA 200.7	Nickel	NELAP	PA	1/19/2005
EPA 200.7	Potassium	NELAP	PA	1/19/2005
EPA 200.7	Selenium	NELAP	PA	1/19/2005
EPA 200.7	Silver	NELAP	PA	4/4/2005
EPA 200.7	Sodium	NELAP	PA	1/19/2005
EPA 200.7	Thallium	NELAP	PA	1/19/2005
EPA 200.7	Tin	NELAP	PA	1/19/2005
EPA 200.7	Titanium	NELAP	PA	1/19/2005
EPA 200.7	Vanadium	NELAP	PA	1/19/2005
EPA 200.7	Zinc	NELAP	PA	1/19/2005
EPA 200.8	Antimony	NELAP	PA	4/4/2005
EPA 200.8	Arsenic	NELAP	PA	4/4/2005

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EPA 200.8	Barium	NELAP	PA	4/4/2005
EPA 200.8	Beryllium	NELAP	PA	4/4/2005
EPA 200.8	Cadmium	NELAP	PA	4/4/2005
EPA 200.8	Chromium	NELAP	PA	4/4/2005
EPA 200.8	Copper	NELAP	PA	4/4/2005
EPA 200.8	Lead	NELAP	PA	4/4/2005
EPA 200.8	Nickel	NELAP	PA	4/4/2005
EPA 200.8	Selenium	NELAP	PA	12/12/2005
EPA 200.8	Silver	NELAP	PA	1/2/2007
EPA 200.8	Thallium	NELAP	PA	5/31/2006
EPA 204.2	Antimony	NELAP	PA	1/3/2007
EPA 206.2	Arsenic	NELAP	PA	12/11/2006
EPA 210.2	Beryllium	NELAP	PA	12/4/2007
EPA 213.2	Cadmium	NELAP	PA	1/19/2005
EPA 218.2	Chromium	NELAP	PA	12/4/2007
EPA 218.6	Chromium VI	NELAP	PA	4/4/2005
EPA 239.2	Lead	NELAP	PA	1/23/2007
EPA 245.1	Mercury	NELAP	PA	1/19/2005
EPA 270.2	Selenium	NELAP	PA	1/19/2005
EPA 279.2	Thallium	NELAP	PA	1/19/2005
EPA 300.0	Bromide	NELAP	PA	4/4/2005
EPA 300.0	Chloride	NELAP	PA	1/19/2005
EPA 300.0	Fluoride	NELAP	PA	5/25/2005
EPA 300.0	Nitrate as N	NELAP	PA	1/19/2005
EPA 300.0	Nitrite as N	NELAP	PA	1/19/2005
EPA 300.0	Sulfate	NELAP	PA	1/19/2005
EPA 3005A	Preconcentration under Acid	NELAP	PA	12/12/2005
EPA 3010A	Hot Plate Acid Digestion (HNO3 + HCl)	NELAP	PA	12/12/2005
EPA 3020A	Hot Plate Acid Digestion (HNO3 only)	NELAP	PA	12/12/2005
EPA 305.1	Acidity as CaCO3	NELAP	PA	1/19/2005
EPA 305.2	Acidity as CaCO3	NELAP	PA	1/24/2007
EPA 3060A	Alkaline Digestion of Cr(VI)	NELAP	PA	1/24/2007
EPA 310.1	Alkalinity as CaCO3	NELAP	PA	1/19/2005
EPA 325.3	Chloride	NELAP	PA	1/19/2005
EPA 330.4	Total residual chlorine	NELAP	PA	1/19/2005
EPA 335.3	Total cyanide	NELAP	PA	4/4/2005

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EPA 335.4	Total cyanide	NELAP	PA	1/19/2005
EPA 340.2	Fluoride	NELAP	PA	1/19/2005
EPA 350.2	Ammonia as N	NELAP	PA	1/19/2005
EPA 350.3	Ammonia as N	NELAP	PA	1/24/2007
EPA 351.2	Kjeldahl nitrogen - total	NELAP	PA	1/19/2005
EPA 3510C	Separatory Funnel Liquid-Liquid Extraction	NELAP	PA	12/12/2005
EPA 3520C	Continuous Liquid-Liquid Extraction	NELAP	PA	12/12/2005
EPA 353.2	Nitrate as N	NELAP	PA	1/19/2005
EPA 353.2	Nitrite as N	NELAP	PA	1/19/2005
EPA 353.2	Total nitrate-nitrite	NELAP	PA	4/4/2005
EPA 360.1	Oxygen dissolved	NELAP	PA	1/19/2005
EPA 3620B	Florisil Clean-up	NELAP	PA	12/12/2005
EPA 3630C	Silica Gel Clean-up	NELAP	PA	12/12/2005
EPA 3640A	Gel-Permeation Clean-up	NELAP	PA	12/12/2005
EPA 365.1	Phosphorus total	NELAP	PA	4/4/2005
EPA 365.3	Orthophosphate as P	NELAP	PA	1/19/2005
EPA 3660B	Sulfur Clean-up	NELAP	PA	12/12/2005
EPA 370.1	Silica-dissolved	NELAP	PA	1/19/2005
EPA 375.4	Sulfate	NELAP	PA	4/4/2005
EPA 376.1	Sulfide	NELAP	PA	1/19/2005
EPA 376.2	Sulfide	NELAP	PA	1/19/2005
EPA 377.1	Sulfite-SO3	NELAP	PA	1/19/2005
EPA 405.1	Biochemical oxygen demand	NELAP	PA	1/19/2005
EPA 410.1	Chemical oxygen demand	NELAP	PA	12/11/2006
EPA 410.2	Chemical oxygen demand	NELAP	PA	12/11/2006
EPA 410.4	Chemical oxygen demand	NELAP	PA	4/1/2005
EPA 413.1	Oil and Grease	NELAP	PA	1/19/2005
EPA 415.1	Total organic carbon	NELAP	PA	1/19/2005
EPA 418.1	Total recoverable petroleum hydrocarbons (TRPH)	NELAP	PA	1/19/2005
EPA 420.2	Total phenolics	NELAP	PA	1/19/2005
EPA 420.4	Total phenolics	NELAP	PA	4/17/2007
EPA 425.1	Surfactants - MBAS	NELAP	PA	1/19/2005
EPA 5030B	Aqueous-phase Purge & Trap	NELAP	PA	12/12/2005
EPA 601	1 1 1-Trichloroethane	NELAP	PA	1/19/2005
EPA 601	1 1 2 2-Tetrachloroethane	NELAP	PA	1/19/2005
EPA 601	1 1 2-Trichloroethane	NELAP	PA	1/19/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 601	1 1-Dichloroethane	NELAP	PA	1/19/2005
EPA 601	1 1-Dichloroethene	NELAP	PA	1/19/2005
EPA 601	1 2-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 601	1 2-Dichloroethane	NELAP	PA	1/19/2005
EPA 601	1 2-Dichloropropane	NELAP	PA	1/19/2005
EPA 601	1 3-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 601	1 4-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 601	2-Chloroethyl vinyl ether	NELAP	PA	1/19/2005
EPA 601	Bromodichloromethane	NELAP	PA	4/5/2006
EPA 601	Bromoform	NELAP	PA	1/19/2005
EPA 601	Carbon tetrachloride	NELAP	PA	1/19/2005
EPA 601	Chlorobenzene	NELAP	PA	1/19/2005
EPA 601	Chloroethane	NELAP	PA	1/19/2005
EPA 601	Chloroform	NELAP	PA	1/19/2005
EPA 601	Dibromochloromethane	NELAP	PA	1/19/2005
EPA 601	Dichlorodifluoromethane	NELAP	PA	1/19/2005
EPA 601	Methyl bromide (Bromomethane)	NELAP	PA	1/19/2005
EPA 601	Methyl chloride (Chloromethane)	NELAP	PA	1/19/2005
EPA 601	Methylene chloride	NELAP	PA	1/19/2005
EPA 601	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	1/19/2005
EPA 601	Trichlorofluoromethane	NELAP	PA	1/19/2005
EPA 601	Vinyl chloride	NELAP	PA	1/19/2005
EPA 601	cis-1 3-Dichloropropene	NELAP	PA	1/19/2005
EPA 601	trans-1 2-Dichloroethene	NELAP	PA	1/19/2005
EPA 601	trans-1 3-Dichloropropene	NELAP	PA	1/19/2005
EPA 601-Extended	Benzene	NELAP	PA	2/10/2006
EPA 6010	Aluminum	NELAP	PA	12/12/2005
EPA 6010	Antimony	NELAP	PA	12/12/2005
EPA 6010	Arsenic	NELAP	PA	12/12/2005
EPA 6010	Barium	NELAP	PA	12/12/2005
EPA 6010	Beryllium	NELAP	PA	12/12/2005
EPA 6010	Boron	NELAP	PA	12/12/2005
EPA 6010	Cadmium	NELAP	PA	12/12/2005
EPA 6010	Calcium	NELAP	PA	12/12/2005
EPA 6010	Chromium	NELAP	PA	12/12/2005
EPA 6010	Cobalt	NELAP	PA	12/12/2005

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Lancaster Laboratories Inc
2425 New Holland Pike
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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 6010	Copper	NELAP	PA	12/12/2005
EPA 6010	Iron	NELAP	PA	12/12/2005
EPA 6010	Lead	NELAP	PA	12/12/2005
EPA 6010	Magnesium	NELAP	PA	12/12/2005
EPA 6010	Manganese	NELAP	PA	12/12/2005
EPA 6010	Molybdenum	NELAP	PA	12/12/2005
EPA 6010	Nickel	NELAP	PA	12/12/2005
EPA 6010	Potassium	NELAP	PA	12/12/2005
EPA 6010	Selenium	NELAP	PA	12/12/2005
EPA 6010	Silver	NELAP	PA	12/12/2005
EPA 6010	Sodium	NELAP	PA	12/12/2005
EPA 6010	Strontium	NELAP	PA	12/12/2005
EPA 6010	Thallium	NELAP	PA	12/12/2005
EPA 6010	Tin	NELAP	PA	12/12/2005
EPA 6010	Titanium	NELAP	PA	12/12/2005
EPA 6010	Vanadium	NELAP	PA	12/12/2005
EPA 6010	Zinc	NELAP	PA	12/12/2005
EPA 602	1 2-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 602	1 3-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 602	1 4-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 602	Benzene	NELAP	PA	1/19/2005
EPA 602	Chlorobenzene	NELAP	PA	1/19/2005
EPA 602	Ethylbenzene	NELAP	PA	1/19/2005
EPA 602	Methyl tert-butyl ether (MTBE)	NELAP	PA	1/19/2005
EPA 602	Toluene	NELAP	PA	1/19/2005
EPA 602	Xylene (total)	NELAP	PA	1/19/2005
EPA 602-Extended	Styrene	NELAP	PA	12/4/2007
EPA 6020	Antimony	NELAP	PA	12/12/2005
EPA 6020	Arsenic	NELAP	PA	12/12/2005
EPA 6020	Barium	NELAP	PA	12/12/2005
EPA 6020	Beryllium	NELAP	PA	12/12/2005
EPA 6020	Cadmium	NELAP	PA	12/12/2005
EPA 6020	Chromium	NELAP	PA	12/12/2005
EPA 6020	Copper	NELAP	PA	12/12/2005
EPA 6020	Lead	NELAP	PA	12/12/2005
EPA 6020	Selenium	NELAP	PA	12/12/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 6020	Silver	NELAP	PA	1/12/2007
EPA 6020	Thallium	NELAP	PA	12/12/2005
EPA 603	Acrolein (Propenal)	NELAP	PA	1/19/2005
EPA 603	Acrylonitrile	NELAP	PA	1/19/2005
EPA 608	Aroclor-1016 (PCB-1016)	NELAP	PA	12/11/2006
EPA 608	Aroclor-1221 (PCB-1221)	NELAP	PA	12/11/2006
EPA 608	Aroclor-1232 (PCB-1232)	NELAP	PA	12/11/2006
EPA 608	Aroclor-1242 (PCB-1242)	NELAP	PA	12/11/2006
EPA 608	Aroclor-1248 (PCB-1248)	NELAP	PA	12/11/2006
EPA 608	Aroclor-1254 (PCB-1254)	NELAP	PA	12/11/2006
EPA 608	Aroclor-1260 (PCB-1260)	NELAP	PA	12/11/2006
EPA 608	4 4`-DDD	NELAP	PA	1/19/2005
EPA 608	4 4`-DDE	NELAP	PA	1/19/2005
EPA 608	4 4`-DDT	NELAP	PA	1/19/2005
EPA 608	Aldrin	NELAP	PA	1/19/2005
EPA 608	Chlordane (tech.)	NELAP	PA	1/19/2005
EPA 608	Dieldrin	NELAP	PA	1/19/2005
EPA 608	Endosulfan I	NELAP	PA	1/19/2005
EPA 608	Endosulfan II	NELAP	PA	1/19/2005
EPA 608	Endosulfan sulfate	NELAP	PA	1/19/2005
EPA 608	Endrin	NELAP	PA	1/19/2005
EPA 608	Endrin aldehyde	NELAP	PA	1/19/2005
EPA 608	Heptachlor	NELAP	PA	1/19/2005
EPA 608	Heptachlor epoxide	NELAP	PA	1/19/2005
EPA 608	Methoxychlor	NELAP	PA	5/2/2006
EPA 608	Toxaphene (Chlorinated camphene)	NELAP	PA	1/19/2005
EPA 608	alpha-BHC (alpha-Hexachlorocyclohexane)	NELAP	PA	1/19/2005
EPA 608	beta-BHC (beta-Hexachlorocyclohexane)	NELAP	PA	1/19/2005
EPA 608	delta-BHC (delta-Hexachlorocyclohexane)	NELAP	PA	1/19/2005
EPA 608	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	1/19/2005
EPA 610	Acenaphthene	NELAP	PA	1/2/2007
EPA 610	Acenaphthylene	NELAP	PA	1/2/2007
EPA 610	Anthracene	NELAP	PA	1/2/2007
EPA 610	Benzo(a)anthracene	NELAP	PA	1/2/2007
EPA 610	Benzo(a)pyrene	NELAP	PA	1/2/2007
EPA 610	Benzo(b)fluoranthene	NELAP	PA	1/2/2007

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 610	Benzo(g h i)perylene	NELAP	PA	1/2/2007
EPA 610	Benzo(k)fluoranthene	NELAP	PA	1/2/2007
EPA 610	Chrysene	NELAP	PA	1/2/2007
EPA 610	Dibenz(a h)anthracene	NELAP	PA	1/2/2007
EPA 610	Fluoranthene	NELAP	PA	1/2/2007
EPA 610	Fluorene	NELAP	PA	1/2/2007
EPA 610	Indeno(1 2 3-cd)pyrene	NELAP	PA	1/2/2007
EPA 610	Phenanthrene	NELAP	PA	1/2/2007
EPA 610	Pyrene	NELAP	PA	1/2/2007
EPA 610	Naphthalene	NELAP	PA	1/2/2007
EPA 624	1 1 1 2-Tetrachloroethane	NELAP	PA	1/19/2005
EPA 624	1 1 1-Trichloroethane	NELAP	PA	1/19/2005
EPA 624	1 1 2 2-Tetrachloroethane	NELAP	PA	1/19/2005
EPA 624	1 1 2-Trichloroethane	NELAP	PA	1/19/2005
EPA 624	1 1-Dichloroethane	NELAP	PA	1/19/2005
EPA 624	1 1-Dichloroethene	NELAP	PA	1/19/2005
EPA 624	1 2-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 624	1 2-Dichloroethane	NELAP	PA	1/19/2005
EPA 624	1 2-Dichloropropane	NELAP	PA	1/19/2005
EPA 624	1 3-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 624	1 4-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 624	2-Chloroethyl vinyl ether	NELAP	PA	1/19/2005
EPA 624	Acrolein (Propenal)	NELAP	PA	1/19/2005
EPA 624	Acrylonitrile	NELAP	PA	1/19/2005
EPA 624	Benzene	NELAP	PA	1/19/2005
EPA 624	Bromodichloromethane	NELAP	PA	1/19/2005
EPA 624	Bromoform	NELAP	PA	1/19/2005
EPA 624	Carbon tetrachloride	NELAP	PA	1/19/2005
EPA 624	Chlorobenzene	NELAP	PA	1/19/2005
EPA 624	Chloroethane	NELAP	PA	1/19/2005
EPA 624	Chloroform	NELAP	PA	1/19/2005
EPA 624	Dibromochloromethane	NELAP	PA	4/4/2005
EPA 624	Ethylbenzene	NELAP	PA	1/19/2005
EPA 624	Methyl bromide (Bromomethane)	NELAP	PA	1/19/2005
EPA 624	Methyl chloride (Chloromethane)	NELAP	PA	1/19/2005
EPA 624	Methylene chloride	NELAP	PA	1/19/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 624	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	1/19/2005
EPA 624	Toluene	NELAP	PA	1/19/2005
EPA 624	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	1/19/2005
EPA 624	Trichlorofluoromethane	NELAP	PA	1/19/2005
EPA 624	Vinyl chloride	NELAP	PA	1/19/2005
EPA 624	Xylene (total)	NELAP	PA	1/19/2005
EPA 624	cis-1 3-Dichloropropene	NELAP	PA	1/19/2005
EPA 624	trans-1 2-Dichloroethene	NELAP	PA	1/19/2005
EPA 624	trans-1 3-Dichloropropene	NELAP	PA	1/19/2005
EPA 624-Extended	1 1-Dichloropropene	NELAP	PA	7/3/2007
EPA 624-Extended	1 2 3-Trichlorobenzene	NELAP	PA	7/3/2007
EPA 624-Extended	1 2 3-Trichloropropane	NELAP	PA	7/3/2007
EPA 624-Extended	1 2 4-Trichlorobenzene	NELAP	PA	7/3/2007
EPA 624-Extended	1 2 4-Trimethylbenzene	NELAP	PA	7/3/2007
EPA 624-Extended	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	7/3/2007
EPA 624-Extended	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	7/3/2007
EPA 624-Extended	1 3 5-Trimethylbenzene	NELAP	PA	7/3/2007
EPA 624-Extended	1 3-Dichloropropane	NELAP	PA	7/3/2007
EPA 624-Extended	1 4-Dioxane (1 4- Diethyleneoxide)	NELAP	PA	7/3/2007
EPA 624-Extended	2 2-Dichloropropane	NELAP	PA	7/3/2007
EPA 624-Extended	2-Butanone (Methyl ethyl ketone MEK)	NELAP	PA	7/3/2007
EPA 624-Extended	2-Chloro-1,3-butadiene	NELAP	PA	7/3/2007
EPA 624-Extended	2-Chlorotoluene	NELAP	PA	7/3/2007
EPA 624-Extended	2-Hexanone	NELAP	PA	7/3/2007
EPA 624-Extended	4-Chlorotoluene	NELAP	PA	7/3/2007
EPA 624-Extended	4-Isopropyltoluene (p-Isopropyltoluene)	NELAP	PA	7/3/2007
EPA 624-Extended	Acetone	NELAP	PA	7/3/2007
EPA 624-Extended	Acetonitrile	NELAP	PA	7/3/2007
EPA 624-Extended	Allyl chloride (3-Chloropropene)	NELAP	PA	7/3/2007
EPA 624-Extended	Bromobenzene	NELAP	PA	7/3/2007
EPA 624-Extended	Bromochloromethane	NELAP	PA	5/2/2006
EPA 624-Extended	Carbon disulfide	NELAP	PA	7/3/2007
EPA 624-Extended	Cyclohexane	NELAP	PA	7/3/2007
EPA 624-Extended	Dibromomethane	NELAP	PA	7/3/2007
EPA 624-Extended	Dichlorodifluoromethane	NELAP	PA	7/3/2007
EPA 624-Extended	Diisopropyl ether (DIPE)	NELAP	PA	5/2/2006

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 624-Extended	Ethyl methacrylate	NELAP	PA	7/3/2007
EPA 624-Extended	Isobutyl alcohol (2-Methyl-1-propanol)	NELAP	PA	7/3/2007
EPA 624-Extended	Isopropylbenzene	NELAP	PA	5/2/2006
EPA 624-Extended	Methacrylonitrile	NELAP	PA	7/3/2007
EPA 624-Extended	Methyl isobutyl ketone (Hexone)	NELAP	PA	5/2/2006
EPA 624-Extended	Methyl methacrylate	NELAP	PA	7/3/2007
EPA 624-Extended	Methyl tert-butyl ether (MTBE)	NELAP	PA	12/12/2005
EPA 624-Extended	Naphthalene	NELAP	PA	7/3/2007
EPA 624-Extended	Pentachloroethane	NELAP	PA	7/3/2007
EPA 624-Extended	Propionitrile (Ethyl cyanide)	NELAP	PA	7/3/2007
EPA 624-Extended	Styrene	NELAP	PA	5/2/2006
EPA 624-Extended	Tetrahydrofuran (THF)	NELAP	PA	7/3/2007
EPA 624-Extended	Vinyl acetate	NELAP	PA	7/3/2007
EPA 624-Extended	cis-1 2-Dichloroethane	NELAP	PA	7/3/2007
EPA 624-Extended	n-Butylbenzene	NELAP	PA	7/3/2007
EPA 624-Extended	n-Heptane	NELAP	PA	7/3/2007
EPA 624-Extended	n-Hexane	NELAP	PA	7/3/2007
EPA 624-Extended	n-Propylbenzene	NELAP	PA	7/3/2007
EPA 624-Extended	sec-Butylbenzene	NELAP	PA	7/3/2007
EPA 624-Extended	t-Amyl methyl ether (TAME)	NELAP	PA	5/2/2006
EPA 624-Extended	tert-Butyl alcohol	NELAP	PA	5/2/2006
EPA 624-Extended	tert-Butylbenzene	NELAP	PA	7/3/2007
EPA 624-Extended	tert-Ethyl butyl ether	NELAP	PA	5/2/2006
EPA 624-Extended	1 2 3-Trimethylbenzene	NELAP	PA	7/3/2007
EPA 624-Extended	Freon-113	NELAP	PA	7/3/2007
EPA 624-Extended	Methyl Iodide (Iodomethane)	NELAP	PA	7/3/2007
EPA 625	2 4 5-Trichlorophenol	NELAP	PA	7/3/2007
EPA 625	2 4 6-Trichlorophenol	NELAP	PA	1/19/2005
EPA 625	2 4-Dichlorophenol	NELAP	PA	1/19/2005
EPA 625	2 4-Dimethylphenol	NELAP	PA	1/19/2005
EPA 625	2 4-Dinitrophenol	NELAP	PA	1/19/2005
EPA 625	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	1/19/2005
EPA 625	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	1/19/2005
EPA 625	2-Chloronaphthalene	NELAP	PA	1/19/2005
EPA 625	2-Chlorophenol	NELAP	PA	1/19/2005
EPA 625	2-Methyl-4 6-dinitrophenol	NELAP	PA	1/19/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 625	2-Methylphenol (o-Cresol)	NELAP	PA	7/3/2007
EPA 625	2-Nitrophenol	NELAP	PA	1/19/2005
EPA 625	3 3`-Dichlorobenzidine	NELAP	PA	1/19/2005
EPA 625	4-Bromophenyl phenyl ether	NELAP	PA	1/19/2005
EPA 625	4-Chloro-3-methylphenol	NELAP	PA	1/19/2005
EPA 625	4-Chlorophenyl phenylether	NELAP	PA	1/19/2005
EPA 625	4-Nitrophenol	NELAP	PA	1/19/2005
EPA 625	Acenaphthene	NELAP	PA	1/19/2005
EPA 625	Acenaphthylene	NELAP	PA	1/19/2005
EPA 625	Acetophenone	NELAP	PA	5/2/2006
EPA 625	Aniline	NELAP	PA	5/2/2006
EPA 625	Anthracene	NELAP	PA	4/4/2005
EPA 625	Benzidine	NELAP	PA	1/19/2005
EPA 625	Benzo(a)anthracene	NELAP	PA	1/19/2005
EPA 625	Benzo(a)pyrene	NELAP	PA	1/19/2005
EPA 625	Benzo(b)fluoranthene	NELAP	PA	1/19/2005
EPA 625	Benzo(g h i)perylene	NELAP	PA	1/19/2005
EPA 625	Benzo(k)fluoranthene	NELAP	PA	1/19/2005
EPA 625	Butyl benzyl phthalate (Benzyl butyl phthalate)	NELAP	PA	1/19/2005
EPA 625	Carbazole	NELAP	PA	5/2/2006
EPA 625	Chrysene	NELAP	PA	1/19/2005
EPA 625	Di-n-butyl phthalate	NELAP	PA	1/19/2005
EPA 625	Di-n-octyl phthalate	NELAP	PA	1/19/2005
EPA 625	Dibenz(a h)anthracene	NELAP	PA	1/19/2005
EPA 625	Diethyl phthalate	NELAP	PA	1/19/2005
EPA 625	Dimethyl phthalate	NELAP	PA	1/19/2005
EPA 625	Fluoranthene	NELAP	PA	1/19/2005
EPA 625	Fluorene	NELAP	PA	1/19/2005
EPA 625	Hexachlorobenzene	NELAP	PA	1/19/2005
EPA 625	Hexachlorocyclopentadiene	NELAP	PA	1/19/2005
EPA 625	Indeno(1 2 3-cd)pyrene	NELAP	PA	1/19/2005
EPA 625	Isophorone	NELAP	PA	1/19/2005
EPA 625	Pentachlorophenol	NELAP	PA	1/19/2005
EPA 625	Phenanthrene	NELAP	PA	1/19/2005
EPA 625	Phenol	NELAP	PA	1/19/2005
EPA 625	Pyrene	NELAP	PA	1/19/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 625	bis(2-Chloroethoxy) methane	NELAP	PA	1/19/2005
EPA 625	bis(2-Chloroethyl) ether	NELAP	PA	1/19/2005
EPA 625	bis(2-Chloroisopropyl) ether	NELAP	PA	1/19/2005
EPA 625	bis(2-Ethylhexyl) phthalate (DEHP)	NELAP	PA	1/19/2005
EPA 625	n-Nitrosodi-n-propylamine	NELAP	PA	1/19/2005
EPA 625	n-Nitrosodimethylamine	NELAP	PA	1/19/2005
EPA 625	n-Nitrosodiphenylamine	NELAP	PA	1/19/2005
EPA 625	1 2 4-Trichlorobenzene	NELAP	PA	1/19/2005
EPA 625	1 2-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 625	1 3-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 625	1 4-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 625	Hexachlorobutadiene	NELAP	PA	1/19/2005
EPA 625	Hexachloroethane	NELAP	PA	1/19/2005
EPA 625	Naphthalene	NELAP	PA	1/19/2005
EPA 625	Nitrobenzene	NELAP	PA	1/19/2005
EPA 625	Pyridine	NELAP	PA	5/2/2006
EPA 625-Extended	1 2 4 5-Tetrachlorobenzene	NELAP	PA	5/2/2006
EPA 625-Extended	1 2-Diphenylhydrazine	NELAP	PA	5/2/2006
EPA 625-Extended	2 3 4 6-Tetrachlorophenol	NELAP	PA	7/3/2007
EPA 625-Extended	2 4 5-Trichlorophenol	NELAP	PA	7/3/2007
EPA 625-Extended	2 6-Dichlorophenol	NELAP	PA	7/3/2007
EPA 625-Extended	2-Methylnaphthalene	NELAP	PA	7/3/2007
EPA 625-Extended	2-Methylphenol (o-Cresol)	NELAP	PA	7/3/2007
EPA 625-Extended	2-Nitroaniline	NELAP	PA	7/3/2007
EPA 625-Extended	3-Methylphenol (m-Cresol)	NELAP	PA	7/3/2007
EPA 625-Extended	3-Nitroaniline	NELAP	PA	7/3/2007
EPA 625-Extended	4-Chloroaniline	NELAP	PA	7/3/2007
EPA 625-Extended	4-Methylphenol (p-Cresol)	NELAP	PA	7/3/2007
EPA 625-Extended	4-Nitroaniline	NELAP	PA	7/3/2007
EPA 625-Extended	Benzoic acid	NELAP	PA	5/2/2006
EPA 625-Extended	Benzyl alcohol	NELAP	PA	7/3/2007
EPA 625-Extended	Dibenzofuran	NELAP	PA	7/3/2007
EPA 625-Extended	Diphenyl ether	NELAP	PA	7/3/2007
EPA 625-Extended	Pentachlorobenzene	NELAP	PA	7/3/2007
EPA 625-Extended	alpha-Terpineol	NELAP	PA	5/2/2006
EPA 625-Extended	n-Decane	NELAP	PA	5/2/2006

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 625-Extended	n-Docosane	NELAP	PA	5/2/2006
EPA 625-Extended	n-Dodecane	NELAP	PA	5/2/2006
EPA 625-Extended	n-Eicosane	NELAP	PA	5/2/2006
EPA 625-Extended	n-Hexadecane	NELAP	PA	5/2/2006
EPA 625-Extended	n-Nitrosodiethylamine	NELAP	PA	5/2/2006
EPA 625-Extended	n-Nitrosopyrrolidine	NELAP	PA	5/2/2006
EPA 625-Extended	n-Octadecane	NELAP	PA	5/2/2006
EPA 625-Extended	n-Tetradecane	NELAP	PA	5/2/2006
EPA 625-Extended	1-Methylphenanthrene	NELAP	PA	5/2/2006
EPA 625-Extended	2 3-Dichloroaniline	NELAP	PA	5/2/2006
EPA 625-Extended	1 1-Biphenyl	NELAP	PA	7/3/2007
EPA 625-Extended	1 4-Dioxane (1 4- Diethyleneoxide)	NELAP	PA	7/3/2007
EPA 625-Extended	n-Nitroso-di-n-butylamine	NELAP	PA	5/2/2006
EPA 625-Extended	o-Toluidine	NELAP	PA	7/3/2007
EPA 625-Extended	2 3-Dinitrotoluene	NELAP	PA	7/3/2007
EPA 7041	Antimony	NELAP	PA	2/10/2006
EPA 7060	Arsenic	NELAP	PA	1/3/2007
EPA 7091	Beryllium	NELAP	PA	12/4/2007
EPA 7131	Cadmium	NELAP	PA	4/5/2006
EPA 7191	Chromium	NELAP	PA	12/4/2007
EPA 7196A	Chromium VI	NELAP	PA	4/6/2006
EPA 7199	Chromium VI	NELAP	PA	1/4/2006
EPA 7421	Lead	NELAP	PA	12/11/2006
EPA 7470	Mercury	NELAP	PA	11/21/2005
EPA 7740	Selenium	NELAP	PA	2/10/2006
EPA 7841	Thallium	NELAP	PA	2/10/2006
EPA 8011	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	12/12/2005
EPA 8011	Dibromochloropropane	NELAP	PA	5/2/2006
EPA 8015	Total Petroleum Hydrocarbons (TPH)	NELAP	PA	1/24/2007
EPA 8015	Diesel range organics (DRO)	NELAP	PA	12/12/2005
EPA 8015	Ethanol	NELAP	PA	12/4/2007
EPA 8015	Ethylene glycol	NELAP	PA	12/4/2007
EPA 8015	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
EPA 8015	Isopropyl alcohol (2-Propanol)	NELAP	PA	12/4/2007
EPA 8015	Methanol	NELAP	PA	12/4/2007
EPA 8015	tert-Butyl alcohol	NELAP	PA	1/12/2007

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2425 New Holland Pike
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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8015B-Extended	Ethane	NELAP	PA	12/4/2007
EPA 8015B-Extended	Ethene	NELAP	PA	12/4/2007
EPA 8015B-Extended	Methane	NELAP	PA	12/4/2007
EPA 8015B-Extended	Propane	NELAP	PA	12/4/2007
EPA 8021	1 1 1 2-Tetrachloroethane	NELAP	PA	12/12/2005
EPA 8021	1 1 1-Trichloroethane	NELAP	PA	12/12/2005
EPA 8021	1 1 2 2-Tetrachloroethane	NELAP	PA	12/12/2005
EPA 8021	1 1 2-Trichloroethane	NELAP	PA	12/12/2005
EPA 8021	1 1-Dichloroethane	NELAP	PA	12/12/2005
EPA 8021	1 1-Dichloroethene	NELAP	PA	12/12/2005
EPA 8021	1 2 4-Trimethylbenzene	NELAP	PA	12/12/2005
EPA 8021	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	12/12/2005
EPA 8021	1 2-Dichlorobenzene	NELAP	PA	12/12/2005
EPA 8021	1 2-Dichloroethane	NELAP	PA	12/12/2005
EPA 8021	1 2-Dichloropropane	NELAP	PA	12/12/2005
EPA 8021	1 3 5-Trimethylbenzene	NELAP	PA	12/12/2005
EPA 8021	1 3-Dichlorobenzene	NELAP	PA	12/12/2005
EPA 8021	1 3-Dichloropropane	NELAP	PA	12/12/2005
EPA 8021	1 4-Dichlorobenzene	NELAP	PA	12/12/2005
EPA 8021	2 2-Dichloropropane	NELAP	PA	12/12/2005
EPA 8021	2-Chloroethyl vinyl ether	NELAP	PA	12/12/2005
EPA 8021	Benzene	NELAP	PA	12/12/2005
EPA 8021	Bromobenzene	NELAP	PA	12/12/2005
EPA 8021	Bromochloromethane	NELAP	PA	12/12/2005
EPA 8021	Bromodichloromethane	NELAP	PA	4/5/2006
EPA 8021	Bromoform	NELAP	PA	12/12/2005
EPA 8021	Carbon tetrachloride	NELAP	PA	12/12/2005
EPA 8021	Chlorobenzene	NELAP	PA	12/12/2005
EPA 8021	Chloroethane	NELAP	PA	12/12/2005
EPA 8021	Chloroform	NELAP	PA	12/12/2005
EPA 8021	Dibromochloromethane	NELAP	PA	12/12/2005
EPA 8021	Dibromofluoromethane	NELAP	PA	12/12/2005
EPA 8021	Dibromomethane	NELAP	PA	12/4/2007
EPA 8021	Dichlorodifluoromethane	NELAP	PA	12/12/2005
EPA 8021	Ethylbenzene	NELAP	PA	12/12/2005
EPA 8021	Isopropylbenzene	NELAP	PA	12/12/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8021	Methyl bromide (Bromomethane)	NELAP	PA	12/12/2005
EPA 8021	Methyl chloride (Chloromethane)	NELAP	PA	5/2/2006
EPA 8021	Methyl tert-butyl ether (MTBE)	NELAP	PA	12/12/2005
EPA 8021	Methylene chloride	NELAP	PA	12/12/2005
EPA 8021	Naphthalene	NELAP	PA	12/12/2005
EPA 8021	Styrene	NELAP	PA	12/12/2005
EPA 8021	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	12/12/2005
EPA 8021	Toluene	NELAP	PA	12/12/2005
EPA 8021	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	12/12/2005
EPA 8021	Trichlorofluoromethane	NELAP	PA	5/2/2006
EPA 8021	Vinyl chloride	NELAP	PA	12/12/2005
EPA 8021	Xylene (total)	NELAP	PA	12/12/2005
EPA 8021	cis-1 2-Dichloroethene	NELAP	PA	12/12/2005
EPA 8021	cis-1 3-Dichloropropene	NELAP	PA	12/12/2005
EPA 8021	n-Butylbenzene	NELAP	PA	12/12/2005
EPA 8021	n-Propylbenzene	NELAP	PA	12/12/2005
EPA 8021	sec-Butylbenzene	NELAP	PA	12/12/2005
EPA 8021	tert-Butylbenzene	NELAP	PA	12/12/2005
EPA 8021	trans-1 2-Dichloroethene	NELAP	PA	12/12/2005
EPA 8021	trans-1 3-Dichloropropene	NELAP	PA	12/12/2005
EPA 8081	4 4`-DDD	NELAP	PA	2/10/2006
EPA 8081	4 4`-DDE	NELAP	PA	12/12/2005
EPA 8081	4 4`-DDT	NELAP	PA	12/12/2005
EPA 8081	Aldrin	NELAP	PA	12/12/2005
EPA 8081	Chlordane (tech.)	NELAP	PA	12/12/2005
EPA 8081	Dieldrin	NELAP	PA	12/12/2005
EPA 8081	Endosulfan I	NELAP	PA	2/10/2006
EPA 8081	Endosulfan II	NELAP	PA	12/12/2005
EPA 8081	Endosulfan sulfate	NELAP	PA	12/12/2005
EPA 8081	Endrin	NELAP	PA	12/12/2005
EPA 8081	Endrin aldehyde	NELAP	PA	12/12/2005
EPA 8081	Endrin ketone	NELAP	PA	2/10/2006
EPA 8081	Heptachlor	NELAP	PA	12/12/2005
EPA 8081	Heptachlor epoxide	NELAP	PA	12/12/2005
EPA 8081	Kepone	NELAP	PA	5/2/2006
EPA 8081	Methoxychlor	NELAP	PA	12/12/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8081	Mirex	NELAP	PA	12/12/2005
EPA 8081	Toxaphene (Chlorinated camphene)	NELAP	PA	12/12/2005
EPA 8081	alpha-BHC (alpha-Hexachlorocyclohexane)	NELAP	PA	2/10/2006
EPA 8081	alpha-Chlordane	NELAP	PA	2/10/2006
EPA 8081	beta-BHC (beta-Hexachlorocyclohexane)	NELAP	PA	2/10/2006
EPA 8081	delta-BHC (delta-Hexachlorocyclohexane)	NELAP	PA	2/10/2006
EPA 8081	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	2/10/2006
EPA 8081	gamma-Chlordane	NELAP	PA	2/10/2006
EPA 8082	Aroclor-1016 (PCB-1016)	NELAP	PA	12/11/2006
EPA 8082	Aroclor-1221 (PCB-1221)	NELAP	PA	12/11/2006
EPA 8082	Aroclor-1232 (PCB-1232)	NELAP	PA	12/11/2006
EPA 8082	Aroclor-1242 (PCB-1242)	NELAP	PA	12/11/2006
EPA 8082	Aroclor-1248 (PCB-1248)	NELAP	PA	12/11/2006
EPA 8082	Aroclor-1254 (PCB-1254)	NELAP	PA	12/11/2006
EPA 8082	Aroclor-1260 (PCB-1260)	NELAP	PA	12/11/2006
EPA 8141	Dichlorovos (DDVP Dichlorvos)	NELAP	PA	12/12/2005
EPA 8141	Disulfoton	NELAP	PA	12/12/2005
EPA 8141	Atrazine	NELAP	PA	12/12/2005
EPA 8141	Azinphos-methyl (Guthion)	NELAP	PA	12/12/2005
EPA 8141	Bolstar (Sulprofos)	NELAP	PA	12/12/2005
EPA 8141	Chlorpyrifos	NELAP	PA	12/12/2005
EPA 8141	Coumaphos	NELAP	PA	12/12/2005
EPA 8141	Demeton-o	NELAP	PA	12/12/2005
EPA 8141	Demeton-s	NELAP	PA	12/12/2005
EPA 8141	Diazinon (Spectracide)	NELAP	PA	12/12/2005
EPA 8141	EPN	NELAP	PA	12/12/2005
EPA 8141	Ethion	NELAP	PA	12/12/2005
EPA 8141	Ethoprop (Prophos)	NELAP	PA	12/12/2005
EPA 8141	Famphur	NELAP	PA	12/12/2005
EPA 8141	Fensulfothion	NELAP	PA	12/12/2005
EPA 8141	Fenthion	NELAP	PA	12/12/2005
EPA 8141	Malathion	NELAP	PA	12/12/2005
EPA 8141	Merphos	NELAP	PA	12/12/2005
EPA 8141	Methyl parathion (Parathion methyl)	NELAP	PA	12/12/2005
EPA 8141	Mevinphos	NELAP	PA	12/12/2005
EPA 8141	Naled	NELAP	PA	12/12/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8141	Parathion (Ethyl parathion)	NELAP	PA	12/12/2005
EPA 8141	Phorate (Thimet)	NELAP	PA	12/12/2005
EPA 8141	Ronnel	NELAP	PA	12/12/2005
EPA 8141	Simazine	NELAP	PA	12/12/2005
EPA 8141	Stirophos (Tetrachlorovinphos)	NELAP	PA	5/2/2006
EPA 8141	Tokuthion (Prothiophos)	NELAP	PA	12/12/2005
EPA 8141	Trichloronate	NELAP	PA	5/2/2006
EPA 8141-Extended	Metolachlor	NELAP	PA	1/24/2007
EPA 8151	Pentachlorophenol	NELAP	PA	12/12/2005
EPA 8151	2 4 5-T	NELAP	PA	12/12/2005
EPA 8151	2 4-D	NELAP	PA	12/12/2005
EPA 8151	2 4-DB (Butoxon)	NELAP	PA	12/12/2005
EPA 8151	Dalapon	NELAP	PA	12/12/2005
EPA 8151	Dicamba	NELAP	PA	12/12/2005
EPA 8151	Dichloroprop (Dichlorprop)	NELAP	PA	1/24/2007
EPA 8151	Dinoseb (2-sec-butyl-4 6-dinitrophenol DNBP)	NELAP	PA	12/12/2005
EPA 8151	Picloram	NELAP	PA	12/12/2005
EPA 8151	Silvex (2 4 5-TP)	NELAP	PA	12/12/2005
EPA 8151	MCPA	NELAP	PA	12/12/2005
EPA 8151	MCPP (Mecoprop)	NELAP	PA	12/12/2005
EPA 8260	Benzyl chloride	NELAP	PA	7/3/2007
EPA 8260	1 1 1 2-Tetrachloroethane	NELAP	PA	12/12/2005
EPA 8260	1 1 1-Trichloroethane	NELAP	PA	12/12/2005
EPA 8260	1 1 2 2-Tetrachloroethane	NELAP	PA	12/12/2005
EPA 8260	1 1 2-Trichloro-1 2 2-trifluoroethane	NELAP	PA	12/12/2005
EPA 8260	1 1 2-Trichloroethane	NELAP	PA	12/12/2005
EPA 8260	1 1-Dichloroethane	NELAP	PA	12/12/2005
EPA 8260	1 1-Dichloroethene	NELAP	PA	12/12/2005
EPA 8260	1 1-Dichloropropene	NELAP	PA	12/12/2005
EPA 8260	1 2 3-Trichlorobenzene	NELAP	PA	12/12/2005
EPA 8260	1 2 3-Trichloropropane	NELAP	PA	12/12/2005
EPA 8260	1 2 4-Trichlorobenzene	NELAP	PA	12/12/2005
EPA 8260	1 2 4-Trimethylbenzene	NELAP	PA	12/12/2005
EPA 8260	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	5/2/2006
EPA 8260	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	12/12/2005
EPA 8260	1 2-Dichlorobenzene	NELAP	PA	12/12/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260	1 2-Dichloroethane	NELAP	PA	12/12/2005
EPA 8260	1 2-Dichloropropane	NELAP	PA	12/12/2005
EPA 8260	1 3 5-Trimethylbenzene	NELAP	PA	12/12/2005
EPA 8260	1 3-Dichlorobenzene	NELAP	PA	12/12/2005
EPA 8260	1 3-Dichloropropane	NELAP	PA	12/12/2005
EPA 8260	1 4-Dichlorobenzene	NELAP	PA	12/12/2005
EPA 8260	1 4-Dioxane (1 4- Diethyleneoxide)	NELAP	PA	12/12/2005
EPA 8260	2 2-Dichloropropane	NELAP	PA	5/2/2006
EPA 8260	2-Butanone (Methyl ethyl ketone MEK)	NELAP	PA	5/2/2006
EPA 8260	2-Chloroethyl vinyl ether	NELAP	PA	12/12/2005
EPA 8260	2-Chlorotoluene	NELAP	PA	12/12/2005
EPA 8260	2-Hexanone	NELAP	PA	12/12/2005
EPA 8260	4-Chlorotoluene	NELAP	PA	12/12/2005
EPA 8260	4-Methyl-2-pentanone (MIBK)	NELAP	PA	12/12/2005
EPA 8260	Acetone	NELAP	PA	12/12/2005
EPA 8260	Acetonitrile	NELAP	PA	12/12/2005
EPA 8260	Acrolein (Propenal)	NELAP	PA	12/12/2005
EPA 8260	Acrylonitrile	NELAP	PA	12/12/2005
EPA 8260	Allyl chloride (3-Chloropropene)	NELAP	PA	12/12/2005
EPA 8260	Benzene	NELAP	PA	12/12/2005
EPA 8260	Bromobenzene	NELAP	PA	12/12/2005
EPA 8260	Bromochloromethane	NELAP	PA	12/12/2005
EPA 8260	Bromodichloromethane	NELAP	PA	12/12/2005
EPA 8260	Bromoform	NELAP	PA	12/12/2005
EPA 8260	Carbon disulfide	NELAP	PA	12/12/2005
EPA 8260	Carbon tetrachloride	NELAP	PA	12/12/2005
EPA 8260	Chlorobenzene	NELAP	PA	12/12/2005
EPA 8260	Chloroethane	NELAP	PA	12/12/2005
EPA 8260	Chloroform	NELAP	PA	12/12/2005
EPA 8260	Dibromochloromethane	NELAP	PA	12/12/2005
EPA 8260	Dibromochloropropane	NELAP	PA	12/12/2005
EPA 8260	Dibromomethane	NELAP	PA	5/2/2006
EPA 8260	Dichlorodifluoromethane	NELAP	PA	12/12/2005
EPA 8260	Ethylbenzene	NELAP	PA	12/12/2005
EPA 8260	Hexachlorobutadiene	NELAP	PA	12/12/2005
EPA 8260	Isobutyl alcohol (2-Methyl-1-propanol)	NELAP	PA	7/3/2007

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260	Isopropylbenzene	NELAP	PA	5/2/2006
EPA 8260	Methacrylonitrile	NELAP	PA	7/3/2007
EPA 8260	Methyl bromide (Bromomethane)	NELAP	PA	12/12/2005
EPA 8260	Methyl chloride (Chloromethane)	NELAP	PA	12/12/2005
EPA 8260	Methyl methacrylate	NELAP	PA	5/25/2007
EPA 8260	Methyl tert-butyl ether (MTBE)	NELAP	PA	12/12/2005
EPA 8260	Methylene chloride	NELAP	PA	12/12/2005
EPA 8260	Naphthalene	NELAP	PA	12/12/2005
EPA 8260	Propionitrile (Ethyl cyanide)	NELAP	PA	12/12/2005
EPA 8260	Styrene	NELAP	PA	12/12/2005
EPA 8260	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	12/12/2005
EPA 8260	Toluene	NELAP	PA	12/12/2005
EPA 8260	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	12/12/2005
EPA 8260	Trichlorofluoromethane	NELAP	PA	12/12/2005
EPA 8260	Vinyl acetate	NELAP	PA	12/12/2005
EPA 8260	Vinyl chloride	NELAP	PA	12/12/2005
EPA 8260	Xylene (total)	NELAP	PA	12/12/2005
EPA 8260	cis-1 2-Dichloroethene	NELAP	PA	12/12/2005
EPA 8260	cis-1 3-Dichloropropene	NELAP	PA	12/12/2005
EPA 8260	n-Butylbenzene	NELAP	PA	12/12/2005
EPA 8260	n-Propylamine	NELAP	PA	12/12/2005
EPA 8260	sec-Butylbenzene	NELAP	PA	12/12/2005
EPA 8260	tert-Butyl alcohol	NELAP	PA	12/12/2005
EPA 8260	tert-Butylbenzene	NELAP	PA	12/12/2005
EPA 8260	trans-1 2-Dichloroethene	NELAP	PA	12/12/2005
EPA 8260	trans-1 3-Dichloropropene	NELAP	PA	12/12/2005
EPA 8260	trans-1 4-Dichloro-2-butene	NELAP	PA	7/3/2007
EPA 8260 SIM	1 4-Dioxane (1 4- Diethyleneoxide)	NELAP	PA	12/4/2007
EPA 8260-Extended	2-Chloro-1,3-butadiene	NELAP	PA	7/3/2007
EPA 8260-Extended	Ethyl t-butyl ether (ETBE)	NELAP	PA	1/24/2007
EPA 8260-Extended	Gasoline range organics (GRO)	NELAP	PA	6/8/2006
EPA 8260-Extended	Isopropyl ether	NELAP	PA	1/24/2007
EPA 8260-Extended	Methyl acetate	NELAP	PA	1/24/2007
EPA 8260-Extended	t-Amyl ethyl ether	NELAP	PA	1/24/2007
EPA 8260-Extended	Methyl Iodide (Iodomethane)	NELAP	PA	5/25/2007
EPA 8260B	4-Isopropyltoluene (p-Isopropyltoluene)	NELAP	PA	1/24/2007

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260B	Ethanol	NELAP	PA	1/24/2007
EPA 8260B	Ethyl acetate	NELAP	PA	1/24/2007
EPA 8260B	Ethyl methacrylate	NELAP	PA	1/24/2007
EPA 8260B	Isobutyl alcohol (2-Methyl-1-propanol)	NELAP	PA	1/24/2007
EPA 8260B	Pentachloroethane	NELAP	PA	1/24/2007
EPA 8260B	n-Propylbenzene	NELAP	PA	1/24/2007
EPA 8260B-Extended	Cyclohexane	NELAP	PA	7/3/2007
EPA 8260B-Extended	Diisopropyl ether (DIPE)	NELAP	PA	7/3/2007
EPA 8270	1 2 4 5-Tetrachlorobenzene	NELAP	PA	12/12/2005
EPA 8270	1 2-Dinitrobenzene	NELAP	PA	12/12/2005
EPA 8270	1 2-Diphenylhydrazine	NELAP	PA	12/12/2005
EPA 8270	1 3 5-Trinitrobenzene (1 3 5-TNB)	NELAP	PA	12/12/2005
EPA 8270	1 3-Dinitrobenzene (1 3-DNB)	NELAP	PA	12/12/2005
EPA 8270	1 4-Naphthoquinone	NELAP	PA	12/12/2005
EPA 8270	1 4-Phenylenediamine	NELAP	PA	12/12/2005
EPA 8270	1-Chloronaphthalene	NELAP	PA	12/12/2005
EPA 8270	1-Naphthylamine	NELAP	PA	12/12/2005
EPA 8270	2 3 4 6-Tetrachlorophenol	NELAP	PA	12/12/2005
EPA 8270	2 4 5-Trichlorophenol	NELAP	PA	12/12/2005
EPA 8270	2 4 6-Trichlorophenol	NELAP	PA	12/12/2005
EPA 8270	2 4-Dichlorophenol	NELAP	PA	12/12/2005
EPA 8270	2 4-Dimethylphenol	NELAP	PA	12/12/2005
EPA 8270	2 4-Dinitrophenol	NELAP	PA	12/12/2005
EPA 8270	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	12/12/2005
EPA 8270	2 6-Dichlorophenol	NELAP	PA	12/12/2005
EPA 8270	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	12/12/2005
EPA 8270	2-Acetylaminofluorene	NELAP	PA	12/12/2005
EPA 8270	2-Chloronaphthalene	NELAP	PA	12/12/2005
EPA 8270	2-Chlorophenol	NELAP	PA	12/12/2005
EPA 8270	2-Methyl-4 6-dinitrophenol	NELAP	PA	12/12/2005
EPA 8270	2-Methylnaphthalene	NELAP	PA	12/12/2005
EPA 8270	2-Methylphenol (o-Cresol)	NELAP	PA	12/12/2005
EPA 8270	2-Naphthylamine	NELAP	PA	12/12/2005
EPA 8270	2-Nitroaniline	NELAP	PA	12/12/2005
EPA 8270	2-Nitrophenol	NELAP	PA	12/12/2005
EPA 8270	3 3`-Dichlorobenzidine	NELAP	PA	12/12/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270	3 3`-Dimethoxybenzidine	NELAP	PA	12/12/2005
EPA 8270	3 3`-Dimethylbenzidine	NELAP	PA	7/3/2007
EPA 8270	3-Methylcholanthrene	NELAP	PA	12/12/2005
EPA 8270	3-Methylphenol (m-Cresol)	NELAP	PA	5/2/2006
EPA 8270	3-Nitroaniline	NELAP	PA	12/12/2005
EPA 8270	4 4`-Methylenebis(2-chloroaniline)	NELAP	PA	12/12/2005
EPA 8270	4-Aminobiphenyl	NELAP	PA	12/12/2005
EPA 8270	4-Bromophenyl phenyl ether	NELAP	PA	12/12/2005
EPA 8270	4-Chloro-3-methylphenol	NELAP	PA	12/12/2005
EPA 8270	4-Chloroaniline	NELAP	PA	12/12/2005
EPA 8270	4-Chlorophenyl phenylether	NELAP	PA	12/12/2005
EPA 8270	4-Methylphenol (p-Cresol)	NELAP	PA	12/12/2005
EPA 8270	4-Nitroaniline	NELAP	PA	12/12/2005
EPA 8270	4-Nitrophenol	NELAP	PA	12/12/2005
EPA 8270	5-Nitro-o-toluidine	NELAP	PA	12/12/2005
EPA 8270	7 12-Dimethylbenz(a)anthracene	NELAP	PA	12/12/2005
EPA 8270	Acenaphthene	NELAP	PA	12/12/2005
EPA 8270	Acenaphthylene	NELAP	PA	12/12/2005
EPA 8270	Acetophenone	NELAP	PA	12/12/2005
EPA 8270	Aniline	NELAP	PA	12/12/2005
EPA 8270	Anthracene	NELAP	PA	12/12/2005
EPA 8270	Aramite	NELAP	PA	12/12/2005
EPA 8270	Benzidine	NELAP	PA	12/12/2005
EPA 8270	Benzo(a)anthracene	NELAP	PA	12/12/2005
EPA 8270	Benzo(a)pyrene	NELAP	PA	12/12/2005
EPA 8270	Benzo(b)fluoranthene	NELAP	PA	12/12/2005
EPA 8270	Benzo(g h i)perylene	NELAP	PA	12/12/2005
EPA 8270	Benzo(k)fluoranthene	NELAP	PA	12/12/2005
EPA 8270	Benzoic acid	NELAP	PA	12/12/2005
EPA 8270	Benzyl alcohol	NELAP	PA	12/12/2005
EPA 8270	Butyl benzyl phthalate (Benzyl butyl phthalate)	NELAP	PA	12/12/2005
EPA 8270	Chrysene	NELAP	PA	12/12/2005
EPA 8270	Di-n-butyl phthalate	NELAP	PA	12/12/2005
EPA 8270	Di-n-octyl phthalate	NELAP	PA	12/12/2005
EPA 8270	Dibenz(a h)anthracene	NELAP	PA	12/12/2005
EPA 8270	Dibenz(a j)acridine	NELAP	PA	12/12/2005

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Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270	Dibenzofuran	NELAP	PA	12/12/2005
EPA 8270	Diethyl phthalate	NELAP	PA	12/12/2005
EPA 8270	Dimethyl phthalate	NELAP	PA	12/12/2005
EPA 8270	Diphenylamine	NELAP	PA	12/12/2005
EPA 8270	Ethyl methanesulfonate	NELAP	PA	12/12/2005
EPA 8270	Fluoranthene	NELAP	PA	12/12/2005
EPA 8270	Fluorene	NELAP	PA	12/12/2005
EPA 8270	Hexachlorobenzene	NELAP	PA	12/12/2005
EPA 8270	Hexachlorocyclopentadiene	NELAP	PA	12/12/2005
EPA 8270	Hexachloropropene	NELAP	PA	12/12/2005
EPA 8270	Indeno(1 2 3-cd)pyrene	NELAP	PA	12/12/2005
EPA 8270	Isophorone	NELAP	PA	12/12/2005
EPA 8270	Isosafrole	NELAP	PA	12/12/2005
EPA 8270	Methapyrilene	NELAP	PA	12/12/2005
EPA 8270	Methyl methanesulfonate	NELAP	PA	12/12/2005
EPA 8270	Nitroquinoline-1-oxide	NELAP	PA	7/3/2007
EPA 8270	Pentachlorobenzene	NELAP	PA	12/12/2005
EPA 8270	Pentachloronitrobenzene (PCNB)	NELAP	PA	12/12/2005
EPA 8270	Pentachlorophenol	NELAP	PA	12/12/2005
EPA 8270	Phenacetin	NELAP	PA	12/12/2005
EPA 8270	Phenanthrene	NELAP	PA	12/12/2005
EPA 8270	Phenol	NELAP	PA	12/12/2005
EPA 8270	Pronamide (Kerb)	NELAP	PA	12/12/2005
EPA 8270	Pyrene	NELAP	PA	12/12/2005
EPA 8270	Safrole	NELAP	PA	12/12/2005
EPA 8270	a-a-Dimethylphenethylamine	NELAP	PA	12/12/2005
EPA 8270	bis(2-Chloroethoxy) methane	NELAP	PA	12/12/2005
EPA 8270	bis(2-Chloroethyl) ether	NELAP	PA	12/12/2005
EPA 8270	bis(2-Chloroisopropyl) ether	NELAP	PA	12/12/2005
EPA 8270	bis(2-Ethylhexyl) phthalate (DEHP)	NELAP	PA	12/12/2005
EPA 8270	n-Nitrosodi-n-propylamine	NELAP	PA	12/12/2005
EPA 8270	n-Nitrosodiethylamine	NELAP	PA	12/12/2005
EPA 8270	n-Nitrosodimethylamine	NELAP	PA	12/12/2005
EPA 8270	n-Nitrosodiphenylamine	NELAP	PA	12/12/2005
EPA 8270	n-Nitrosomethylethylamine	NELAP	PA	12/12/2005
EPA 8270	n-Nitrosomorpholine	NELAP	PA	12/12/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270	n-Nitrosopiperidine	NELAP	PA	12/12/2005
EPA 8270	n-Nitrosopyrrolidine	NELAP	PA	12/12/2005
EPA 8270	Dinoseb (2-sec-butyl-4 6-dinitrophenol DNBP)	NELAP	PA	12/12/2005
EPA 8270	Disulfoton	NELAP	PA	12/12/2005
EPA 8270	Chlorobenzilate	NELAP	PA	12/12/2005
EPA 8270	Diallate (cis or trans)	NELAP	PA	12/12/2005
EPA 8270	Dimethoate	NELAP	PA	12/12/2005
EPA 8270	Famphur	NELAP	PA	12/12/2005
EPA 8270	Isodrin	NELAP	PA	12/12/2005
EPA 8270	Kepone	NELAP	PA	12/12/2005
EPA 8270	Methyl parathion (Parathion methyl)	NELAP	PA	5/25/2007
EPA 8270	Parathion (Ethyl parathion)	NELAP	PA	5/25/2007
EPA 8270	Phorate (Thimet)	NELAP	PA	12/12/2005
EPA 8270	Thionazin (Zinophos)	NELAP	PA	12/12/2005
EPA 8270	o o o-Triethyl phosphorothioate	NELAP	PA	12/12/2005
EPA 8270	1 2 4-Trichlorobenzene	NELAP	PA	12/12/2005
EPA 8270	1 2-Dichlorobenzene	NELAP	PA	12/12/2005
EPA 8270	1 3-Dichlorobenzene	NELAP	PA	12/12/2005
EPA 8270	1 4-Dichlorobenzene	NELAP	PA	12/12/2005
EPA 8270	2-Picoline (2-Methylpyridine)	NELAP	PA	5/2/2006
EPA 8270	Hexachlorobutadiene	NELAP	PA	12/12/2005
EPA 8270	Hexachloroethane	NELAP	PA	12/12/2005
EPA 8270	Naphthalene	NELAP	PA	12/12/2005
EPA 8270	Nitrobenzene	NELAP	PA	12/12/2005
EPA 8270	Pyridine	NELAP	PA	12/12/2005
EPA 8270	n-Nitroso-di-n-butylamine	NELAP	PA	12/12/2005
EPA 8270	o-Toluidine	NELAP	PA	12/12/2005
EPA 8270	Dimethylaminoazobenzene	NELAP	PA	5/2/2006
EPA 8270 SIM	Acenaphthene	NELAP	PA	12/4/2007
EPA 8270 SIM	Acenaphthylene	NELAP	PA	12/4/2007
EPA 8270 SIM	Anthracene	NELAP	PA	12/4/2007
EPA 8270 SIM	Benzo(a)anthracene	NELAP	PA	12/4/2007
EPA 8270 SIM	Benzo(a)pyrene	NELAP	PA	12/4/2007
EPA 8270 SIM	Benzo(b)fluoranthene	NELAP	PA	12/4/2007
EPA 8270 SIM	Benzo(g h i)perylene	NELAP	PA	12/4/2007
EPA 8270 SIM	Benzo(k)fluoranthene	NELAP	PA	12/4/2007

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Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270 SIM	Chrysene	NELAP	PA	12/4/2007
EPA 8270 SIM	Dibenz(a h)anthracene	NELAP	PA	12/4/2007
EPA 8270 SIM	Fluoranthene	NELAP	PA	12/4/2007
EPA 8270 SIM	Fluorene	NELAP	PA	12/4/2007
EPA 8270 SIM	Indeno(1 2 3-cd)pyrene	NELAP	PA	12/4/2007
EPA 8270 SIM	Phenanthrene	NELAP	PA	12/4/2007
EPA 8270 SIM	Pyrene	NELAP	PA	12/4/2007
EPA 8270 SIM	Naphthalene	NELAP	PA	12/4/2007
EPA 8270-Extended	1 2 3 4-Tetrachlorobenzene	NELAP	PA	7/3/2007
EPA 8270-Extended	1 2 3 5-Tetrachlorobenzene	NELAP	PA	7/3/2007
EPA 8270-Extended	Carbazole	NELAP	PA	12/12/2005
EPA 8270-Extended	Asulam	NELAP	PA	1/12/2007
EPA 8270-Extended	Atrazine	NELAP	PA	1/22/2007
EPA 8310	Acenaphthene	NELAP	PA	1/2/2007
EPA 8310	Acenaphthylene	NELAP	PA	1/2/2007
EPA 8310	Anthracene	NELAP	PA	1/2/2007
EPA 8310	Benzo(a)anthracene	NELAP	PA	1/2/2007
EPA 8310	Benzo(a)pyrene	NELAP	PA	1/2/2007
EPA 8310	Benzo(b)fluoranthene	NELAP	PA	1/2/2007
EPA 8310	Benzo(g h i)perylene	NELAP	PA	1/2/2007
EPA 8310	Benzo(k)fluoranthene	NELAP	PA	1/2/2007
EPA 8310	Chrysene	NELAP	PA	1/2/2007
EPA 8310	Dibenz(a h)anthracene	NELAP	PA	1/2/2007
EPA 8310	Fluoranthene	NELAP	PA	1/2/2007
EPA 8310	Fluorene	NELAP	PA	1/2/2007
EPA 8310	Indeno(1 2 3-cd)pyrene	NELAP	PA	1/2/2007
EPA 8310	Phenanthrene	NELAP	PA	1/2/2007
EPA 8310	Pyrene	NELAP	PA	1/2/2007
EPA 8310	Naphthalene	NELAP	PA	1/2/2007
EPA 8315	1 4-Tolualdehyde	NELAP	PA	1/24/2007
EPA 8315	2 5-Dimethylbenzaldehyde	NELAP	PA	12/12/2005
EPA 8315	Benzaldehyde	NELAP	PA	12/12/2005
EPA 8315	Isovaleraldehyde	NELAP	PA	12/12/2005
EPA 8315	Pentanal (Valeraldehyde)	NELAP	PA	12/12/2005
EPA 8315	1 2-Tolualdehyde	NELAP	PA	1/24/2007
EPA 8315	1 3-Tolualdehyde	NELAP	PA	5/2/2006

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Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8315	Acetaldehyde	NELAP	PA	12/12/2005
EPA 8315	Acrolein (Propenal)	NELAP	PA	12/12/2005
EPA 8315	Butanal (Butyraldehyde)	NELAP	PA	5/2/2006
EPA 8315	Crotonaldehyde	NELAP	PA	12/12/2005
EPA 8315	Formaldehyde	NELAP	PA	12/12/2005
EPA 8330	1 3 5-Trinitrobenzene (1 3 5-TNB)	NELAP	PA	12/12/2005
EPA 8330	1 3-Dinitrobenzene (1 3-DNB)	NELAP	PA	12/12/2005
EPA 8330	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	6/11/2007
EPA 8330	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	6/11/2007
EPA 8330	2 4 6-Trinitrotoluene (2 4 6-TNT)	NELAP	PA	12/12/2005
EPA 8330	2-Amino-4 6-dinitrotoluene (2-am-dnt)	NELAP	PA	12/12/2005
EPA 8330	2-Nitrotoluene	NELAP	PA	12/12/2005
EPA 8330	3-Nitrotoluene	NELAP	PA	12/12/2005
EPA 8330	4-Amino-2 6-dinitrotoluene (4-am-dnt)	NELAP	PA	12/12/2005
EPA 8330	4-Nitrotoluene	NELAP	PA	12/12/2005
EPA 8330	Octahydro-1 3 5 7-tetranitro-1 3 5 7-tetrazocine (HMX)	NELAP	PA	12/12/2005
EPA 8330	RDX (hexahydro-1 3 5-trinitro-1 3 5-triazine)	NELAP	PA	12/12/2005
EPA 8330	Tetryl (methyl-2 4 6-trinitrophenylnitramine)	NELAP	PA	12/12/2005
EPA 8330	Nitrobenzene	NELAP	PA	6/11/2007
EPA 8330-Extended	Nitroglycerin	NELAP	PA	1/24/2007
EPA 8330-Extended	Pentaerythritoltetranitrate	NELAP	PA	5/2/2006
EPA 8332	Nitroglycerin	NELAP	PA	12/12/2005
EPA 9012	Total cyanide	NELAP	PA	12/12/2005
EPA 9040	pH	NELAP	PA	12/12/2005
EPA 9050	Conductivity	NELAP	PA	12/12/2005
EPA 9056	Bromide	NELAP	PA	12/12/2005
EPA 9056	Chloride	NELAP	PA	12/12/2005
EPA 9056	Fluoride	NELAP	PA	12/12/2005
EPA 9056	Nitrate	NELAP	PA	12/12/2005
EPA 9056	Nitrite	NELAP	PA	1/19/2005
EPA 9056	Sulfate	NELAP	PA	12/12/2005
EPA 9060	Total organic carbon	NELAP	PA	12/12/2005
EPA 9066	Total phenolics	NELAP	PA	12/12/2005
EPA 9095A	Paint Filter Liquids Test	NELAP	PA	1/24/2007
FL-PRO	Total Petroleum Hydrocarbons (TPH)	NELAP	PA	12/12/2005
MA-EPH	Diesel range organics (DRO)	NELAP	PA	12/12/2005

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Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
MA-VPH	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
NWTPH-Dx	Diesel range organics (DRO)	NELAP	PA	12/12/2005
NWTPH-Gx	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
OA-1	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
OA-2	Diesel range organics (DRO)	NELAP	PA	12/12/2005
SM 2120 B	Color	NELAP	PA	4/17/2007
SM 2310 B	Acidity as CaCO3	NELAP	PA	4/17/2007
SM 2320 B	Alkalinity as CaCO3	NELAP	PA	1/19/2005
SM 2340 B	Total hardness as CaCO3	NELAP	PA	1/24/2007
SM 2340 C	Total hardness as CaCO3	NELAP	PA	4/17/2007
SM 2510 B	Conductivity	NELAP	PA	12/12/2005
SM 2540 B	Residue-total	NELAP	PA	4/17/2007
SM 2540 C	Residue-filterable (TDS)	NELAP	PA	4/17/2007
SM 2540 D	Residue-nonfilterable (TSS)	NELAP	PA	4/17/2007
SM 2540 F	Residue-settleable	NELAP	PA	4/17/2007
SM 3500-Cr B (20th ed.)	Chromium VI	NELAP	PA	5/24/2007
SM 4500-CN- C	Cyanide	NELAP	PA	12/12/2005
SM 4500-CN- E	Cyanide	NELAP	PA	12/12/2005
SM 4500-CN- G	Amenable cyanide	NELAP	PA	5/24/2007
SM 4500-Cl F	Total residual chlorine	NELAP	PA	4/17/2007
SM 4500-Cl- C	Chloride	NELAP	PA	4/17/2007
SM 4500-F- C	Fluoride	NELAP	PA	1/19/2005
SM 4500-H+ B	pH	NELAP	PA	4/17/2007
SM 4500-NH3 B	Ammonia Distillation	NELAP	PA	4/17/2007
SM 4500-NH3 C	Ammonia as N	NELAP	PA	4/17/2007
SM 4500-NH3 D	Ammonia as N	NELAP	PA	4/17/2007
SM 4500-O G	Oxygen dissolved	NELAP	PA	4/17/2007
SM 4500-P E	Orthophosphate as P	NELAP	PA	12/12/2005
SM 4500-P E	Phosphorus total	NELAP	PA	12/4/2007
SM 4500-S D	Sulfide	NELAP	PA	4/17/2007
SM 4500-S F	Sulfide	NELAP	PA	4/17/2007
SM 4500-SO3 B	Sulfite-SO3	NELAP	PA	4/17/2007
SM 4500-SiO2 C (20th ed.)	Silica as SiO2	NELAP	PA	5/25/2007
SM 4500-SiO2 C (20th ed.)	Silica-dissolved	NELAP	PA	5/24/2007
SM 5210 B	Biochemical oxygen demand	NELAP	PA	4/4/2005
SM 5210 B	Carbonaceous BOD (CBOD)	NELAP	PA	1/19/2005

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Program Non-Potable Water

Method	Analyte	Accreditation Type	Primary	Effective Date
SM 5310 B	Total organic carbon	NELAP	PA	4/17/2007
SM 5310 C	Total organic carbon	NELAP	PA	5/24/2007
SM 5540 C	Surfactants - MBAS	NELAP	PA	4/17/2007
SM 9222 D	Fecal coliforms	NELAP	PA	7/6/2007
TN-DRO	Diesel range organics (DRO)	NELAP	PA	12/12/2005
TN-GRO	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
TX1005 (TNRCC)	Total Petroleum Hydrocarbons (TPH)	NELAP	PA	12/12/2005
TX1006 (TNRCC)	Total Petroleum Hydrocarbons (TPH)	NELAP	PA	12/12/2005
WA-EPH	Diesel range organics (DRO)	NELAP	PA	12/12/2005
WA-VPH	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
WI-DRO	Diesel range organics (DRO)	NELAP	PA	12/12/2005
WI-GRO	Gasoline range organics (GRO)	NELAP	PA	12/12/2005

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Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
AK-101	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
AK-102	Diesel range organics (DRO)	NELAP	PA	12/12/2005
AK-103	Diesel range organics (DRO)	NELAP	PA	12/12/2005
EPA 1010	Ignitability	NELAP	PA	1/19/2005
EPA 1311	Toxicity Characteristic Leaching Procedure (TCLP)	NELAP	PA	12/12/2005
EPA 1312	Synthetic Precipitation Leaching Procedure (SPLP)	NELAP	PA	12/12/2005
EPA 3005A	Preconcentration under Acid	NELAP	PA	4/4/2005
EPA 3010A	Hot Plate Acid Digestion (HNO3 + HCl)	NELAP	PA	4/4/2005
EPA 3020A	Hot Plate Acid Digestion (HNO3 only)	NELAP	PA	4/4/2005
EPA 3050B	Acid Digestion of Solids	NELAP	PA	4/4/2005
EPA 3060A	Alkaline Digestion of Cr(VI)	NELAP	PA	4/4/2005
EPA 3510C	Separatory Funnel Liquid-Liquid Extraction	NELAP	PA	4/4/2005
EPA 3540C	Soxhlet Extraction	NELAP	PA	4/4/2005
EPA 3545	Pressurized Fluid Extraction	NELAP	PA	4/4/2005
EPA 3550B	Ultrasonic Extraction	NELAP	PA	4/4/2005
EPA 3620B	Florisil Clean-up	NELAP	PA	4/4/2005
EPA 3630C	Silica Gel Clean-up	NELAP	PA	4/4/2005
EPA 3640A	Gel-Permeation Clean-up	NELAP	PA	4/4/2005
EPA 3660B	Sulfur Clean-up	NELAP	PA	4/4/2005
EPA 3665A	Sulfuric acid/permanganate clean-up	NELAP	PA	4/4/2005
EPA 5030	Bulk purge and trap (methanol)	NELAP	PA	12/4/2007
EPA 5035	Closed System Purge & Trap (bisulfate option)	NELAP	PA	12/12/2005
EPA 5035	Closed System Purge & Trap (methanol option)	NELAP	PA	4/4/2005
EPA 5035	Closed System Purge & Trap (unpreserved)	NELAP	PA	4/4/2005
EPA 6010	Aluminum	NELAP	PA	1/19/2005
EPA 6010	Antimony	NELAP	PA	1/19/2005
EPA 6010	Arsenic	NELAP	PA	1/19/2005
EPA 6010	Barium	NELAP	PA	1/19/2005
EPA 6010	Beryllium	NELAP	PA	1/19/2005
EPA 6010	Boron	NELAP	PA	1/19/2005
EPA 6010	Cadmium	NELAP	PA	1/19/2005
EPA 6010	Calcium	NELAP	PA	1/19/2005
EPA 6010	Chromium	NELAP	PA	1/19/2005
EPA 6010	Cobalt	NELAP	PA	1/19/2005
EPA 6010	Copper	NELAP	PA	1/19/2005
EPA 6010	Iron	NELAP	PA	1/19/2005

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2425 New Holland Pike
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EPA 6010	Lead	NELAP	PA	1/19/2005
EPA 6010	Magnesium	NELAP	PA	1/19/2005
EPA 6010	Manganese	NELAP	PA	1/19/2005
EPA 6010	Molybdenum	NELAP	PA	1/19/2005
EPA 6010	Nickel	NELAP	PA	1/19/2005
EPA 6010	Potassium	NELAP	PA	1/19/2005
EPA 6010	Selenium	NELAP	PA	1/19/2005
EPA 6010	Silver	NELAP	PA	1/19/2005
EPA 6010	Sodium	NELAP	PA	1/19/2005
EPA 6010	Strontium	NELAP	PA	1/19/2005
EPA 6010	Thallium	NELAP	PA	1/19/2005
EPA 6010	Tin	NELAP	PA	1/19/2005
EPA 6010	Titanium	NELAP	PA	1/19/2005
EPA 6010	Vanadium	NELAP	PA	1/19/2005
EPA 6010	Zinc	NELAP	PA	1/19/2005
EPA 6020	Antimony	NELAP	PA	1/19/2005
EPA 6020	Arsenic	NELAP	PA	1/19/2005
EPA 6020	Beryllium	NELAP	PA	1/19/2005
EPA 6020	Cadmium	NELAP	PA	1/19/2005
EPA 6020	Chromium	NELAP	PA	1/19/2005
EPA 6020	Copper	NELAP	PA	1/19/2005
EPA 6020	Lead	NELAP	PA	1/19/2005
EPA 6020	Nickel	NELAP	PA	4/4/2005
EPA 6020	Selenium	NELAP	PA	4/4/2005
EPA 6020	Thallium	NELAP	PA	1/19/2005
EPA 7.3.3.2	Reactive Cyanide	NELAP	PA	12/12/2005
EPA 7.3.4.2	Reactive sulfide	NELAP	PA	12/12/2005
EPA 7060	Arsenic	NELAP	PA	5/25/2005
EPA 7196	Chromium VI	NELAP	PA	1/19/2005
EPA 7199	Chromium VI	NELAP	PA	5/2/2006
EPA 7421	Lead	NELAP	PA	1/23/2007
EPA 7471	Mercury	NELAP	PA	10/17/2007
EPA 8015	Ethanol	NELAP	PA	1/19/2005
EPA 8015	Ethylene glycol	NELAP	PA	12/4/2007
EPA 8015	Isopropyl alcohol (2-Propanol)	NELAP	PA	12/4/2007
EPA 8015	Methanol	NELAP	PA	1/19/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8015	tert-Butyl alcohol	NELAP	PA	1/12/2007
EPA 8015B	Diesel range organics (DRO)	NELAP	PA	4/4/2005
EPA 8015B	Gasoline range organics (GRO)	NELAP	PA	4/4/2005
EPA 8015B-Extended	Ethane	NELAP	PA	12/4/2007
EPA 8015B-Extended	Ethene	NELAP	PA	12/4/2007
EPA 8015B-Extended	Methane	NELAP	PA	12/4/2007
EPA 8021	Benzene	NELAP	PA	1/19/2005
EPA 8021	Ethylbenzene	NELAP	PA	1/19/2005
EPA 8021	Methyl tert-butyl ether (MTBE)	NELAP	PA	5/2/2006
EPA 8021	Naphthalene	NELAP	PA	12/4/2007
EPA 8021	Toluene	NELAP	PA	1/19/2005
EPA 8021	Xylene (total)	NELAP	PA	1/19/2005
EPA 8021	m-Xylene	NELAP	PA	1/24/2007
EPA 8021	o-Xylene	NELAP	PA	1/24/2007
EPA 8021	p-Xylene	NELAP	PA	1/24/2007
EPA 8021-Extended	1 2 4-Trimethylbenzene	NELAP	PA	1/24/2007
EPA 8021-Extended	1 3 5-Trimethylbenzene	NELAP	PA	1/24/2007
EPA 8021-Extended	Isopropylbenzene	NELAP	PA	1/24/2007
EPA 8021-Extended	n-Butylbenzene	NELAP	PA	1/24/2007
EPA 8021-Extended	n-Propylbenzene	NELAP	PA	1/24/2007
EPA 8021-Extended	p-Isopropyltoluene (4-Isopropyltoluene)	NELAP	PA	1/24/2007
EPA 8021-Extended	sec-Butylbenzene	NELAP	PA	1/24/2007
EPA 8021-Extended	tert-Butylbenzene	NELAP	PA	1/24/2007
EPA 8081	4 4`-DDD	NELAP	PA	1/19/2005
EPA 8081	4 4`-DDE	NELAP	PA	1/19/2005
EPA 8081	4 4`-DDT	NELAP	PA	1/19/2005
EPA 8081	Aldrin	NELAP	PA	1/19/2005
EPA 8081	Chlordane (tech.)	NELAP	PA	1/19/2005
EPA 8081	Dieldrin	NELAP	PA	1/19/2005
EPA 8081	Endosulfan I	NELAP	PA	1/19/2005
EPA 8081	Endosulfan II	NELAP	PA	1/19/2005
EPA 8081	Endosulfan sulfate	NELAP	PA	1/19/2005
EPA 8081	Endrin	NELAP	PA	1/19/2005
EPA 8081	Endrin aldehyde	NELAP	PA	1/19/2005
EPA 8081	Endrin ketone	NELAP	PA	1/19/2005
EPA 8081	Heptachlor	NELAP	PA	1/19/2005

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EPA 8081	Heptachlor epoxide	NELAP	PA	1/19/2005
EPA 8081	Kepone	NELAP	PA	1/19/2005
EPA 8081	Methoxychlor	NELAP	PA	1/19/2005
EPA 8081	Mirex	NELAP	PA	1/19/2005
EPA 8081	Toxaphene (Chlorinated camphene)	NELAP	PA	1/19/2005
EPA 8081	alpha-BHC (alpha-Hexachlorocyclohexane)	NELAP	PA	1/19/2005
EPA 8081	alpha-Chlordane	NELAP	PA	4/4/2005
EPA 8081	beta-BHC (beta-Hexachlorocyclohexane)	NELAP	PA	1/19/2005
EPA 8081	delta-BHC (delta-Hexachlorocyclohexane)	NELAP	PA	1/19/2005
EPA 8081	gamma-BHC (Lindane gamma-Hexachlorocyclohexane)	NELAP	PA	1/19/2005
EPA 8081	gamma-Chlordane	NELAP	PA	4/4/2005
EPA 8082	Aroclor-1016 (PCB-1016)	NELAP	PA	1/2/2007
EPA 8082	Aroclor-1221 (PCB-1221)	NELAP	PA	1/2/2007
EPA 8082	Aroclor-1232 (PCB-1232)	NELAP	PA	1/2/2007
EPA 8082	Aroclor-1242 (PCB-1242)	NELAP	PA	1/2/2007
EPA 8082	Aroclor-1248 (PCB-1248)	NELAP	PA	1/2/2007
EPA 8082	Aroclor-1254 (PCB-1254)	NELAP	PA	1/2/2007
EPA 8082	Aroclor-1260 (PCB-1260)	NELAP	PA	1/2/2007
EPA 8141	Dichlorovos (DDVP Dichlorvos)	NELAP	PA	1/19/2005
EPA 8141	Disulfoton	NELAP	PA	1/19/2005
EPA 8141	Atrazine	NELAP	PA	1/19/2005
EPA 8141	Bolstar (Sulprofos)	NELAP	PA	1/19/2005
EPA 8141	Coumaphos	NELAP	PA	1/19/2005
EPA 8141	Demeton-o	NELAP	PA	1/19/2005
EPA 8141	Demeton-s	NELAP	PA	1/19/2005
EPA 8141	Diazinon (Spectracide)	NELAP	PA	1/19/2005
EPA 8141	EPN	NELAP	PA	1/19/2005
EPA 8141	Ethion	NELAP	PA	1/19/2005
EPA 8141	Ethoprop (Prophos)	NELAP	PA	1/19/2005
EPA 8141	Famphur	NELAP	PA	1/19/2005
EPA 8141	Fensulfothion	NELAP	PA	1/19/2005
EPA 8141	Fenthion	NELAP	PA	4/4/2005
EPA 8141	Malathion	NELAP	PA	1/19/2005
EPA 8141	Merphos	NELAP	PA	1/19/2005
EPA 8141	Methyl parathion (Parathion methyl)	NELAP	PA	5/25/2005
EPA 8141	Mevinphos	NELAP	PA	1/19/2005

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EPA 8141	Naled	NELAP	PA	1/19/2005
EPA 8141	Parathion (Ethyl parathion)	NELAP	PA	1/19/2005
EPA 8141	Phorate (Thimet)	NELAP	PA	1/19/2005
EPA 8141	Ronnel	NELAP	PA	1/19/2005
EPA 8141	Simazine	NELAP	PA	1/4/2006
EPA 8141	Stirophos (Tetrachlorovinphos)	NELAP	PA	1/19/2005
EPA 8141	Tokuthion (Prothiophos)	NELAP	PA	1/19/2005
EPA 8141	Trichloronate	NELAP	PA	1/19/2005
EPA 8141A	Azinphos-methyl (Guthion)	NELAP	PA	4/4/2005
EPA 8141A	Chlorpyrifos	NELAP	PA	4/4/2005
EPA 8151	Pentachlorophenol	NELAP	PA	1/19/2005
EPA 8151	2 4 5-T	NELAP	PA	1/19/2005
EPA 8151	2 4-D	NELAP	PA	1/19/2005
EPA 8151	2 4-DB (Butoxon)	NELAP	PA	4/4/2005
EPA 8151	Dalapon	NELAP	PA	1/19/2005
EPA 8151	Dicamba	NELAP	PA	1/19/2005
EPA 8151	Dichloroprop (Dichlorprop)	NELAP	PA	1/19/2005
EPA 8151	Dinoseb (2-sec-butyl-4 6-dinitrophenol DNBP)	NELAP	PA	1/19/2005
EPA 8151	Picloram	NELAP	PA	1/19/2005
EPA 8151	Silvex (2 4 5-TP)	NELAP	PA	1/19/2005
EPA 8151	MCPA	NELAP	PA	1/19/2005
EPA 8151	MCPP (Mecoprop)	NELAP	PA	5/2/2006
EPA 8260	Benzyl chloride	NELAP	PA	1/4/2006
EPA 8260	1 1 1 2-Tetrachloroethane	NELAP	PA	1/19/2005
EPA 8260	1 1 1-Trichloroethane	NELAP	PA	1/19/2005
EPA 8260	1 1 2 2-Tetrachloroethane	NELAP	PA	1/19/2005
EPA 8260	1 1 2-Trichloro-1 2 2-trifluoroethane	NELAP	PA	5/2/2006
EPA 8260	1 1 2-Trichloroethane	NELAP	PA	1/19/2005
EPA 8260	1 1-Dichloroethane	NELAP	PA	1/19/2005
EPA 8260	1 1-Dichloroethene	NELAP	PA	1/19/2005
EPA 8260	1 1-Dichloropropene	NELAP	PA	1/19/2005
EPA 8260	1 2 3-Trichlorobenzene	NELAP	PA	1/19/2005
EPA 8260	1 2 3-Trichloropropane	NELAP	PA	1/19/2005
EPA 8260	1 2 4-Trichlorobenzene	NELAP	PA	1/19/2005
EPA 8260	1 2 4-Trimethylbenzene	NELAP	PA	1/19/2005
EPA 8260	1 2-Dibromo-3-chloropropane (DBCP)	NELAP	PA	5/25/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260	1 2-Dibromoethane (EDB Ethylene dibromide)	NELAP	PA	1/19/2005
EPA 8260	1 2-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 8260	1 2-Dichloroethane	NELAP	PA	1/19/2005
EPA 8260	1 2-Dichloropropane	NELAP	PA	1/19/2005
EPA 8260	1 3 5-Trimethylbenzene	NELAP	PA	1/19/2005
EPA 8260	1 3-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 8260	1 3-Dichloropropane	NELAP	PA	1/19/2005
EPA 8260	1 4-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 8260	1 4-Dioxane (1 4- Diethyleneoxide)	NELAP	PA	1/19/2005
EPA 8260	2 2-Dichloropropane	NELAP	PA	1/19/2005
EPA 8260	2-Butanone (Methyl ethyl ketone MEK)	NELAP	PA	1/19/2005
EPA 8260	2-Chloroethyl vinyl ether	NELAP	PA	1/19/2005
EPA 8260	2-Chlorotoluene	NELAP	PA	5/2/2006
EPA 8260	2-Hexanone	NELAP	PA	1/19/2005
EPA 8260	4-Chlorotoluene	NELAP	PA	1/19/2005
EPA 8260	4-Isopropyltoluene (p-Isopropyltoluene)	NELAP	PA	1/24/2007
EPA 8260	4-Methyl-2-pentanone (MIBK)	NELAP	PA	1/19/2005
EPA 8260	Acetone	NELAP	PA	1/19/2005
EPA 8260	Acetonitrile	NELAP	PA	1/4/2006
EPA 8260	Acrolein (Propenal)	NELAP	PA	1/19/2005
EPA 8260	Acrylonitrile	NELAP	PA	1/19/2005
EPA 8260	Allyl chloride (3-Chloropropene)	NELAP	PA	1/19/2005
EPA 8260	Benzene	NELAP	PA	1/19/2005
EPA 8260	Bromobenzene	NELAP	PA	1/19/2005
EPA 8260	Bromochloromethane	NELAP	PA	1/19/2005
EPA 8260	Bromodichloromethane	NELAP	PA	1/19/2005
EPA 8260	Bromoform	NELAP	PA	1/19/2005
EPA 8260	Carbon disulfide	NELAP	PA	1/19/2005
EPA 8260	Carbon tetrachloride	NELAP	PA	1/19/2005
EPA 8260	Chlorobenzene	NELAP	PA	1/19/2005
EPA 8260	Chloroethane	NELAP	PA	1/19/2005
EPA 8260	Chloroform	NELAP	PA	1/19/2005
EPA 8260	Dibromochloromethane	NELAP	PA	1/19/2005
EPA 8260	Dibromochloropropane	NELAP	PA	1/19/2005
EPA 8260	Dibromomethane	NELAP	PA	1/19/2005
EPA 8260	Dichlorodifluoromethane	NELAP	PA	1/19/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260	Epichlorohydrin (1-Chloro-2 3-epoxypropane)	NELAP	PA	1/4/2006
EPA 8260	Ethanol	NELAP	PA	1/4/2006
EPA 8260	Ethyl acetate	NELAP	PA	1/4/2006
EPA 8260	Ethyl methacrylate	NELAP	PA	1/4/2006
EPA 8260	Ethylbenzene	NELAP	PA	1/19/2005
EPA 8260	Hexachlorobutadiene	NELAP	PA	1/19/2005
EPA 8260	Isobutyl alcohol (2-Methyl-1-propanol)	NELAP	PA	1/24/2007
EPA 8260	Isopropyl alcohol (2-Propanol)	NELAP	PA	1/19/2005
EPA 8260	Isopropylbenzene	NELAP	PA	8/7/2005
EPA 8260	Methacrylonitrile	NELAP	PA	1/24/2007
EPA 8260	Methyl bromide (Bromomethane)	NELAP	PA	1/19/2005
EPA 8260	Methyl chloride (Chloromethane)	NELAP	PA	1/19/2005
EPA 8260	Methyl methacrylate	NELAP	PA	5/2/2006
EPA 8260	Methyl tert-butyl ether (MTBE)	NELAP	PA	1/19/2005
EPA 8260	Methylene chloride	NELAP	PA	1/19/2005
EPA 8260	Naphthalene	NELAP	PA	1/19/2005
EPA 8260	Pentachloroethane	NELAP	PA	1/24/2007
EPA 8260	Propionitrile (Ethyl cyanide)	NELAP	PA	1/24/2007
EPA 8260	Styrene	NELAP	PA	1/19/2005
EPA 8260	Tetrachloroethene (PCE Perchloroethylene)	NELAP	PA	1/19/2005
EPA 8260	Toluene	NELAP	PA	1/19/2005
EPA 8260	Trichloroethene (TCE Trichloroethylene)	NELAP	PA	1/19/2005
EPA 8260	Trichlorofluoromethane	NELAP	PA	1/19/2005
EPA 8260	Vinyl acetate	NELAP	PA	1/19/2005
EPA 8260	Vinyl chloride	NELAP	PA	1/19/2005
EPA 8260	Xylene (total)	NELAP	PA	1/19/2005
EPA 8260	cis-1 2-Dichloroethene	NELAP	PA	1/19/2005
EPA 8260	cis-1 3-Dichloropropene	NELAP	PA	1/19/2005
EPA 8260	m+p-xylene	NELAP	PA	1/24/2007
EPA 8260	n-Butyl alcohol	NELAP	PA	1/19/2005
EPA 8260	n-Butylbenzene	NELAP	PA	1/19/2005
EPA 8260	n-Propylbenzene	NELAP	PA	1/4/2006
EPA 8260	o-Xylene	NELAP	PA	1/24/2007
EPA 8260	sec-Butylbenzene	NELAP	PA	1/19/2005
EPA 8260	tert-Butyl alcohol	NELAP	PA	1/19/2005
EPA 8260	tert-Butylbenzene	NELAP	PA	1/19/2005

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Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8260	tert-Ethyl butyl ether	NELAP	PA	5/25/2007
EPA 8260	trans-1 2-Dichloroethene	NELAP	PA	1/19/2005
EPA 8260	trans-1 3-Dichloropropene	NELAP	PA	1/19/2005
EPA 8260	trans-1 4-Dichloro-2-butene	NELAP	PA	1/24/2007
EPA 8260-Extended	1 1 2-Trichloro-1 2 2-trifluoroethane	NELAP	PA	5/2/2006
EPA 8260-Extended	2-Chloro-1,3-butadiene	NELAP	PA	5/2/2006
EPA 8260-Extended	Cyclohexanone	NELAP	PA	7/3/2007
EPA 8260-Extended	Diisopropyl ether (DIPE)	NELAP	PA	7/3/2007
EPA 8260-Extended	Ethyl t-butyl ether (ETBE)	NELAP	PA	7/3/2007
EPA 8260-Extended	Gasoline range organics (GRO)	NELAP	PA	6/8/2006
EPA 8260-Extended	Isobutyl alcohol (2-Methyl-1-propanol)	NELAP	PA	7/3/2007
EPA 8260-Extended	t-Amyl methyl ether (TAME)	NELAP	PA	7/3/2007
EPA 8260-Extended	trans-1 4-Dichloro-2-butene	NELAP	PA	7/3/2007
EPA 8260-Extended	Methyl Iodide (Iodomethane)	NELAP	PA	5/2/2006
EPA 8270	1 2 4 5-Tetrachlorobenzene	NELAP	PA	4/4/2005
EPA 8270	1 2-Dinitrobenzene	NELAP	PA	1/19/2005
EPA 8270	1 2-Diphenylhydrazine	NELAP	PA	5/2/2006
EPA 8270	1 3 5-Trichlorobenzene	NELAP	PA	1/19/2005
EPA 8270	1 3 5-Trinitrobenzene (1 3 5-TNB)	NELAP	PA	1/4/2006
EPA 8270	1 3-Dinitrobenzene (1 3-DNB)	NELAP	PA	1/19/2005
EPA 8270	1 4-Dinitrobenzene	NELAP	PA	5/2/2006
EPA 8270	1 4-Naphthoquinone	NELAP	PA	1/19/2005
EPA 8270	1 4-Phenylenediamine	NELAP	PA	1/19/2005
EPA 8270	1-Chloronaphthalene	NELAP	PA	1/4/2006
EPA 8270	1-Naphthylamine	NELAP	PA	4/4/2005
EPA 8270	2 3 4 6-Tetrachlorophenol	NELAP	PA	1/19/2005
EPA 8270	2 4 5-Trichlorophenol	NELAP	PA	1/19/2005
EPA 8270	2 4 6-Trichlorophenol	NELAP	PA	1/19/2005
EPA 8270	2 4-Dichlorophenol	NELAP	PA	1/19/2005
EPA 8270	2 4-Dimethylphenol	NELAP	PA	1/19/2005
EPA 8270	2 4-Dinitrophenol	NELAP	PA	1/19/2005
EPA 8270	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	1/19/2005
EPA 8270	2 6-Dichlorophenol	NELAP	PA	1/19/2005
EPA 8270	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	1/19/2005
EPA 8270	2-Acetylaminofluorene	NELAP	PA	1/19/2005
EPA 8270	2-Chloronaphthalene	NELAP	PA	1/19/2005

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EPA 8270	2-Chlorophenol	NELAP	PA	1/19/2005
EPA 8270	2-Methyl-4 6-dinitrophenol	NELAP	PA	1/19/2005
EPA 8270	2-Methylnaphthalene	NELAP	PA	1/19/2005
EPA 8270	2-Methylphenol (o-Cresol)	NELAP	PA	1/19/2005
EPA 8270	2-Naphthylamine	NELAP	PA	5/17/2005
EPA 8270	2-Nitroaniline	NELAP	PA	4/4/2005
EPA 8270	2-Nitrophenol	NELAP	PA	1/19/2005
EPA 8270	3 3`-Dichlorobenzidine	NELAP	PA	1/19/2005
EPA 8270	3 3`-Dimethylbenzidine	NELAP	PA	1/19/2005
EPA 8270	3-Methylcholanthrene	NELAP	PA	1/19/2005
EPA 8270	3-Methylphenol (m-Cresol)	NELAP	PA	1/4/2006
EPA 8270	3-Nitroaniline	NELAP	PA	1/19/2005
EPA 8270	4 4`-Methylenebis(2-chloroaniline)	NELAP	PA	1/19/2005
EPA 8270	4-Aminobiphenyl	NELAP	PA	1/19/2005
EPA 8270	4-Bromophenyl phenyl ether	NELAP	PA	1/19/2005
EPA 8270	4-Chloro-3-methylphenol	NELAP	PA	1/19/2005
EPA 8270	4-Chloroaniline	NELAP	PA	1/19/2005
EPA 8270	4-Chlorophenyl phenylether	NELAP	PA	1/19/2005
EPA 8270	4-Methylphenol (p-Cresol)	NELAP	PA	1/19/2005
EPA 8270	4-Nitroaniline	NELAP	PA	4/4/2005
EPA 8270	4-Nitrophenol	NELAP	PA	1/19/2005
EPA 8270	5-Nitro-o-toluidine	NELAP	PA	4/4/2005
EPA 8270	7 12-Dimethylbenz(a)anthracene	NELAP	PA	1/19/2005
EPA 8270	Acenaphthene	NELAP	PA	1/19/2005
EPA 8270	Acenaphthylene	NELAP	PA	1/19/2005
EPA 8270	Acetophenone	NELAP	PA	1/19/2005
EPA 8270	Aniline	NELAP	PA	1/19/2005
EPA 8270	Anthracene	NELAP	PA	1/19/2005
EPA 8270	Aramite	NELAP	PA	5/17/2005
EPA 8270	Benzidine	NELAP	PA	1/19/2005
EPA 8270	Benzo(a)anthracene	NELAP	PA	1/19/2005
EPA 8270	Benzo(a)pyrene	NELAP	PA	1/19/2005
EPA 8270	Benzo(b)fluoranthene	NELAP	PA	1/19/2005
EPA 8270	Benzo(g h i)perylene	NELAP	PA	1/19/2005
EPA 8270	Benzo(k)fluoranthene	NELAP	PA	1/19/2005
EPA 8270	Benzoic acid	NELAP	PA	1/19/2005

Attachment to Certificate of Accreditation 006, expiration date January 31, 2009. This listing of accredited analytes should be used only when associated with a valid certificate of accreditation.

State Laboratory ID: 36-00037 **EPA Lab Code: PA00009** **(717) 656-2300**

Lancaster Laboratories Inc
2425 New Holland Pike
Lancaster, PA 17601-5994

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270	Benzyl alcohol	NELAP	PA	1/19/2005
EPA 8270	Butyl benzyl phthalate (Benzyl butyl phthalate)	NELAP	PA	5/17/2005
EPA 8270	Chrysene	NELAP	PA	1/19/2005
EPA 8270	Di-n-butyl phthalate	NELAP	PA	1/19/2005
EPA 8270	Di-n-octyl phthalate	NELAP	PA	1/19/2005
EPA 8270	Dibenz(a h)anthracene	NELAP	PA	1/19/2005
EPA 8270	Dibenz(a j)acridine	NELAP	PA	5/17/2005
EPA 8270	Dibenzofuran	NELAP	PA	1/19/2005
EPA 8270	Diethyl phthalate	NELAP	PA	1/19/2005
EPA 8270	Dimethyl phthalate	NELAP	PA	1/19/2005
EPA 8270	Ethyl methanesulfonate	NELAP	PA	1/19/2005
EPA 8270	Fluoranthene	NELAP	PA	1/19/2005
EPA 8270	Fluorene	NELAP	PA	1/19/2005
EPA 8270	Hexachlorobenzene	NELAP	PA	1/19/2005
EPA 8270	Hexachlorocyclopentadiene	NELAP	PA	1/19/2005
EPA 8270	Hexachloropropene	NELAP	PA	1/19/2005
EPA 8270	Indeno(1 2 3-cd)pyrene	NELAP	PA	1/19/2005
EPA 8270	Isophorone	NELAP	PA	1/19/2005
EPA 8270	Isosafrole	NELAP	PA	1/19/2005
EPA 8270	Methapyrilene	NELAP	PA	1/19/2005
EPA 8270	Methyl methanesulfonate	NELAP	PA	1/19/2005
EPA 8270	Pentachlorobenzene	NELAP	PA	1/19/2005
EPA 8270	Pentachloronitrobenzene (PCNB)	NELAP	PA	1/19/2005
EPA 8270	Pentachlorophenol	NELAP	PA	1/19/2005
EPA 8270	Phenacetin	NELAP	PA	1/19/2005
EPA 8270	Phenanthrene	NELAP	PA	1/19/2005
EPA 8270	Phenol	NELAP	PA	1/19/2005
EPA 8270	Pronamide (Kerb)	NELAP	PA	1/19/2005
EPA 8270	Pyrene	NELAP	PA	1/19/2005
EPA 8270	Safrole	NELAP	PA	1/19/2005
EPA 8270	a-a-Dimethylphenethylamine	NELAP	PA	5/2/2006
EPA 8270	bis(2-Chloroethoxy) methane	NELAP	PA	1/19/2005
EPA 8270	bis(2-Chloroethyl) ether	NELAP	PA	1/19/2005
EPA 8270	bis(2-Chloroisopropyl) ether	NELAP	PA	1/4/2006
EPA 8270	bis(2-Ethylhexyl) phthalate (DEHP)	NELAP	PA	1/19/2005
EPA 8270	n-Nitrosodi-n-propylamine	NELAP	PA	1/19/2005

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State Laboratory ID: 36-00037 **EPA Lab Code: PA00009** **(717) 656-2300**

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Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270	n-Nitrosodiethylamine	NELAP	PA	1/19/2005
EPA 8270	n-Nitrosodimethylamine	NELAP	PA	1/19/2005
EPA 8270	n-Nitrosodiphenylamine	NELAP	PA	1/19/2005
EPA 8270	n-Nitrosomethylethylamine	NELAP	PA	1/19/2005
EPA 8270	n-Nitrosomorpholine	NELAP	PA	1/19/2005
EPA 8270	n-Nitrosopiperidine	NELAP	PA	1/19/2005
EPA 8270	n-Nitrosopyrrolidine	NELAP	PA	1/19/2005
EPA 8270	Dinoseb (2-sec-butyl-4 6-dinitrophenol DNBP)	NELAP	PA	5/2/2006
EPA 8270	Disulfoton	NELAP	PA	7/1/2007
EPA 8270	Chlorobenzilate	NELAP	PA	5/2/2006
EPA 8270	Diallate (cis or trans)	NELAP	PA	5/2/2006
EPA 8270	Dimethoate	NELAP	PA	5/2/2006
EPA 8270	Famphur	NELAP	PA	5/2/2006
EPA 8270	Isodrin	NELAP	PA	5/2/2006
EPA 8270	Kepone	NELAP	PA	5/2/2006
EPA 8270	Methyl parathion (Parathion methyl)	NELAP	PA	5/25/2007
EPA 8270	Parathion (Ethyl parathion)	NELAP	PA	5/25/2007
EPA 8270	Phorate (Thimet)	NELAP	PA	5/2/2006
EPA 8270	Thionazin (Zinophos)	NELAP	PA	5/2/2006
EPA 8270	o o o-Triethyl phosphorothioate	NELAP	PA	5/2/2006
EPA 8270	tris-(2 3-Dibromopropyl) phosphate (tris-BP)	NELAP	PA	12/4/2007
EPA 8270	1 2 4-Trichlorobenzene	NELAP	PA	1/19/2005
EPA 8270	1 2-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 8270	1 3-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 8270	1 4-Dichlorobenzene	NELAP	PA	1/19/2005
EPA 8270	2-Picoline (2-Methylpyridine)	NELAP	PA	1/19/2005
EPA 8270	Hexachlorobutadiene	NELAP	PA	1/19/2005
EPA 8270	Hexachloroethane	NELAP	PA	1/19/2005
EPA 8270	Naphthalene	NELAP	PA	1/19/2005
EPA 8270	Nitrobenzene	NELAP	PA	1/4/2006
EPA 8270	Pyridine	NELAP	PA	4/4/2005
EPA 8270	n-Nitroso-di-n-butylamine	NELAP	PA	1/19/2005
EPA 8270	o-Toluidine	NELAP	PA	1/19/2005
EPA 8270 SIM	Acenaphthene	NELAP	PA	12/4/2007
EPA 8270 SIM	Acenaphthylene	NELAP	PA	12/4/2007
EPA 8270 SIM	Anthracene	NELAP	PA	12/4/2007

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State Laboratory ID: 36-00037 **EPA Lab Code: PA00009** **(717) 656-2300**

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2425 New Holland Pike
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Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8270 SIM	Benzo(a)anthracene	NELAP	PA	12/4/2007
EPA 8270 SIM	Benzo(a)pyrene	NELAP	PA	12/4/2007
EPA 8270 SIM	Benzo(b)fluoranthene	NELAP	PA	12/4/2007
EPA 8270 SIM	Benzo(g h i)perylene	NELAP	PA	12/4/2007
EPA 8270 SIM	Benzo(k)fluoranthene	NELAP	PA	12/4/2007
EPA 8270 SIM	Chrysene	NELAP	PA	12/4/2007
EPA 8270 SIM	Dibenz(a h)anthracene	NELAP	PA	12/4/2007
EPA 8270 SIM	Fluoranthene	NELAP	PA	12/4/2007
EPA 8270 SIM	Fluorene	NELAP	PA	12/4/2007
EPA 8270 SIM	Indeno(1 2 3-cd)pyrene	NELAP	PA	12/4/2007
EPA 8270 SIM	Phenanthrene	NELAP	PA	12/4/2007
EPA 8270 SIM	Pyrene	NELAP	PA	12/4/2007
EPA 8270 SIM	Naphthalene	NELAP	PA	12/4/2007
EPA 8270-Extended	1 2 3 4-Tetrachlorobenzene	NELAP	PA	7/3/2007
EPA 8270-Extended	1 2 3 4-Tetrahydronaphthalene	NELAP	PA	12/4/2007
EPA 8270-Extended	1 2 3 5-Tetrachlorobenzene	NELAP	PA	7/3/2007
EPA 8270-Extended	1-Methylnaphthalene	NELAP	PA	12/4/2007
EPA 8270-Extended	Benzaldehyde	NELAP	PA	12/4/2007
EPA 8270-Extended	Benzenethiol	NELAP	PA	12/4/2007
EPA 8270-Extended	Carbazole	NELAP	PA	1/19/2005
EPA 8270-Extended	Indene	NELAP	PA	12/4/2007
EPA 8270-Extended	Nitroquinoline-1-oxide	NELAP	PA	7/3/2007
EPA 8270-Extended	Quinoline	NELAP	PA	12/4/2007
EPA 8270-Extended	a-Methylstyrene	NELAP	PA	12/4/2007
EPA 8270-Extended	n n-dimethylacetamide	NELAP	PA	12/4/2007
EPA 8270-Extended	p-(Dimethylamino)azobenzene	NELAP	PA	5/2/2006
EPA 8270-Extended	Dibenz(a h)acridine	NELAP	PA	12/4/2007
EPA 8270-Extended	1 1-Biphenyl	NELAP	PA	12/4/2007
EPA 8270-Extended	Atrazine	NELAP	PA	1/12/2007
EPA 8270-Extended	Caprolactam	NELAP	PA	12/4/2007
EPA 8270-Extended	Tetraethyl dithiopyrophosphate	NELAP	PA	12/4/2007
EPA 8270-Extended	1 4-Dioxane (1 4- Diethyleneoxide)	NELAP	PA	12/4/2007
EPA 8270-Extended	n n-dimethyl formamide	NELAP	PA	12/4/2007
EPA 8270-Extended	6-methylchrysene	NELAP	PA	12/4/2007
EPA 8270C	Diphenylamine	NELAP	PA	5/2/2006
EPA 8310	Acenaphthene	NELAP	PA	1/19/2005

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Lancaster Laboratories Inc
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Lancaster, PA 17601-5994

Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8310	Acenaphthylene	NELAP	PA	1/23/2007
EPA 8310	Anthracene	NELAP	PA	1/19/2005
EPA 8310	Benzo(a)anthracene	NELAP	PA	1/19/2005
EPA 8310	Benzo(a)pyrene	NELAP	PA	1/19/2005
EPA 8310	Benzo(b)fluoranthene	NELAP	PA	1/19/2005
EPA 8310	Benzo(g h i)perylene	NELAP	PA	1/19/2005
EPA 8310	Benzo(k)fluoranthene	NELAP	PA	1/19/2005
EPA 8310	Chrysene	NELAP	PA	1/19/2005
EPA 8310	Dibenz(a h)anthracene	NELAP	PA	1/19/2005
EPA 8310	Fluoranthene	NELAP	PA	1/19/2005
EPA 8310	Fluorene	NELAP	PA	5/25/2005
EPA 8310	Indeno(1 2 3-cd)pyrene	NELAP	PA	1/19/2005
EPA 8310	Phenanthrene	NELAP	PA	1/19/2005
EPA 8310	Pyrene	NELAP	PA	1/19/2005
EPA 8310	Naphthalene	NELAP	PA	1/19/2005
EPA 8315	Formaldehyde	NELAP	PA	1/19/2005
EPA 8318	3-Hydroxycarbofuran	NELAP	PA	4/4/2005
EPA 8318	Aldicarb (Temik)	NELAP	PA	4/4/2005
EPA 8318	Aldicarb sulfone	NELAP	PA	4/4/2005
EPA 8318	Carbaryl (Sevin)	NELAP	PA	4/4/2005
EPA 8318	Carbofuran (Furaden)	NELAP	PA	4/4/2005
EPA 8318	Methiocarb (Mesurol)	NELAP	PA	4/4/2005
EPA 8318	Methomyl (Lannate)	NELAP	PA	4/4/2005
EPA 8318	Propoxur (Baygon)	NELAP	PA	4/4/2005
EPA 8318-Extended	Aldicarb sulfoxide	NELAP	PA	12/12/2005
EPA 8318-Extended	Oxamyl (Vydate)	NELAP	PA	12/12/2005
EPA 8330	1 3 5-Trinitrobenzene (1 3 5-TNB)	NELAP	PA	1/19/2005
EPA 8330	1 3-Dinitrobenzene (1 3-DNB)	NELAP	PA	1/19/2005
EPA 8330	2 4-Dinitrotoluene (2 4-DNT)	NELAP	PA	1/19/2005
EPA 8330	2 6-Dinitrotoluene (2 6-DNT)	NELAP	PA	1/19/2005
EPA 8330	2 4 6-Trinitrotoluene (2 4 6-TNT)	NELAP	PA	1/19/2005
EPA 8330	2-Amino-4 6-dinitrotoluene (2-am-dnt)	NELAP	PA	1/19/2005
EPA 8330	2-Nitrotoluene	NELAP	PA	1/19/2005
EPA 8330	3-Nitrotoluene	NELAP	PA	1/19/2005
EPA 8330	4-Amino-2 6-dinitrotoluene (4-am-dnt)	NELAP	PA	1/19/2005
EPA 8330	4-Nitrotoluene	NELAP	PA	1/19/2005

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Program Solid and Chemical Materials

Method	Analyte	Accreditation Type	Primary	Effective Date
EPA 8330	Octahydro-1 3 5 7-tetranitro-1 3 5 7-tetrazocine (HMX)	NELAP	PA	1/24/2006
EPA 8330	RDX (hexahydro-1 3 5-trinitro-1 3 5-triazine)	NELAP	PA	1/19/2005
EPA 8330	Tetryl (methyl-2 4 6-trinitrophenylnitramine)	NELAP	PA	1/19/2005
EPA 8330	Nitrobenzene	NELAP	PA	1/19/2005
EPA 8330-Extended	Pentaerythritoltetranitrate	NELAP	PA	11/21/2005
EPA 8332	Nitroglycerin	NELAP	PA	4/4/2005
EPA 9012	Total cyanide	NELAP	PA	1/19/2005
EPA 9040	Corrosivity (pH)	NELAP	PA	5/17/2005
EPA 9040	pH	NELAP	PA	1/19/2005
EPA 9045	pH	NELAP	PA	1/19/2005
EPA 9050	Conductivity	NELAP	PA	5/17/2005
EPA 9060	Total organic carbon	NELAP	PA	1/19/2005
EPA 9066	Total phenolics	NELAP	PA	4/4/2005
EPA 9071	Oil and Grease	NELAP	PA	1/19/2005
EPA 9081	Cation exchange capacity	NELAP	PA	5/25/2005
EPA 9095A	Paint Filter Liquids Test	NELAP	PA	1/24/2007
FL-PRO	Total Petroleum Hydrocarbons (TPH)	NELAP	PA	12/12/2005
MA-EPH	Diesel range organics (DRO)	NELAP	PA	12/12/2005
MA-VPH	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
NWTPH-Dx	Diesel range organics (DRO)	NELAP	PA	12/12/2005
NWTPH-Gx	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
OA-1	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
OA-2	Diesel range organics (DRO)	NELAP	PA	12/12/2005
TN-DRO	Diesel range organics (DRO)	NELAP	PA	12/12/2005
TN-GRO	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
TX1005 (TNRCC)	Total Petroleum Hydrocarbons (TPH)	NELAP	PA	12/12/2005
TX1006 (TNRCC)	Total Petroleum Hydrocarbons (TPH)	NELAP	PA	12/12/2005
WA-EPH	Diesel range organics (DRO)	NELAP	PA	12/12/2005
WA-VPH	Gasoline range organics (GRO)	NELAP	PA	12/12/2005
WI-DRO	Diesel range organics (DRO)	NELAP	PA	12/12/2005
WI-GRO	Gasoline range organics (GRO)	NELAP	PA	12/12/2005

Karen Alger

Lancaster Laboratories

Environmental Quality Policy Manual

Appendix J

Quality Control Types, Frequency, and Corrective Action

Current as of January 25, 2008
33 Total Pages (including this coversheet)

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Lancaster Laboratories
2425 New Holland Pike • Lancaster, PA 17601

SW - 846 Quality Control GC/MS Volatiles Method 8260B		
Type	**Frequency**	**Corrective Action**
Surrogates: Toluene-d_8 Bromofluorobenzene 1,2-Dichloroethane-d_4 Dibromofluoromethane	Each sample, MS, MSD, LCS, and blank	Reanalyze sample if outside limits; if reanalysis confirms original, document on report and/or case narrative
Matrix Spikes: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Evaluation in conjunction with acceptable LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Samples: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Reanalyze LCS and associated samples for compounds outside acceptance limits that are also outside MS/MSD acceptance limits. Compounds that fail high in the LCS and are ND in the samples, can be reported.
Matrix Spike Duplicates (RPD): Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	Once for each 12-hour time period or ≤20 samples	Reanalyze blank and associated samples if blank outside limits
Internal Standards (ISTD): Fluorobenzene Chlorobenzene-d_5 1,4-Dichlorobenzene-d_4	Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report or case narrative

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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SW - 846
Quality Control
GC/MS Semivolatiles Method 8270C

Type	Frequency	Corrective Action
Surrogate: Nitrobenzene-d_5 2-Fluorobiphenyl Terphenyl-d_{14} Phenol-d_6 2-Fluorophenol 2,4,6-Tribromophenol	Each sample, MS, MSD, LCS, and blank	Repeat extraction and analysis; if reanalysis confirms original, document on report and/or case narrative
Matrix Spikes: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Evaluation in conjunction with acceptable LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds that fail high in the LCS and are ND in the samples, can be reported.
Matrix Spike Duplicates (RPD): Same as for matrix spikes	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	Once per extraction group (≤20) of samples, each matrix, level	Re-extract and reanalyze blank and associated samples
Internal Standards (ISTD): 1,4-Dichlorobenzene-d_4 Naphthalene-d_8 Acenaphthene-d_{10} Phenanthrene-d_{10} Chrysene-d_{12} Perylene-d_{12}	Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report and/or case narrative

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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SW - 846 Quality Control GC/MS Semivolatiles Method 8270C SIM		
Type	**Frequency**	**Corrective Action**
Surrogate: Nitrobenzene-d_5 2-Fluorobiphenyl Terphenyl-d_{14}	Each sample, MS, MSD, LCS, and blank	Repeat extraction and analysis; if reanalysis confirms original, document on report and/or case narrative
Matrix Spikes: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Evaluation in conjunction with acceptable LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds that fail high in the LCS and are ND in the samples, can be reported.
Matrix Spike Duplicates (RPD): Same as for matrix spikes	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	Once per extraction group (≤20) of samples, each matrix, level	Re-extract and reanalyze blank and associated samples
Internal Standards (ISTD): 1,4-Dichlorobenzene-d_4 Naphthalene-d_8 Acenaphthene-d_{10} Phenanthrene-d_{10} Chrysene-d_{12} Perylene-d_{12}	Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report and/or case narrative

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

SW-846 Quality Control Pesticides/PCBs Methods 8081; 8082; 8141; 8151		
Type	**Frequency**	**Corrective Action**
Surrogate: Organochlorine Pesticides & PCBs Decachlorobiphenyl (DCB) Tetrachloro-*m*-xylene (TCMX) Herbicides: Dichloroacetic acid (DCAA) Organophosphorous Pesticides: 2-nitro-*m*-xylene (2NMX)	Added to each sample, MS/MSD, blank, LCS/LCSD during the extraction phase	Repeat extraction and analysis. If reanalysis confirms original result, report results and comment in case narrative
Matrix Spikes: Organochlorine Pesticides: Spike all compounds of interest, except PCBs, chlordane, and toxaphene Herbicides & Organophosphorous Pesticides: all compounds of interest PCBs: Aroclor 1016 & Aroclor 1260	Each extraction group (≤20) of samples per *matrix/level*	Evaluation in conjunction with acceptable LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample: Organochlorine Pesticides: Spike all compounds of interest, except PCBs, chlordane, and toxaphene Herbicides & Organophosphorous Pesticides: all compounds of interest PCBs: Aroclor 1016 & Aroclor 1260	Each group (≤20) when MS/MSD falls outside established limits	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds that fail high in the LCS and are ND in the samples can be reported.

SW-846
Quality Control
Pesticides/PCBs Methods 8081; 8082; 8141; 8151

Type	Frequency	Corrective Action
Matrix Spike Duplicates (RPD): Organochlorine Pesticides: Spike all compounds of interest, except PCBs, chlordane, and toxaphene Herbicides & Organophosphorous Pesticides: all compounds of interest PCBs: Aroclor 1016 & Aroclor 1260	Each extraction group (≤20) of samples per matrix/level	Evaluated in conjunction with acceptable LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Blanks:	Once per extraction group (≤20) of samples, each matrix, level	Inject a hexane or solvent blank first to be sure the analytical system is clean then reinject the blank itself. If the reinjected blank is acceptable, any samples extracted with this blank should be reinjected if they, too, contain the analyte which was contaminating the blank. If the reinjected blank is unacceptable, any affected samples must be reextracted.
Internal Standards (ISTD): Herbicides: 4,4'-dibromo octafluorobiphenyl(DBOB) OP Pesticides: 1-bromo-2-nitrobenzene	Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report and/or case narrative

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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SW-846
Quality Control
Volatiles by GC
8021

Type	Frequency	Corrective Action
Surrogates: Halocarbons: 1-Bromo-4-chlorobenzene (ELCD) Aromatics: 1-Bromo-4-chlorobenzene (PID) Halocarbons/Aromatics: 1-Bromo-4-chlorobenzene (ELCD/PID) Non-halogenated: 2-hexanone (FID)	Each sample, MS, MSD, LCS and blank	Reanalyze if the surrogate recovery is outside the limits unless matrix-related problems are evident.
Matrix Spikes: Spike all compounds of interest	Each group of samples (≤20) of similar matrix/level each method	Evaluation in conjunction with acceptable LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20); LCSD is analyzed if sufficient volume is not available for MS/MSD	Reanalyze LCS and associated samples for compounds outside of acceptance limits. Compounds that fail high in the LCS and are ND in the samples can be reported.
Internal Standard (ISTD): Fluorobenzene (ELCD/PID)	Each sample, LCS , MS, MSD, blank, and standard	Reanalyze samples; if reanalysis confirms original, document on report and/or case narrative. In cases where the sample matrix is elevating the ISTD recovery, a dilution and reanalysis may be performed.
Matrix Spike Duplicate (RPD): Same compounds as matrix spikes	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	At least once per batch (≤20 samples) and once per 24 hours	Reanalyze blank and associated samples if blank is outside limits

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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SW-846 Quality Control Petroleum Analysis		
Type	**Frequency**	**Corrective Action**
Surrogate: α,α,α-Trifluorotoluene (PID)	Each sample, MS, MSD, LCS, and blank	Reanalyze if the surrogate recovery is outside the limits unless matrix-related problems are evident.
Matrix Spike: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Evaluation in conjunction with acceptable LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20) of samples per matrix/level. LCSD analyzed if sufficient volume is not available for MS/MSD	Reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds that fail high and are ND in the samples can be reported.
Matrix Spike Duplicates (RPD):	Each group (≤20) of samples per matrix/level	Evaluated by an analyst in relationship to other QC results
Blanks:	At least once per batch (≤20 samples) and once per 24 hours	Reanalyze blank and associated samples if blank is outside limits
Internal Standards (ISTD): 1-Chloro-3-fluorobenzene (PID)	Each sample, MS, MSD, LCS, and blank analyzed on the PID	Reanalyze samples; if reanalysis confirms original result, document on report or case narrative. In cases where the sample matrix is elevating the ISTD recovery, a dilution and reanalysis may be performed.

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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SW-846 Quality Control PAHs by HPLC Method 8310		
Type	**Frequency**	**Corrective Action**
Surrogate: Nitrobenzene and Triphenylene	Added to each sample, MS/MSD, blank, LCS/LCSD prior to extraction	Re-extract and reanalyze. If re-extraction and reanalysis confirms then comment on report and/or case narrative. Re-extraction may not be needed if matrix related problems are evident. Comment in case narrative.
Matrix Spike: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Evaluation in conjunction with acceptable LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds that fail high in the LCS and are ND in the samples can be reported.
Matrix Spike Duplicates (RPD): Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	Once per extraction group (≤20 samples), per matrix/level	Inject a solvent blank first to be sure the analytical system is clean then reinject the blank itself. If the reinjected blank is acceptable, any samples extracted with this blank should be reinjected, if they, too, contain the analyte which was contaminating the blank. If the reinjected blank is unacceptable, any affected samples must be re-extracted.

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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SW-846 Quality Control TPH-DRO 8015B		
Type	**Frequency**	**Corrective Action**
Surrogate: *o*-Terphenyl	Added to each sample, MS/MSD, blank, LCS/LCSD during the extraction phase	Repeat extraction and analysis. If reanalysis confirms original result. report results and comment in case narrative.
Matrix Spike: # 2 Fuel	Each group (≤20) of samples per matrix/level	Reinject if surrogates appear low. If still out of spec, evaluate for matrix effect. If matrix effect, accept based on LCS data. If no matrix effect, repeat batch.
Laboratory Control Sample: # 2 Fuel	Each group (≤20) of samples per matrix/level	Reinject if surrogates appear low. If still out of spec, reextract batch. LCS that fails high and DRO is ND in the samples can be reported.
Laboratory Control Duplicates (RPD): # 2 Fuel	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	Once per extraction group (≤20) of samples, each matrix, level	Inject a solvent blank first to be sure the analytical system is clean then reinject the blank itself. If the reinjected blank is acceptable, any samples extracted with this blank should be reinjected, if they, too, contain the analyte which was contaminating the blank. If the reinjected blank is unacceptable, any affected samples must be re-extracted.

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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SW-846 Quality Control TPH-GRO 8015B		
Type	**Frequency**	**Corrective Action**
Surrogate: Trifluorotoluene (FID)	Each sample, MS/MSD, LCS, and blank	Reanalyze if the surrogate recovery is outside the limits unless matrix-related problems are evident
Matrix Spike: Gasoline standard 8015B	Each group of samples of similar matrix/level (≤20) each method	Evaluation in conjunction with acceptable LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample Gasoline standard	Each group (≤20) of samples. LCSD analyzed if sufficient volume is not available for MS/MSD.	Reanalyze LCS and associated samples. LCS that fails high and GRO is ND in the samples can be reported.
Matrix Spike Duplicate (RPD): Same compounds as matrix spikes	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	At least one per 20 samples and at least once per 24 hours.	Reanalyze blank and associated samples if blank is outside limits

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change

SW-846 Quality Control* Inorganics (Metals)		
Type	**Frequency**	**Corrective Action**
Internal Standard (ICP & ICP/MS only):	Each sample, standard and QC (MS, MSD, LCS, dilution and blank)	If the internal standard response falls outside the specified range, then the samples would be reanalyzed.
Matrix Spikes:	Each group of samples of similar matrix/level (≤20) each method	Analyze post-digestion spike sample
Matrix Spike Duplicate (RPD):	Each group of samples of similar matrix/level (20) each method	Analyze post-digestion spike sample if not already run for MS, flag the data
Duplicates (RPD):	Each group of samples of similar matrix/level (≤20) each method	Flag the data
Blanks: Initial Calibration (ICB) Continuing Calibration (CCB)	Each element immediately after calibration verification at 10% frequency or every 2 hours (beginning and end of run min.)	Correct problem, recalibrate, and rerun
Preparation Blank	Each SDG or batch (≤20 samples)	Redigest and reanalyze blank and associated samples if sample result is greater than the LOQ and <20× blank result
Serial Dilutions (ICP, ICP/MS only):	Each group of (≤20) of similar matrix/level	Flag the data
Interference Check Sample (ICP, ICP/MS only):	Each element after Initial Calibration Verification at beginning and end of the run or min. of 2× per 8 hour	Correct for interference, recalibrate the instrument
Laboratory Control Sample:	Each SDG or batch (≤20 samples), each method	Redigest and reanalyze LCS and associated samples. Elements in the LCS that fail high and are ND in the samples can be reported.
Post Digestion Spike:	When matrix spikes are outside 75 % - 125% range, or the statistical window (whichever is tighter).	Flag the data

*Refer to flow chart on following page for GFAA Batch QC.

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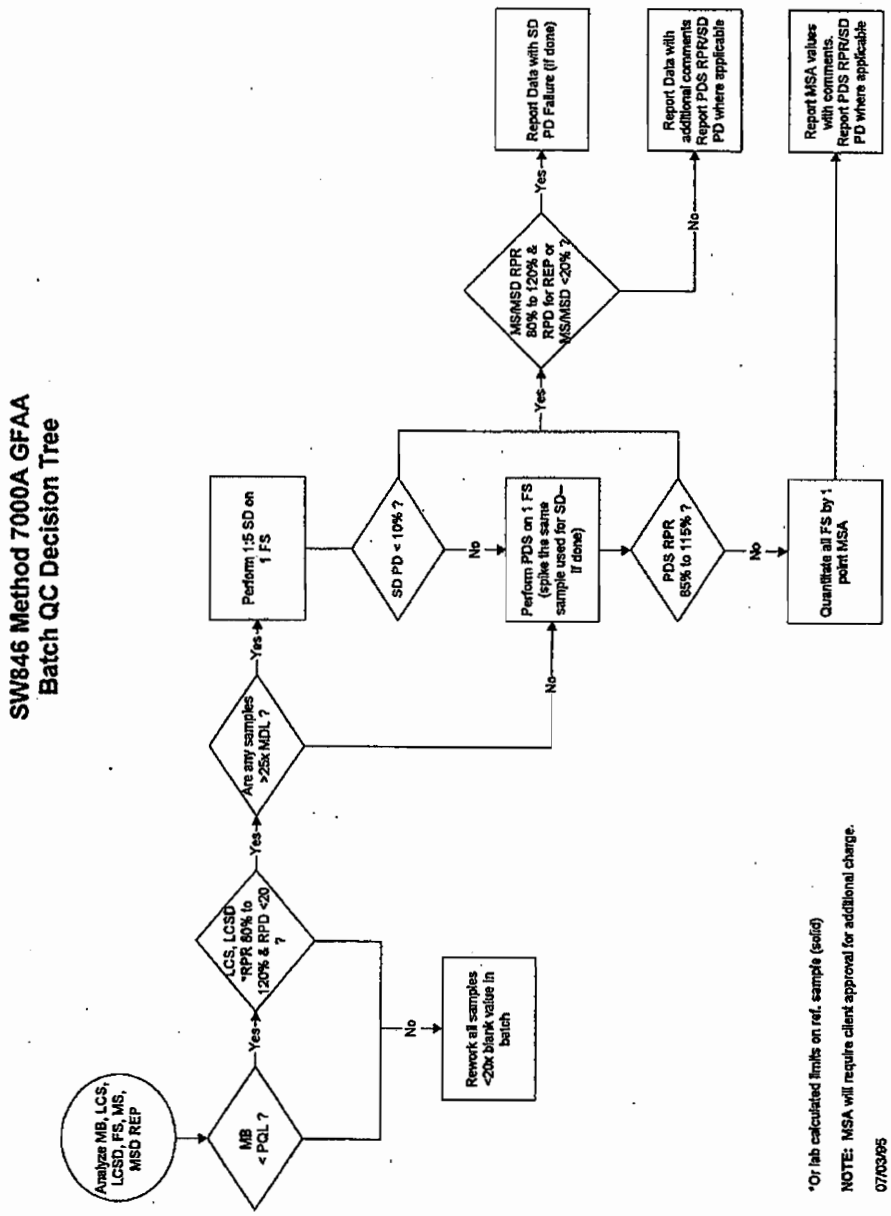
SW-846
GFAA Batch QC Decision Tree



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QC Table for SW-846 Miscellaneous Water Tests			
Test	**QC Type**	**Frequency**	**Corrective Action**
Sulfide TPH	Blank	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze.
	Laboratory Control Sample	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze. LCSs that fail high (and associated samples are ND) can be reported.
	Duplicate	Each group of samples of similar matrix (≤20)	Ensure that LCS meets acceptance criteria.
	Matrix Spike/ Matrix Spike Duplicate	Each group of samples of similar matrix (≤20)	Ensure that LCS meets acceptance criteria.
Bromide (IC) Chloride (IC) Cyanide (total) Fluoride (IC) Nitrate/Nitrite (IC) Sulfate (IC)	Blank	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze.
	Laboratory Control Sample	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze. LCSs that fail high (and associated samples are ND) can be reported.
	Duplicate	Each group of samples of similar matrix (≤10)	Ensure that LCS meets acceptance criteria.
	Matrix Spike	Each group of samples of similar matrix (≤10)	Ensure that LCS meets acceptance criteria.
Phenols TOC Quad	Blank	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze.
	Laboratory Control Sample	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze. LCSs that fail high (and associated samples are ND) can be reported.
	Matrix Spike/ Matrix Spike Duplicate	Each group of samples of similar matrix (≤10)	Ensure that LCS meets acceptance criteria.
pH Moisture	Laboratory Control Sample	Each group of samples of similar matrix (≤20)	Re-analyze samples.
	Duplicate	Each group of samples of similar matrix (≤10)	Ensure that LCS meets acceptance criteria.
Microbiology	Organism control	Each lot of media (minimum of one per month)	Investigate cause
	Negative control	Each lot of media (minimum of one per month)	Investigate cause

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CLP Quality Control GC/MS Volatiles		
Type	**Frequency**	**Corrective Action**
Surrogates: Toluene-d_8 Bromofluorobenzene 1,2-Dichloroethane-d_4	Each sample, MS, MSD, and blank	Reanalyze sample if outside limits; if reanalysis confirms original, document on report and/or case narrative
Matrix Spikes: 1,1-Dichloroethene Trichloroethene Benzene Toluene Chlorobenzene	Each group of samples (≤20) per matrix/level	Advisory Only Evaluated by analyst in relationship to other QC results
Matrix Spike Duplicates (RPD): 1,1-Dichloroethene Trichloroethene Benzene Toluene Chlorobenzene	Each group of samples (≤20) per matrix/level	Advisory Only Evaluated by analyst in relationship to other QC results
Blanks:	Once for each 12-hour time period or ≤20 samples	Reanalyze blank and associated samples if blank outside limits
Internal Standards (ISTD): Bromochloromethane 1,4-Difluorobenzene Chlorobenzene-d_5	Each sample, MS, MSD, and blank	Reanalyze samples; if reanalysis confirms original, document on report or case narrative

Some of the CLP recovery limits are advisory limits only. If in the opinion of the analyst, a problem other than the matrix exists, the samples will be reanalyzed.

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CLP
Quality Control
GC/MS Semivolatiles

Type	Frequency	Corrective Action
Surrogate: Nitrobenzene-d_5 2-Fluorobiphenyl Terphenyl-d_{14} Phenol-d_5 2-Fluorophenol 2,4,6-Tribromophenol 2-Chlorophenol-d_4 1,2-dichlorobenzene-d_4	Each sample, MS, MSD, and blank (Advisory) (Advisory)	Re-extract and reanalyze if more than one surrogate out per fraction (acid/base) or any recovery <10%; if re-extraction and reanalysis confirms originals, document on report and/or case narrative
Matrix Spikes & Matrix Spike Duplicates (RPD): Phenol 2-Chlorophenol 1,4-Dichlorobenzene N-Nitroso-di-n-propylamine 1,2,4-Trichlorobenzene 4-Chloro-3-methylphenol Acenaphthene 4-Nitrophenol 2,4-Dinitrotoluene Pentachlorophenol Pyrene	Each group (≤20) of samples per matrix/level	Advisory Only Evaluated by analyst in relationship to other QC results
Blanks:	Once per extraction group (≤20) of samples, each matrix, level, instrument	Reextract and reanalyze blank and associated samples, except for phthalate contamination, which is allowed to be present at levels up to 5 times the CRQL.
Internal Standards (ISTD): 1,4-Dichlorobenzene-d_4 Naphthalene-d_8 Acenaphthene-d_{10} Phenanthrene-d_{10} Chrysene-d_{12} Perylene-d_{12}	Each sample, MS, MSD, and blank	Reanalyze samples; if reanalysis confirms original, document on report and/or case narrative

Some of the CLP recovery limits are advisory limits only. If in the opinion of the analyst, a problem exists other than matrix, the sample will be reanalyzed.

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CLP Quality Control Pesticides/PCBs		
Type	**Frequency**	**Corrective Action**
Surrogates: Tetrachloro-*m*-xylene (TCMX) Decachlorobiphenyl (DCB)	Added to each sample, MS/MSD, and blank during the extraction phase	Advisory Only for Samples For Blank, reinject; if still out reextract and reanalyze blank and associated samples
Matrix Spikes & Matrix Spike Duplicates (RPD): gamma-BHC (Lindane) Heptachlor Aldrin Dieldrin Endrin 4,4'-DDT	Each extraction group (≤20) of samples per matrix/level	Advisory Only Evaluated by analyst in relationship to other QC results
Blanks:	Once per extraction group (≤20) of samples, each matrix, level	Inject a hexane or solvent blank first to be sure the analytical system is clean then reinject the blank itself. If the reinjected blank is acceptable, any samples extracted with this blank should be reinjected if they, too, contain the analyte which was contaminating the blank. If the reinjected blank is unacceptable, any affected samples must be reprepped.

Some of the CLP recovery limits are advisory limits only. If in the opinion of the analyst, a problem exists other than matrix, the sample will be reanalyzed.

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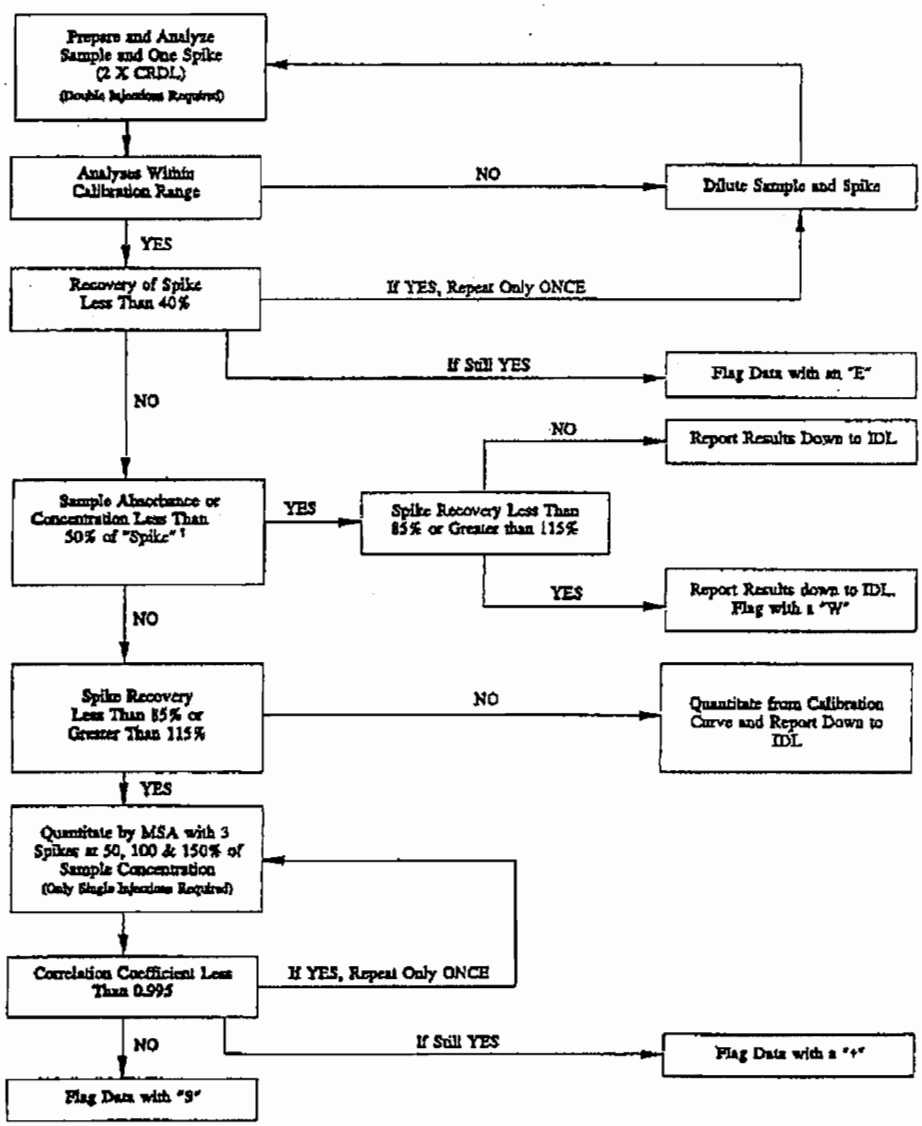
CLP Quality Control Inorganics		
Type	**Frequency**	**Corrective Action**
Internal Standard (ICP & ICP/MS only):	Each sample, standard and QC (MS, MSD, LCS, dilution and blank)	If the internal standard response falls outside the specified range, then the samples would be reanalyzed.
Matrix Spikes:	Each group of samples of similar matrix/level (≤20) each method	Analyze post-digestion spike sample
Duplicates (RPD):	Each group of samples of similar matrix/level (≤20) each method	Flag the data
Blanks: Initial Calibration (ICB) Continuing Calibration (CCB) Preparation Blank	Each wavelength immediately after calibration verification at 10% frequency or every 2 hours (beginning and end of run min.) Each SDG or batch (≤20 samples)	Correct problem, recalibrate, and rerun Redigest and reanalyze blank and associated samples if sample result is greater than the LOQ and <20× blank result
Serial Dilutions (ICP, ICP/MS only):	Each group of (≤20) of similar matrix/level	Flag the data
Interference Check Sample:	Each wavelength after Initial Calibration Verification at beginning and end of the run and per 20 samples	Correct for interference, recalibrate the instrument
Laboratory Control Sample:	Each SDG or batch (≤20 samples), each method	Redigest and reanalyze LCS and associated samples
Post Digestion Spike:	When matrix spikes are outside 75% to 125% range (not performed on GFAA analyses)	Flag the data
Analytical Spike:	Every GFAA determination	Refer to the Furnace AA Analysis Scheme flow diagram shown on the following page

FIGURE 1. FURNACE ATOMIC ABSORPTION ANALYSIS SCHEME



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Drinking Water Quality Control Inorganics (Metals)		
Type	**Frequency**	**Corrective Action**
Internal Standard (ICP & ICP/MS only):	Each sample, standard and QC (MS, MSD, LFB, dilution and blank)	If the internal standard response falls outside the specified range, then the samples would be reanalyzed.
Matrix Spikes:	Each group of samples of similar matrix/level (≤10) each method	Analyze post-digestion spike sample
Duplicates (RPD):	Each group of samples of similar matrix/level (≤10) each method	Flag the data
Blanks: Initial Calibration (ICB) Continuing Calibration (CCB)	Each wavelength immediately after calibration verification at 10% frequency	Correct problem, recalibrate, and rerun
Preparation Blank	Each batch (≤10 samples)	Redigest and reanalyze blank and associated samples if sample result <10 times blank result or >LOQ
Laboratory Fortified Blank (LFB):	Each batch (≤10 samples)	Redigest and reanalyze LFB and associated samples. Elements that fail high in the LFB and are ND in the samples can be reported.
Post Digestion Spike:	When matrix spikes are outside range	Flag the data

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Drinking Water EPA Method 525.2 Quality Control		
Type	**Frequency**	**Corrective Action**
Lab Reagent Blank (LRB):	One per extraction batch of (≤20) samples	Re-extract and reanalyze blank and associated samples
Lab Fortified Blank (LFB): Spike all compounds of interest	One per extraction batch of (≤20) samples	Re-extract and reanalyze LFB and associated samples for compounds outside acceptance limits. Compounds that fail high in the LFB and are ND in the samples can be reported.
Matrix Spike/Matrix Spike Duplicate (MS/MSD): Spike all compounds of interest	One per extraction batch of (≤20) samples	Recoveries for LFB must be within criteria. If there is insufficient sample for MSD, then a duplicate (extraction and analysis) of another sample in the batch must be performed.
Surrogates: 1,3-Dimethyl-2-nitrobenzene Perylene-d_{12} Triphenylphosphate	Each sample, LFB, MS, MSD, and blank	Re-extract and reanalyze the sample
Internal Standards (ISTD): Acenaphthene-d_{10} Phenanthrene-d_{10} Chrysene-d_{12}	Each sample, LFB, MS, MSD, and blank	Reanalyze samples

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QC Table for Miscellaneous Water Tests			
Test	**QC Type**	**Frequency**	**Corrective Action**
Alkalinity **Ammonia (ISE)** **Ammonia (Distill)** **Dissolved Solids** **Fluoride (ISE)** **Hardness** **Sulfate (TURB)** **Sulfide** **TPH** **Total Solids** **Turbidity**	Blank	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze.
	Laboratory Fortified Blank	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze.*
	Duplicate	Each group of samples of similar matrix (≤20)	Ensure that LFB meets acceptance criteria.
	Matrix Spike/ Matrix Spike Duplicate	Each group of samples of similar matrix (≤20) (not for Turbidity)	Ensure that LFB meets acceptance criteria.
Bromide (IC) **Chloride (IC)** **Cyanide (total & free)** **Fluoride (IC)** **Nitrogen (TKN)** **Nitrate/Nitrite** **Sulfate (IC)** **Total Phosphorus** **TOC**	Blank	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze.
	Laboratory Fortified Blank	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze.*
	Duplicate	Each group of samples of similar matrix (≤10)	Ensure that LFB meets acceptance criteria.
	Matrix Spike	Each group of samples of similar matrix (≤10)	Ensure that LFB meets acceptance criteria.
Phenols	Blank	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze.
	Laboratory Fortified Blank/Laboratory Control Sample	Each group of samples of similar matrix (≤20)	Prepare the entire batch again and re-analyze.*
	Matrix Spike/ Matrix Spike Duplicate	Each group of samples of similar matrix (≤10)	Ensure that LFB meets acceptance criteria.
pH **Moisture**	Laboratory Fortified Blank	Each group of samples of similar matrix (≤20)	Re-analyze samples.
	Duplicate	Each group of samples of similar matrix (≤10)	Ensure that LFB meets acceptance criteria.
Microbiology	Organism control (+)	Each lot of media (minimum of one per month)	Investigate cause
	Negative control (-)	Each lot of media (minimum of one per month)	Investigate cause

*LFBs that fail high and associated samples are ND can be reported.

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QC Table for Drinking Water Methods: 507, 508, 515.1, 531.1		
Type of QC	**Frequency**	**Corrective Action**
Blank	Each batch of (≤20) samples	Inject a solvent blank to check for analytical system contamination. Re-inject the blank. If the re-injected blank is acceptable then any samples with positive results must be re-injected. If the re-injected blank is unacceptable, all associated samples must be re-extracted.
Surrogate	Added to each field and QC sample during the extraction.	Recovery must be within specifications unless matrix-related problems are evident, in which case report results and comment.
Matrix Spike/Matrix Spike Duplicate Spike all compounds of interest, except multipeak compounds	Each batch (≤20) of samples if sample volume is available.	Evaluate in conjunction with the LFB.
Laboratory Fortified Blank (LFB) Spike all compounds of interest, except multipeak compounds	Each batch of (≤20) samples. LCSD may be used if insufficient sample for MS/MSD is submitted.	If LFB compounds are outside of acceptance limits, re-extract and re-analyze the batch. Compounds that fail high in the LFB and are ND in the samples can be reported.

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QC Table for Drinking Water Method: 524.2		
Type of QC	**Frequency**	**Corrective Action**
Blank	One blank for each 12-hour period or batch of ≤20 samples	Reanalyze blank and associated samples if blank is unacceptable.
Surrogate 4-Bromofluorobenzene 1,2-Dichlorobenzene-d_4	Added to each field and QC sample prior to analysis	Reanalyze sample if outside limits. If reanalysis confirms original, document on report.
Matrix Spike/Matrix Spike Duplicate Spike all compounds of interest	At client request.	Evaluate in conjunction with the LFB.
Laboratory Fortified Blank (LFB) Spike all compounds of interest	One LFB for each 12 hour period.	If target compounds are outside of acceptance limits, re-analyze the LFB. If second LFB fails, recalibrate instrument, re-analyze LFB and any associated samples. Compounds that fail high in the LFB and are ND in the samples can be reported.
Internal standard (ISTD) Fluorobenzene	Added to each field and QC sample prior to analysis	Reanalyze sample if outside limits. If reanalysis confirms original, document on report.

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EPA 624 Quality Control GC/MS Volatiles		
Type	**Frequency**	**Corrective Action**
Surrogates: 4-Bromofluorobenzene 1,2-Dichloroethane-d_4 Fluorobenzene	Each sample, MS, MSD, LCS, and blank	Reanalyze sample if outside limits; if reanalysis is within limits, the reanalysis data is reported. If surrogates confirm original, document on report and/or case narrative
Matrix Spikes: Spike all compounds of interest	Each batch (≤20) of samples	Evaluated by analyst in conjunction with the LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Samples: Spike all compounds of interest	Each batch (≤20) of samples	Reanalyze LCS and associated samples for compounds outside acceptance limits that are also outside MS/MSD acceptance limits. Compounds that fail high in the LCS and are ND in the samples can be reported.
Matrix Spike Duplicates (RPD): Spike all compounds of interest	Each batch (≤20) of samples	Evaluated by analyst in relationship to other QC results
Blanks:	Once every 24-hour tune period and/or 20 samples, which ever comes first	Reanalyze blank and associated samples if blank outside QC limits
Internal Standards (ISTD): Bromochloromethane 2-Bromo-1-chloropropane 1,4-Difluorobenzene	Each sample, MS, MSD, LCS, and blank	Reanalyze sample if outside limits; if reanalysis is within limits, the reanalysis data is reported. If internals confirm original, document on report and/or case narrative

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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EPA 625 Quality Control GC/MS Semivolatiles		
Type	**Frequency**	**Corrective Action**
Surrogate: Nitrobenzene-d_5 2-Fluorobiphenyl Terphenyl-d_{14} Phenol-d_6 2-Fluorophenol 2,4,6-Tribromophenol	Each sample, MS, MSD, LCS, and blank	Re-extract and reanalyze if more than one surrogate out per fraction (acid/base) or any recovery <10%; if re-extraction and reanalysis confirms originals, document on report and/or case narrative
Matrix Spikes: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Evaluate in conjunction with the LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20) of samples per matrix/level	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds that fail high in the LCS and are ND in the samples can be reported.
Matrix Spike Duplicates (RPD): Same as for matrix spikes	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	Once per extraction group (≤20) of samples, each matrix, level, instrument	Re-extract and reanalyze blank and associated samples
Internal Standards (ISTD): 1,4-Dichlorobenzene-d_4 2-Fluoronaphthalene Acenaphthene-d_{10} Phenanthrene-d_{10} Chrysene-d_{12} Perylene-d_{12}	Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report and/or case narrative

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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EPA 608 Quality Control Pesticides/PCBs		
Type	**Frequency**	**Corrective Action**
Surrogate: Organochlorine Pesticides & PCBs DCB TCMX	Each sample, MS, MSD, LCS, and blank	Repeat extraction and analysis if reanalysis confirms original report results and comment in case narrative
Matrix Spikes: Organochlorine Pesticides: Spike all compounds of interest, except PCBs, chlordane, and toxaphene PCBs: Aroclor 1016 and Aroclor 1260	Each batch (≤20) of samples	Evaluate in conjunction with LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Matrix Spike Duplicates (RPD): Organochlorine Pesticides: Spike all compounds of interest, except PCBs, chlordane, and toxaphene PCBs: Aroclor 1016 and Aroclor 1260	Each batch (≤20) of samples	Evaluated by analyst in relationship to other QC results
Laboratory Control Sample: Organochlorine Pesticides: Spike all compounds of interest, except PCBs, chlordane, and toxaphene PCBs: Aroclor 1016 and Aroclor 1260	Each batch (≤20) of samples	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds in the LCS that fail high and are ND in the samples can be reported.
Blanks:	Each batch (≤20) of samples	Inject a hexane or solvent blank first to be sure the analytical system is clean then reinject the blank itself. If the reinjected blank is acceptable, any samples extracted with this blank should be reinjected if they, too, contain the analyte which was contaminating the blank. If the reinjected blank is unacceptable, any affected samples must be reextracted.

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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EPA 601/602 Quality Control Volatiles by GC		
Type	**Frequency**	**Corrective Action**
Surrogates: Halocarbons/Aromatics: 1-Bromo-4-chlorobenzene (ELCD/PID)	Each sample, MS, MSD, LCS and blank	Reanalyze if the surrogate recovery is outside the limits unless matrix related problems are evident
Matrix Spikes: Spike all compounds of interest	Each group (≤20) of samples	Evaluate in conjunction with LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Matrix Spike Duplicate (RPD): Same compounds as matrix spikes	Each group (≤20) of samples	Evaluated by analyst in relationship to other QC results
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20) of samples LCSD analyzed if sufficient volume is not available for MS/MSD	Reanalyze LCS and associated samples for compounds outside of acceptance limits. Compounds in the LCS that fail high and are ND in the samples can be reported.
Blanks:	At least one per 24 hours	Reanalyze blank and associated samples if blank is outside limits
Internal Standard (ISTD): Fluorobenzene (ELCD/PID)	Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original result, document on report or case narrative. In cases where the sample matrix is elevating the ISTD recovery, a dilution and reanalysis may be performed.

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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EPA Method 602
Petroleum Analysis
Acceptance Criteria

Type	Frequency	Corrective Action
Surrogate: α,α,α-Trifluorotoluene (PID)	Each sample, MS, MSD, LCS, and blank	Reanalyze if the surrogate recovery is outside the limits unless matrix-related problems are evident.
Matrix Spike: Spike all compounds of interest	Each group (≤20) of samples	Evaluate in conjunction with LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20) of samples. LCSD analyzed if sufficient volume is not available for MS/MSD	Reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds in the LCS that fail high and are ND in the samples can be reported.
Matrix Spike Duplicates (RPD): Same compounds as the matrix spike	Each group (≤20) of samples	Evaluated by an analyst in relationship to other QC results
Blanks:	At least once per 24 hours	Reanalyze blank and associated samples if blank is outside limits
Internal Standards (ISTD): 1-Chloro-3-fluorobenzene (PID)	Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original result, document on report or case narrative. In cases where the sample matrix is elevating the ISTD recovery, a dilution and reanalysis may be performed.

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change

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EPA 610 Quality Control PAHs by HPLC		
Type	**Frequency**	**Corrective Action**
Surrogate: Nitrobenzene Triphenylene	Each sample, MS, MSD, LCS, and blank	Re-extract and reanalyze. If re-extraction and reanalysis confirms then comment on report and/or case narrative. Re-extraction may not be needed if matrix related problems are evident. Comment in case narrative.
Matrix Spike: Spike all compounds of interest	Each batch (≤20) of samples	Evaluate in conjunction with LCS. Acceptable LCS would be indicative of matrix effects on the MS/MSD.
Laboratory Control Sample: Spike all compounds of interest	Each batch (≤20) of samples	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds in the LCS that fail high and are ND in the samples can be reported.
Matrix Spike Duplicates (RPD): Spike all compounds of interest	Each batch (≤20) of samples	Evaluated by analyst in relationship to other QC results
Blanks:	Each batch (≤20) of samples	Inject a solvent blank first to be sure the analytical system is clean then reinject the blank itself. If the reinjected blank is acceptable, any samples extracted with this blank should be reinjected, if they, too, contain the analyte which was contaminating the blank. If the reinjected blank is unacceptable, any affected samples must be re-extracted.

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

EPA Method 600 Series (Method 200.8 for ICP/MS)
Quality Control
Inorganics (Metals)

Type	Frequency	Corrective Action
Internal Standard:	Each sample, standard and QC (MS, LCS, dilution and blank)	If the internal standard response falls outside the specified range, then the samples would be reanalyzed.
Matrix Spikes:	Each group of samples of similar matrix/level (≤10) each method	Analyze post-digestion spike sample (ICP and GFAA only)
Matrix Spike Duplicate (RPD):	Not required	N/A
Duplicates (RPD):	Each group of samples of similar matrix/level (≤10) each method	Flag the data
Blanks: Initial Calibration (ICB) Continuing Calibration (CCB) Preparation Blank	Each wavelength immediately after calibration verification at 10% frequency or every 2 hours (beginning and end of run min.) Each SDG or batch (≤10 samples)	Correct problem, recalibrate, and rerun Redigest and reanalyze blank and associated samples if sample result is greater than the LOQ and <20× blank result
Serial Dilutions:	Each group of (≤10) of similar matrix/level	Flag the data
Interference Check Sample:	Each wavelength after Initial Calibration Verification at beginning and end of the run or min. of 2 times per 8 hour	Correct for interference, recalibrate the instrument
Laboratory Control Sample:	Each SDG or batch (≤10 samples), each method	Redigest and reanalyze LCS and associated samples. Elements in the LCS that fail high and are ND in the samples can be reported.
Post Digestion Spike:	When matrix spikes are outside 70% to 130% range or within the statistical window (whichever is tighter)	Flag the data
Analytical Spike:	One per 10 field samples	ICP and Hg – flag the data GFAA – data is evaluated using the PDS/MSA.

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

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Quality Control for Miscellaneous 600 Series Water Tests			
Test	**QC Type**	**Frequency**	**Corrective Action**
Alkalinity **Ammonia (ISE)** **Ammonia (Distill.)** **Dissolved Solids** **Fluoride (ISE)** **Hardness** **Sulfate (turb)** **Sulfide** **TPH** **Total Solids** **Turbidity**	Blank	Each batch (≤20) of samples	Prepare the entire batch again and re-analyze.
	Laboratory Control Sample	Each batch (≤20) of samples	Prepare the entire batch again and re-analyze.*
	Duplicate	Each batch (≤20) of samples	Ensure that LCS meets acceptance criteria.
	Matrix Spike/ Matrix Spike Duplicate	Each batch (≤20) of samples (not for turbidity)	Ensure that LCS meets acceptance criteria.
Bromide (IC) **Chloride (IC)** **Sulfate (IC)** **Cyanide (total & free)** **Fluoride (IC)** **Nitrogen (TKN)** **Nitrate/Nitrite** **Total Phosphorus** **TOC**	Blank	Each batch (≤20) of samples	Prepare the entire batch again and re-analyze.
	Laboratory Control Sample	Each batch (≤20) of samples	Prepare the entire batch again and re-analyze.*
	Duplicate	Each batch (≤10) of samples	Ensure that LCS meets acceptance criteria.
	Matrix Spike	Each batch (≤10) of samples	Ensure that LCS meets acceptance criteria.
Phenols	Blank	Each batch (≤20) of samples	Prepare the entire batch again and re-analyze.
	Laboratory Control Sample	Each batch (≤20) of samples	Prepare the entire batch again and re-analyze.*
	Matrix Spike/ Matrix Spike Duplicate	Each batch (≤10) of samples	Ensure that LCS meets acceptance criteria.

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

*LCSs that fail high and associated samples are ND can be reported.

TO-15 Volatile Organics in Air		
Type	**Frequency**	**Corrective Action**
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20) of samples	Reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds that fail high in the LCS and are ND in the samples, can be reported.
Blanks:	Once for each 24-hour time period or ≤20 samples	Reanalyze blank and associated samples if blank outside limits
Internal Standards (ISTD): Bromochloromethane 1,4-Difluorobenzene Chlorobenzene-d_5	Each sample, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report and/or case narrative

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

TO-14A Volatile Organics in Air		
Type	**Frequency**	**Corrective Action**
Laboratory Control Sample: Spike all compounds of interest	Each group (≤20) of samples	Reanalyze LCS and associated samples for compounds outside acceptance limits. Compounds that fail high in the LCS and are ND in the samples, can be reported.
Blanks:	Once for each 24-hour time period or ≤20 samples	Reanalyze blank and associated samples if blank outside limits
Internal Standards (ISTD): Bromochloromethane 1,4-Difluorobenzene Chlorobenzene-d_5	Each sample, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report and/or case narrative

Acceptance limits are based on statistical evaluation of laboratory data and are subject to change.

Lancaster Laboratories

Environmental Quality Policy Manual

Appendix K
Microbiological Testing

Current as of January 23, 2008
5 Total Pages (including this coversheet)

Lancaster Laboratories, Inc. • 2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681

MICROBIOLOGICAL TESTING

1. MICROBIOLOGICAL SAMPLE HANDLING

1.1. *Microbiological Sample Collection*

The containers for environmental microbiology are sterile, screw-cap plastic bottles or sterile, Whirl-Pak plastic bags. A minimum of 100 mL of sample is required. The sampling containers are purchased with a sterility certification. The sterility is verified by randomly selecting a container from each purchased lot and inoculating it with approximately 50 mL of sterile tryptic soy broth and placing it in incubation for 24 hours at 35° ± 0.5°C. Each lot of bottles is also check for absence of autofluoresence with a 366-nm UV light with a 6-Watt bulb. The 100-mL calibration line on the container is verified using a 100-mL Class A graduated cylinder to 2.5% tolerance.

Samples collected for microbiological analyses must follow a specific protocol:

- The sampling taps are to be free of aerators, strainers, hose attachments, and purification devices; they should not be mixing type faucets, and avoid leaky faucets.
- Maintain a steady water flow for 3 to 5 minutes before collecting the sample.
- Using aseptic techniques, fill the container to just above the 100-mL mark on the container. This will allow for mixing and chlorine residual analysis.
- Do not overfill the container.
- If another environmental microbial analysis is required, or if the water is discolored (to act as a color standard), a separate container will be required.

1.2. *Microbiological Sample Storage*

Because sample integrity can be compromised by improper storage, the environmental microbiology samples are refrigerated with the temperature monitored until requested by the microbiologist for analysis.

Holding times for samples are monitored and analysis is scheduled accordingly. For SDWA compliance purposes, no sample (for total coliform analysis) with over 30 hours elapsed time from collection will be analyzed. HPC samples from SDWA surface water systems must be run within 8 hours of collection. Fecal coliform tests on effluents for NPDES compliance purposes must be run within 6 hours of collection.

1.3. Microbiological Sample Return/Disposal

All solid wastes generated from the microbiological analyses are disposed in bags clearly marked as 'BioHazard", sterilized via autoclave and disposed of by incineration. Lancaster Laboratories uses a sophisticated, computerized sample management system (CSMS), which includes programming to assist in the identification of hazardous wastes at time of discard. In most cases, a sample for coliform testing is collected in a container that will also be the test vessel. These samples are assigned a discard location. If a sample is being tested for an analysis other than microbiology, it will be assigned a storage location.

2. MICROBIOLOGICAL TECHNICAL REQUIREMENTS AND TRACEABILITY OF MEASUREMENTS

2.1. Media

- Within the microbiology laboratory, procedures are in place to address preparation, labeling, storage, expiration, documentation, and quality/sterility evaluation requirements for these materials. Only commercially prepared or manufactured dehydrated media is used for SDWA water work. Media may not be formulated from basic ingredients. Each new lot of dehydrated or commercially prepared medium is checked against positive and negative culture controls. Each purchased lot of MMO-MUG media is tested for performance using *E. coli*, *K. pneumoniae*, and *Ps. aeruginosa*, or equivalent organisms following a standard operating procedure. The positive/negative organism check is repeated at least monthly for QC purposes.

- Each analytical method includes a list of media needed for the test. These are fully described, including name, purity, and description of preparation. Where applicable, shelf life and storage conditions are also listed.

- The Microbiology Department is responsible for maintaining an inventory of the media needed. New supplies of media are checked by the Purchasing Department to ensure that they match the purchase order. The laboratory is responsible for checking that new supplies meet the method requirements.

- In addition to the name and concentration, the media containers are labeled with the storage conditions, the date opened, and an expiration or re-evaluation date. Subsequent media preparations at the laboratory are fully documented in a logbook and labeled to include:

    1. Name of media
    2. Concentration
    3. Date prepared
    4. Name of analyst preparing or reference to logbook
    5. Storage conditions
    6. Expiration/re-evaluation date
    7. Manufacturer name and lot #
    8. Sterilization time and temperature
    9. Final pH
    10. Sterility check result

2.2. Microbiological Standard Sources, Calibration, and Preparation

Microbial Control Species - Where required, laboratory cultures are obtained from the American Type Culture Collection (ATCC). Cultures used in testing are no more than five transfers from ATCC freeze-dried cultures.

2.3. Microbiological Equipment Maintenance

Equipment maintenance and calibration is addressed in instrument-specific Operation, Maintenance, and Calibration Procedures (OMC) or instrument-specific instruction manuals located within the department.

The general process for sterilization procedures are outlined below:

2.3.1. All autoclaving is done at 121° ± 1°C, with times as specified below (in minutes):

Membrane filters/pads	10
Carbohydrate media	12
Rinse water	60
Dilution water	25
Membrane filter units	30
Contaminated materials	minimum of 70

2.3.2. Membrane filter funnels are sanitized between filtrations by exposing to UV light (254 nm) for a minimum of two minutes.

2.4. Microbiological Labware Cleaning

Sterile disposable plasticware is primarily used for microbiological analysis. However, procedures are in place to outline the washing process for each type of labware used in the laboratory. Most glassware is machine-washed. Labware that is washed by hand is either air dried or dried in specifically designed ovens and sterilized appropriately. Each new lot, or at least annually, of detergents used to wash glassware for Environmental Microbiology labware, be tested using the Inhibitory Residue Test, as outlined in SM20 9020.B.4.a.2).

MICROBIOLOGICAL INTERNAL QUALITY CONTROL CHECKS

2.5. Microbiological Laboratory Quality Control Samples and Acceptance Criteria

Quality control (QC) samples are analyzed with each batch of samples to demonstrate that all aspects of the analysis are in control within established limits of precision and accuracy. Chromofluorogenic media QC tests are lot-specific and performed on each newly received lot or at least monthly.

As required in the procedure on written methods, each analytical method specifies (or cross-references another procedure) the type of QC sample, frequency of analysis, acceptance criteria for QC sample results, and corrective action to be taken if QC sample results fall outside of the acceptable range.

The handling of QC data is described in the procedure addressing, "Quality Control Records." The types of QC samples and the information each provides are discussed in the following paragraphs.

2.5.1. Negative System Control - The QC on this is method specific and can be found in each SOP.

2.5.2. Positive and Negative Organism Controls - Each lot/batch of media is tested using positive and negative organism controls.

2.5.3. Duplicate Counting (Test Variability/Reproducibility) - As per NELAC section D.3.2 (test variability/reproducibility for multiple analysts), duplicate counting is performed monthly on HPC and fecal MF plates. Each analyst counts the plates and their results are evaluated. Counts must be within 10% difference to be acceptable.

2.5.4. Duplicates - For heterotrophic plate count samples, a duplicate is a second aliquot of a sample that is treated identically to the original to determine precision of the test. The plates are averaged.

2.5.5. Serial Dilutions - Fecal coliform, biosolids analyses, and heterotrophic plate counts may require serial dilution of the sample.

2.6. Microbiological Quality Control Sample Frequency and Corrective Action

Each analytical method and NELAC defines the frequency for the required QC samples. The corrective action required when a QC result fails to meet the acceptance criteria is also given.

The QC acceptance criteria are available to analysts in the laboratory. If the results are not within the acceptance criteria, corrective action suitable to the situation must be taken. This may include, but is not limited to, checking calculations, examining other quality control analyzed with the same batch of samples, qualifying results with a comment stating the observed deviation, and invalidating results. It should be noted that resampling would be required in the case of invalidated results due to the short hold-times in microbiological analysis.

2.7. Microbiological Water Systems

Laboratory Reagent Water Suitability Testing - On an annual basis, a sample is sent to a PADEP certified laboratory for suitability analyses. These serve as confirmation of our analyses, as well as to supply additional data on the water suitability.

2.8. Microbiological Reporting Limits

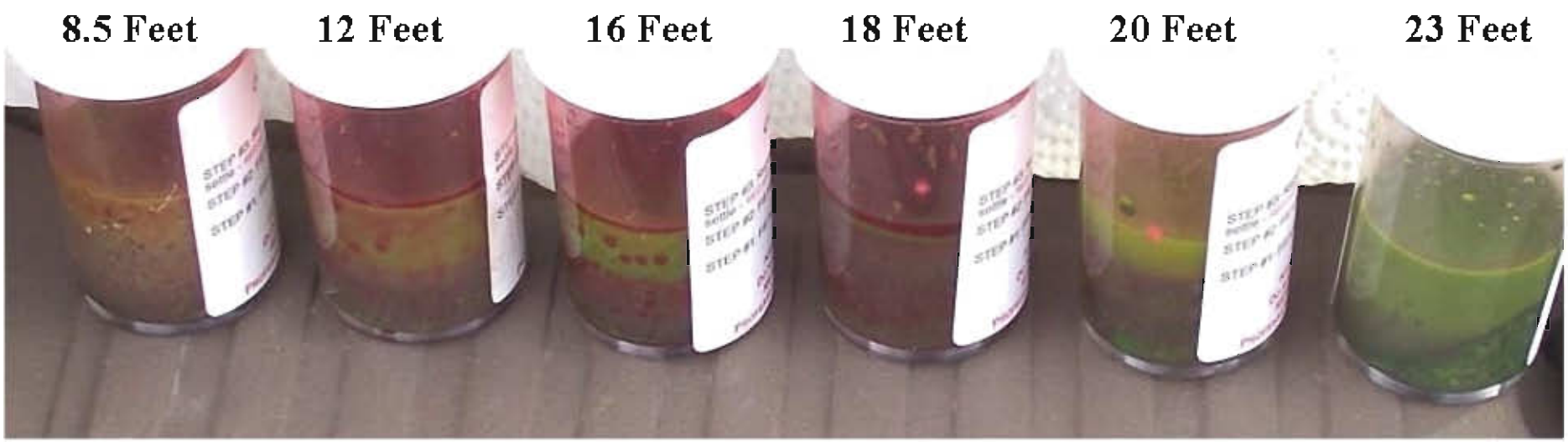
For microbiological analysis, the limits are method-specified and/or project-specific. This information is programmed into the LIMS for reporting purposes.

Appendix C
OIL-in-SOIL Output Example

CB-10

Smear – zone product evident to 18 feet below ground level.

CB-10



Smear – zone product evident to 18 feet below ground level.

Appendix D
Field Forms

PROJECT NAME: _____

PROJECT NUMBER: _____

PROJECT MANAGER: _____

SITE LOCATION: _____

_____

DATES OF FIELDWORK: _____ TO _____

_____

_____

PURPOSE OF FIELDWORK: _____

_____

_____

_____

_____

WORK PERFORMED BY: _____

_____

_____

SIGNED DATE

CHECKED BY DATE

GENERAL NOTES

PROJECT NAME: 0	DATE:	TIME ARRIVED:
PROJECT NUMBER: 0	AUTHOR: 0	TIME LEFT:

WEATHER		
TEMPERATURE: _____ °F	WIND: _____ MPH	VISIBILITY: _____

WORK / SAMPLING PERFORMED

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION		
NAME		

SIGNED DATE CHECKED BY DATE

EQUIPMENT SUMMARY

PROJECT NAME: 0	SAMPLER NAME: 0
PROJECT NO.: 0	

WATER LEVEL MEASUREMENTS COLLECTED WITH:

QED

NAME AND MODEL OF INSTRUMENT

SERIAL NUMBER (IF APPLICABLE)

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT

SERIAL NUMBER (IF APPLICABLE)

DEPTH TO BOTTOM OF WELL MEASUREMENTS COLLECTED WITH:

QED

NAME AND MODEL OF INSTRUMENT

SERIAL NUMBER (IF APPLICABLE)

PURGING METHOD

BLADDER PUMP (QED SAMPLE PRO)

NAME AND MODEL OF PUMP OR TYPE OF BAILER

SERIAL NUMBER (IF APPLICABLE)

SAMPLING METHOD

BLADDER PUMP (QED SAMPLE PRO)

NAME AND MODEL OF PUMP OR TYPE OF BAILER

SERIAL NUMBER (IF APPLICABLE)

GEOTECH DISPOSABLE FILTER

NAME AND MODEL OF FILTERATION DEVICE

0.45 MICRON

FILTER TYPE AND SIZE

DISPOSABLE POLY TUBING

TUBING TYPE

☑ LOW-FLOW SAMPLING EVENT

PURGE WATER DISPOSAL METHOD

☐ GROUND ☐ DRUM ☐ POTW ☑ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

NA

POTABLE WATER SOURCE

STORE BOUGHT

DI WATER SOURCE

SIGNED DATE

CHECKED BY DATE

CALIBRATION LOG

PROJECT NAME: 0	MODEL: QED MP-10	SAMPLER:
PROJECT NO.: 0	SERIAL #:	DATE:

PH CALIBRATION CHECK

PH 7 (LOT NUMBER):	PH 4 / 10 (LOT NUMBER):	TIME
/	/	
/	/	
/	/	
/	/	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CALIBRATION READING (LOT NUMBER):	TEMPERATURE (°CELSIUS)	CORRECTED CONDUCTIVITY (umhos/cm)	TIME
/			
/			
/			
/			

D.O. CALIBRATION CHECK

CALIBRATION READING (mg/L)	TIME

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (LOT #):	(LOT #):	TIME
/	/	
/	/	
/	/	
/	/	

OXIDATION / REDUCTION POTENTIAL CALIBRATION CHECK

CALIBRATION READING (LOT NUMBER):	TEMPERATURE (°CELSIUS)	CORRECTED ORP (mV)	TIME
/			
/			
/			
/			

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED DATE

CHECKED BY DATE

IN-SITU TROLL 9000 CALIBRATION LOG

PROJECT NAME:	0	MODEL:	IN-SITU 9000	SAMPLER:	0
PROJECT NO.:	0	SERIAL #:		DATE:	

QUICK CAL SOLUTION

ACCEPTABLE RANGE OF CALIBRATION PARAMETERS SHOWN

LOT #	PH CALIBRATION				ORP CALIBRATION	TIME	DATE
	pH Slope -54 mV< Slope <-62 mV		pH Offset 390 mV< Offset <450 mV		ORP OFFSET		
		☐ WITHIN RANGE		☐ WITHIN RANGE			
		☐ WITHIN RANGE		☐ WITHIN RANGE			
		☐ WITHIN RANGE		☐ WITHIN RANGE			
		☐ WITHIN RANGE		☐ WITHIN RANGE			
		☐ WITHIN RANGE		☐ WITHIN RANGE			

LOT #	CONDUCTIVITY CALIBRATION		DO CALIBRATION				TIME	DATE
	CONDUCTIVITY 0.33 1/cm < Kcell < 0.39 1/cm		DO SLOPE 15 < Slope < 34		DO Offset 2 nAmps			
		☐ WITHIN RANGE		☐ WITHIN RANGE		☐ WITHIN RANGE		
		☐ WITHIN RANGE		☐ WITHIN RANGE		☐ WITHIN RANGE		
		☐ WITHIN RANGE		☐ WITHIN RANGE		☐ WITHIN RANGE		
		☐ WITHIN RANGE		☐ WITHIN RANGE		☐ WITHIN RANGE		
		☐ WITHIN RANGE		☐ WITHIN RANGE		☐ WITHIN RANGE		

TURBIDITY CALIBRATION			
TYPE OF SOLUTION / LOT #	TURBIDITY READING (NTU)/SOLUTION TURBIDITY (NTU)	TIME	DATE
	/		
	/		
	/		
	/		
	/		

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED DATE

CHECKED DATE

PID FIELD CALIBRATION LOG

PROJECT NAME:	0	MODEL:	
PROJECT NUMBER.:	0	LAMP VOLTAGE:	
SAMPLER NAME:	0	SERIAL NO.:	

PID CALIBRATION CHECK

	DATE: TIME: INITIALS:	DATE: TIME: INITIALS:	DATE: TIME: INITIALS:	DATE: TIME: INITIALS:	DATE: TIME: INITIALS:
BATTERY CHECK	☐	☐	☐	☐	☐
ZERO GAS	/	/	/	/	/
SPAN GAS	/	/	/	/	/
AUDIBLE FAN MOTOR CHECK	☐	☐	☐	☐	☐
RESPONSE CHECK	☐	☐	☐	☐	☐

PROBLEMS ENCOUNTERED

CORRECTIVE ACTION

SIGNED DATE CHECKED DATE

WATER LEVEL DATA

PROJECT NAME: 0	DATE:
PROJECT NUMBER: 0	AUTHOR: 0

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
MW-19						
MW-19-1						
MW-19-2						
MW-19-3						
MW-19-4						
MW-19-5						
MW-19-6						
MW-19-7						
MW-19-8						
MW-19-9D						
MW-19-10						
MW-19-11						
MW-19-12						
GEI-2I						
GEI-2S						
GEI-3I						
MW-15S						
MW-15I						
MW-18S						
MW-18I						
MW-17S						
MW-12R						
MW-9						
MW-8						
MW-25R						
MW-21						
MW-27S						
MW-28S						

MW-28I						
MW-29S						
MW-30S						
MW-30I						
MW-30D						
MW-31s						
MW-32s						
MW-33s						
MW-34s						
MW-35s						
SW-D-1						
SW-D-2						
SW-D-3						
SW-D-4						
SW-D-5						
SW-R-1						
SW-R-2						
SW-R-3						
SW-R-4						
SW-R-5						
SW-R-6						
DRC-2						
SG-R2						
MW-13S						
MW-13I						
MW-13S (R)						

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

SIGNED DATE CHECKED DATE

WATER SAMPLE LOG

PROJECT NAME: 0	PREPARED		CHECKED	
PROJECT NUMBER: 0	BY: 0	DATE:	BY:	DATE:

SAMPLE ID:	WELL DIAMETER: ☐ 2" ☐ 4" ☐ 6" ☐ OTHER _____
WELL MATERIAL: ☐ PVC ☐ SS ☐ IRON ☐ OTHER _____	
SAMPLE TYPE: ☐ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER _____	

PURGING	TIME:	DATE:	SAMPLE	TIME:	DATE:
PURGE METHOD: ☑ PUMP BLADDER PUMP (QED) ☐ BAILER _____			PH: _____ SU	CONDUCTIVITY: umhos/cm	
			ORP: _____ mv	DO: _____ mg/L	
DEPTH TO WATER: _____ T/ PVC			TURBIDITY: _____ NTU		
DEPTH TO BOTTOM: _____ T/ PVC			☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: _____ ☑ LITERS ☐ GALLONS			TEMPERATURE: _____ °C	OTHER: _____	
VOLUME REMOVED: _____ ☑ LITERS ☐ GALLONS			COLOR: _____	ODOR: _____	
COLOR: _____ ODOR: _____			FILTRATE (0.45 um) ☑ YES ☐ NO		
TURBIDITY: _____			FILTRATE COLOR: _____	FILTRATE ODOR: _____	
☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☐ DUP- _____		
DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☑ OTHER			COMMENTS:		

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **10** ORP: +/- **10** D.O.: +/- **10** TURB: +/- **0.1** OR <= **10** TEMP.: +/- **0.5°C**

BOTTLES FILLED

PRESERVATIVE CODES

A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - Na2S2O3

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	40 mL	VOA	E	☐ Y ☑ N	2	1 L	AMBER	A	☐ Y ☑ N
2	40 mL	VOA	A	☐ Y ☑ N	2	500mL	PLASTIC	A	☐ Y ☑ N
1	100 mL	PLASTIC		☐ Y ☑ N	1	1 L	PLASTIC	A	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N	1	250 mL	PLASTIC	C	☐ Y ☑ N

SHIPPING METHOD: __FedEx	DATE SHIPPED: _____	AIRBILL NUMBER: NA
COC NUMBER: _____ NA	SIGNATURE: _____	DATE SIGNED: _____

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME: 0	PREPARED		CHECKED	
PROJECT NUMBER: 0	BY: 0	DATE:	BY:	DATE:

SAMPLE ID:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)

SIGNATURE: _____ DATE SIGNED: _____

LOG OF SOIL BORING

PROJECT NAME: 0		**SOIL BORING ID:**	
PROJECT NUMBER: 0		NORTHING:	SHEET 1 OF
LOGGED BY: 0		EASTING:	SURFACE ELEV.:
PROJECT LOCATION: 0			DATE STARTED:
DRILLED BY:	DRILLER NAME:		DATE COMPLETED:

NO.	TYPE	%	BLOWS	PID	DEPTH	VISUAL CLASSIFICATION AND OBSERVATIONS	COMMENT
					2.5		
					5		
					7.5		
					10		
					12.5		
					15		
					17.5		
					20		

DRILLING METHOD
DRILL RIG
BORING DIAMETER

WATER LEVEL OBSERVATIONS			
FIRST OCCURRENCE:			
DATE	TIME	DEPTH TO WATER	DEPTH TO CAVE-IN

SIGNED DATE

CHECKED DATE

LOG OF SOIL BORING

SHEET 2 OF

PROJECT NAME: 0

SOIL BORING ID:

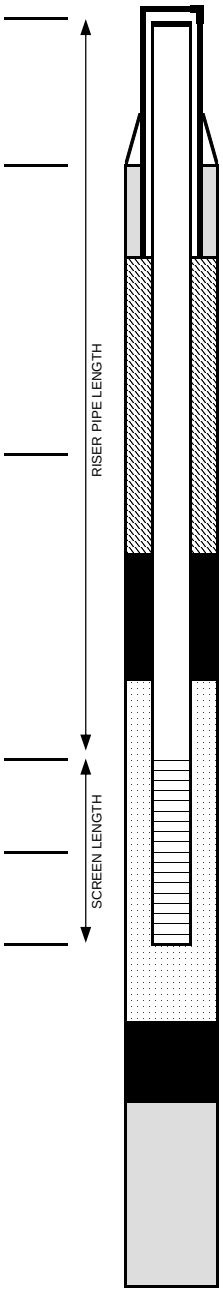
NO.	TYPE	%	BLOWS	PID	DEPTH	VISUAL CLASSIFICATION AND OBSERVATIONS	COMMENT
					22.5		
					25		
					27.5		
					30		
					32.5		
					35		
					37.5		
					40		
					42.5		
					45		

SIGNED DATE CHECKED DATE

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: 0		WELL ID:	
PROJ. NO: 0	DATE INSTALLED:	INSTALLED BY: 0	CHECKED BY:

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)



____	TOP OF CASING
0	GROUND SURFACE
____	CEMENT SURFACE PLUG
	GROUT/BACKFILL MATERIAL
	GROUT/BACKFILL METHOD
____	GROUT
	BENTONITE SEAL MATERIAL
____	BENTONITE SEAL
____	TOP OF SCREEN
	FILTER PACK MATERIAL
____	BOTTOM OF SCREEN
____	BOTTOM OF FILTER PACK
____	BENTONITE PLUG
	BACKFILL MATERIAL
____	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: _____

PIPE SCHEDULE: _____

PIPE JOINTS: _____

SOLVENT USED? _____

SCREEN TYPE: _____

SCR. SLOT SIZE: _____ INCH

BOREHOLE DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: _____

TIME DEVELOPING: ____ HOURS

WATER REMOVED: ____ GALLONS

WATER ADDED: ____ GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: _____

COLOR BEFORE: _____

CLARITY AFTER: _____

COLOR AFTER: _____

ODOR (IF PRESENT): _____

WATER LEVEL SUMMARY

SWE MEASUREMENT		DATE	TIME
BEFORE DEVELOPING:	T/PVC		
AFTER DEVELOPING:	T/PVC		
OTHER	T/PVC		
OTHER	T/PVC		

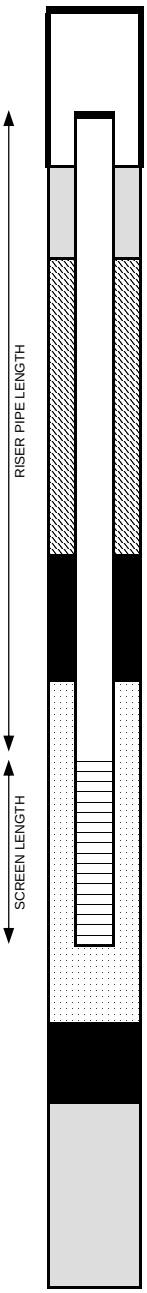
PROTECTIVE COVER AND LOCK INSTALLED? ☐ YES ☐ NO

PERMANENT, LEGIBLE WELL LABEL ADDED? ☐ YES ☐ NO

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: 0			WELL ID:
PROJ. NO: 0	DATE INSTALLED:	INSTALLED BY: 0	CHECKED BY:

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
	0	GROUND SURFACE
		TOP OF CASING
		CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL
		GROUT/BACKFILL METHOD
		GROUT
		BENTONITE SEAL MATERIAL
		BENTONITE SEAL
		TOP OF SCREEN
		FILTER PACK MATERIAL
		BOTTOM OF SCREEN
		BOTTOM OF FILTER PACK
		BENTONITE PLUG
		BACKFILL MATERIAL
		HOLE BOTTOM



NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: _____

PIPE SCHEDULE: _____

PIPE JOINTS: _____

SOLVENT USED? _____

SCREEN TYPE: _____

SCR. SLOT SIZE: _____ INCH

BOREHOLE DIAMETER: _____ IN. FROM _____ TO _____ FT.
_____ IN. FROM _____ TO _____ FT.

SURF. CASING DIAMETER: _____ IN. FROM _____ TO _____ FT.
_____ IN. FROM _____ TO _____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: _____

TIME DEVELOPING: _____ HOURS

WATER REMOVED: _____ GALLONS

WATER ADDED: _____ GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: _____

COLOR BEFORE: _____

CLARITY AFTER: _____

COLOR AFTER: _____

ODOR (IF PRESENT): _____

WATER LEVEL SUMMARY

SWE MEASUREMENT		DATE	TIME
BEFORE DEVELOPING:	T/PVC		
AFTER DEVELOPING:	T/PVC		
OTHER	T/PVC		
OTHER	T/PVC		

PROTECTIVE COVER AND LOCK INSTALLED? ☐ YES ☐ NO

PERMANENT, LEGIBLE WELL LABEL ADDED? ☐ YES ☐ NO

WELL INSPECTION REPORT

PROJECT NAME: 0	SAMPLER NAME: 0
PROJECT NO.: 0	DATE:

WELL ID	PROTECTIVE CASING	SURFACE SEAL	DEGREE OF IMMOBILITY OF PROTECTIVE CASING	PERMANENT LEGIBLE LABELS	LOCK	WELL CAP	EASE OF INSERTING / REMOVING BAILER	SEDIMENT IN WELL	COMMENT

SIGNED DATE

CHECKED BY DATE

Appendix E
Chain of Custody Form

Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # _____ Group# _____ Sample #_____

COC #

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: _____ Acct. #: _____

Project Name/#: _____ PWSID #: _____

Project Manager: _____ P.O.#: _____

Sampler: _____ Quote #: _____

Name of state where samples were collected: _____

For Lab Use Only
FSC: _____
SCR #: _____

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Grab	Composite	Matrix: Soil	Matrix: Water (☐ Potable ☐ NPDES Check if Applicable)	Matrix: Other	Total # of Containers	Type Here.....	Type Here.....	Type Here.....	Type Here.....	Type Here.....	Type Here.....	Type Here.....	Type Here.....		Remarks	Temperature of samples upon receipt (if requested)

(7)

Turnaround Time Requested (TAT) (please circle): Normal Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)

Date results are needed: _____

Rush results requested by (please circle): Phone Fax E-mail

Phone #: _____ Fax #: _____

E-mail address: _____

(8)

Data Package Options (please circle if required)

QC Summary
Type I (Tier I)
Type II (Tier II)
Type III (NJ Red. Del.)
Type IV (CLP)
Type VI (Raw Data)
GLP
Other

SDG Complete? Yes No

Site-specific QC required? Yes No

(If yes, indicate QC sample and submit triplicate volume.)

Internal Chain of Custody required? Yes No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

Appendix F
Laboratory Bottle Label

Bottle Request and Sample Submission Form

Project Information	
Project/Site ID:	
Location:	
City, State, ZIP:	
Project #:	
Company:	
Client Contact:	
Consultant:	
Report to MDL?	☐Yes ☐No

Bottle Shipping Information	
Company:	
Address:	
City, State, ZIP:	
Contact:	
Phone:	
Date Needed:	
Other:	

Optional Information	
Lab Address	2425 New Holland Pike
City, State, ZIP:	Lancaster, PA 17601
Contact:	
Phone:	717-656-2308, Ext.
Fax:	
E-mail:	
Client Acct. #:	

Report To (Original)	
Company:	
Address:	
City, State, ZIP:	
Contact:	
Phone:	
Fax:	
E-mail:	
☐Hard copy ☐E-mail Excel ☐E-mail PDF	
TAT: ☐Std. ☐RUSH Due Date:	

Report To (Copy)	
Company:	
Address:	
City, State, ZIP:	
Contact:	
Phone:	
Fax:	
E-mail:	
☐Hard copy ☐E-mail Excel ☐E-mail PDF	
TAT: ☐Std. ☐RUSH Due Date:	

Invoice Information	
Company:	
Address:	
City, State, ZIP:	
Contact:	
PO #:	
Other:	

	Analysis/Cmpd. List (e.g., BTEX)	Method (e.g., 8260)	# Solid	# Aqueous
QC Samples				
MS/MSD:				
Field/Equip. Blank:				
Trip Blank:				
DI Water:				

Soil Volatiles
☐Volatiles 5035 low-level Encore (3 per sample)
☐Volatiles 5035 high-level Encore (1 per sample)
☐Volatiles methanol vials

Data Deliverables
☐Full "CLP level" DP
☐Other:
☐Electronic data deliverables format:

3349.03

Appendix G
Health and Safety Plan

Risk Analysis (RA)

(Required for all RMT field projects.)

1. General Information

Business Unit: ☒ Environmental Consulting, Construction, or Remediation

☐ SmartBurn™

Client Name:	L.E. Carpenter & Company	Project #:	6527.26	Task #:
Project Name:	L.E. Carpenter Site Work	Project Manager:	Nicholas Clevett	
Street Address:	170 N. Main St.	City, State, ZIP	Wharton, NJ 07885	
Prepared By:	Jennifer Overvoorde	Date:	November 6, 2008	
Approved By:	(PM) Nicholas Clevett	Approved By:	(HSC) Jennifer Overvoode	
Date:	11/14/08	Date:	11/14/08	

Proposed Date(s) of Work: November 2008 to December 2009.

Proposed Scope of Work On Site:

The proposed scope of work includes the installation and surveying of soil borings, temporary groundwater monitoring points, building surveying, IDW management, and groundwater low-flow sampling. Specifics are as follows:

Soil Boring Installation:

1. Installation of soil borings. Screen soil cores with visual, PID, and Oil-N-Soil kits.
2. Containerize soil cuttings in fifty-five gallon drums.
3. Collect soils samples.

Temporary Monitoring Well Installation:

1. Installation of temporary groundwater monitoring points.
2. Containerize soil cuttings in fifty-five gallon drums. Decon and development water will be contained in the onsite tank.
3. Decontaminate all equipment using an industrial detergent (*e.g.*, alconox) and rinse between sample locations.
4. Horizontal and vertical survey inner casing, and adjacent ground of installed monitoring point.

Groundwater Sampling:

1. Collect water elevation measurements.
2. Collect groundwater sample(s) using low-flow sampling methods.

RMT Role(s) On Site:

☐ RMT Staff Will Not Be On Site (RA is for subcontractor information only)

☐ Resident Project Representative (*e.g.*, RPR, "Observe and Document")

☐ Construction Manager (*e.g.*, CM, Managing/General Contractor)

☒ Representative for Client (*e.g.*, "Agent for Owner")

☒ General On-site Consulting/Engineering Services

☒ Other

☒ Soil Sampling ☒ Solid Waste Sampling ☒ Liquid Waste Sampling

Risk Analysis (RA)

(Required for all RMT field projects.)

- ☒ Groundwater Sampling
- ☐ Surface Water Sampling
- ☐ Wastewater Sampling
- ☐ Sediment Sampling
- ☐ Surveying
- ☐ Specify

Risk Analysis (RA)

(Required for all RMT field projects.)

Major Project Tasks	RMT Task	Subcontractor Task	Minimum PPE Level Required see HSP for details (suggested levels for Subcontractor work)
1. Installation of groundwater monitoring points.	☒	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A
2. Containerize soil cuttings in fifty-five gallon drums. Decon, and development water will be contained in the onsite poly tank.	☒	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A
3. Collect soil samples.	☒	☐	☐ N/A ☒ D ☐ C ☐ B ☐ A
4. Decontaminate all equipment using an industrial detergent (e.g. alconox) and rinse between sample locations.	☒	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A
5. Horizontal and vertical survey inner casing, and adjacent ground of installed monitoring points.	☐	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A
6. Collect water elevation measurements.	☒	☐	☐ N/A ☒ D ☐ C ☐ B ☐ A
7. Collect groundwater samples using low-flow sampling methods	☒	☐	☐ N/A ☒ D ☐ C ☐ B ☐ A
8.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
9.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
10.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
11.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
12.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
13.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
14.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
15.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
16.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
17.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
18.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
19.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
20.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
21.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
22.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
23.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A
24.	☐	☐	☐ N/A ☐ D ☐ C ☐ B ☐ A

Risk Analysis (RA)

(Required for all RMT field projects.)

25.	☐	☐	☐ N/A	☐ D	☐ C	☐ B	☐ A
26.	☐	☐	☐ N/A	☐ D	☐ C	☐ B	☐ A
27.	☐	☐	☐ N/A	☐ D	☐ C	☐ B	☐ A
28.	☐	☐	☐ N/A	☐ D	☐ C	☐ B	☐ A
29.	☐	☐	☐ N/A	☐ D	☐ C	☐ B	☐ A
30.	☐	☐	☐ N/A	☐ D	☐ C	☐ B	☐ A

2. Contingency Planning

LOCAL EMERGENCY RESOURCES	
Ambulance: 911	Emergency Room: 911
Police: 911	Fire Department: 911
USEPA Contact: ☐ N/A ☐ Specify:	Poison Control Center: 1-800-222-1222 ☐ Specify:
Other (client services offered, etc.):	

SITE RESOURCES			
Drinking Water Supply	☒ RMT	☐ Subcontractor	☐ Client
Wash Water Supply	☒ RMT	☒ Subcontractor	☐ Client
Telephone – Land Line		☐ Subcontractor	☒ Client
Telephone - Cellular	☒ RMT	☒ Subcontractor	
First Aid Kit	☒ RMT	☒ Subcontractor	
Fire Extinguisher	☒ RMT	☒ Subcontractor	☒ Client
Emergency Shower	☐ RMT	☐ Subcontractor	☐ Client
Eye Wash	☐ RMT	☐ Subcontractor	☐ Client
Other:	☐ RMT	☐ Subcontractor	☐ Client

Risk Analysis (RA)

(Required for all RMT field projects.)

EMERGENCY CONTACTS	
RMT Technical Contact:	Jim Dexter, 616-975-5415 (office), 616-915-3658 (cell)
RMT Project Manager (PM):	Nicholas Clevett: 616-975-5415 (office), 616-780-2398 (cell)
RMT Corporate Health & Safety Manager (CHSM): - Confined Space Permits - Air Monitoring Plans - Scaffolding Permits - Demolition Plan Approval	Jason Chevallard 864/234-9369 (work) 864/525-8357 (cell)
Radiation Safety Officer (RSO):	John Hanson 608/662-5238 (work) 608/220-2502 (cell - emergency only) 608/222-4588 (home - emergency only)
RMT Health & Safety Coordinator (HSC): – Excavation Permits – Hot Work Permits – Lockout/Tagout Permits – Traffic Control Plan Approval – Lighting Plan Approval	Jennifer Overvoode 616/975-5415 (work) 616/915-3685 (home/cell)
RMT Field Contact:	Scot Middlebrook, 616-975-5415 (office), 616-915-3496 (cell)
Contractor Contact:	N/A
Client Contact:	N/A

Emergency Route (provide detailed directions and/or attach a map):

The emergency route should be driven at least once before fieldwork begins, to verify that the planned route is feasible. Hospitals or clinics identified for emergency medical care should also be contacted, to verify that emergency care is provided at that location. Verify the exact location of the medical facility during this call.

Hospital: DOVER GENERAL (St. Clare's) HOSPITAL

24 JARDINE ST, DOVER, NJ (see attached map)

Phone: (973) 989-3000

Other:

Risk Analysis (RA)

(Required for all RMT field projects.)

Emergency Procedures:

If an emergency develops at the site, the first responder should take the following course of action:

- Notify the proper emergency services for assistance.
- Notify other personnel at the site.
- As soon as possible, contact the RMT Incident Reporting Operator to inform them of the incident.
- Prepare a summary report of the incident for the client representative as required.

Emergency Equipment Required On Site:

☒ First Aid Kit

☒ Emergency Eye Wash

☐ Emergency Shower

☒ Fire Extinguisher

☐ Spill Control Media

☐ Other:

Investigation of Near Miss Incident and Initial Report of Incident/Exposure:

RMT employees are required to report any incident, near miss, or injury, as soon as possible, by contacting the following:

☒ RMT Incident Report Operator
866-902-4577

☒ Notify supervisor

☒ Notify project manager

☐ Notify client
(name):
(phone number)

☐ Complete client report:

The incident report submittal operator will obtain the necessary information from the employee and enter the information into the H&S incident database. All appropriate H&S, HR, and legal staff will be notified and will follow up as necessary.

Note: Pursuant to RMT's "Drug and Substance Abuse" policy (#45), RMT may require employees or subcontractors to be tested upon reasonable suspicion, following accidents or incidents during work activities, or during travel to or from a project site. Client policies may be more stringent in regard to procedures following an accident. Project managers must be aware of these and inform employees and subcontractors of any additional requirements.

Risk Analysis (RA)

(Required for all RMT field projects.)

3. Site Classification

	Identification of Potential Hazards	YES	NO	SITE TYPE[1]
1.	Is the work a Phase I ESA (i.e., supervised plant walk-through, etc.)	☐	☒	1
2.	Is the work being performed solely by a subcontractor (i.e., RMT not on site)	☐	☒	1
3.	Is the work just a supervised inspection for process evaluation, other inspections, meetings, records review, or a tour?	☐	☒	1
4.*	Is the work completely absent any chemical, physical, biological, or radiological hazards which would require a site specific health and safety plan?	☐	☒	1
5.	Does the work include any mandatory client H&S requirements?	☐	☒	1, 2, or 3
6.	Does the project include on-site work other than office type areas?	☒	☐	2 or 3
7.	Does the proposed work scope involve any of the following:			
	Known and controlled chemical or biological hazards	☒	☐	2
	Unprotected work at elevation (fall protection required)	☐	☒	2
	Invasive activities (*i.e.*, Phase II ESA, UST Removal, sampling, etc.)	☒	☐	2 or 3
	Exposure to ionizing radiation (i.e., using nuclear gauges, etc.)	☐	☒	2 or 3
	Open excavations/trenches (competent person may be required on site)	☐	☒	2 or 3
	Confined space entry (permit may be required)	☐	☒	2 or 3
	The use of scaffolding (qualified inspections are required)	☐	☒	2 or 3
	Heavy equipment	☒	☐	2 or 3
	Facility maintenance (O&M, piping, electrical, lockout/tagout, etc.)	☐	☒	2 or 3
	Underground utilities may be encountered	☒	☐	2 or 3
	Overhead utilities may be encountered	☒	☐	2 or 3
	Stack testing	☐	☒	2 or 3
	Geotechnical drilling	☒	☐	2 or 3
	Demolition Activities with known or suspected contamination	☐	☒	2 or 3
	Unknown or uncontrolled chemical or biological hazards	☒	☐	3
	Known and uncontrolled chemical or biological hazards	☒	☐	3
	Waste sampling	☒	☐	3
	Construction activities with known or suspected contamination	☐	☒	3
	Remedial activities (RCRA, CERCLA, EnviroBlend®, Oxigent, etc.)	☐	☒	3
8.	Is the work regulated by 29 CFR 1910.120 (OSHA) or 30 CFR (MSHA)?	☒	☐	3
9.	Is the work regulated by NPL, CERCLA, RCRA, TSD, or SARA?	☒	☐	3

(1) Denotes typical site level (based on activities).

Site Type Designation:

☐ **Type 1** Known and controlled hazards associated with consulting/engineering services

☐ **Type 2** Known and controlled hazards, but with invasive, hazardous activities and/or civil/mechanical construction related services, or sampling

☒ **Type 3** Unknown and/or uncontrolled hazards associated with corrective action clean-up, and/or remediation of hazardous substances

Risk Analysis (RA)

(Required for all RMT field projects.)

4. Site Characterization

Client Requirement(s)[1]:	☒ None	☐ Site Orientation	☐ H&S Orientation
	☐ Permits or Other Requirements (specify and attach, if available):		
Site Information:	☒ Map/Diagram (attach)	☐ Map/Diagram Unavailable	
	☒ Inactive Site	☐ Active Site (specify below)	
General Environmental Concerns:	☒ Contaminated Water	☐ Wastewater	☐ Dust
	☒ Contaminated Soil	☐ Solid Waste	☐ Noise
	☐ Contaminated Air	☐ Waterways	☐ Other:
Site Security/Access Control:	☐ None	☐ On Site	
	☒ Other (explain): Gated/Locked Fence		
Amenities Available for Work:	☐ None	☒ Waste Storage	☒ Restrooms
	☒ Tools/Equipment Storage	☒ Office/Trailer Space	☒ Supplies Storage
Utilities Available For Work:	☐ None	☒ As Listed: water supply, restrooms, electric supply	
Medical Services Available:	☒ None On Site	☐ As Listed:	
Facility Alarms/Signals:	☒ None	☐ As Listed:	
Traffic/Parking/Railway Issues:	☒ None	☐ As Listed (On-Site/Off-Site):	
☐ Permits Required (specify)[2]:	☐ RMT:	☐ Local:	☐ State:
	☐ Federal:	☐ Other:	☒ N/A
☒ Utility Locate Service(s):	☒ On Site	☐ Client	☐ Other:
	☐ Off Site	☐ Diggers Hotline	☐ One Call
		☐ Julie, Inc.	☐ N/A

[1] If relying on the client for any specific hazard identification and control, implemented control and effectiveness should be documented prior to beginning any work activities. This is recommended for all field projects.

[2] Permit examples: Utilities (electrical, water, gas, etc.); Excavations; Explosives; Cranes; Burning; Fuel storage; Traffic control; Hoists; Cutting; Welding; Demolition; Confined space; Restricted access areas; etc.

Detailed Physical Description of Site/Facility: ☒ Map/Diagram Attached

Site Activities/Current Operations: ☒ None ☒ As Specified: Past Operations include a manufacturing facility for vinyl wall covering (1943-1987). The site was operated as an iron mine from the mid-1700's through the late 1800's.

Other Concurrent Site Activities, Work, and/or Other Adjacent Hazards or Concerns:

☐ None As Specified:

☐ Schools	☐ Daycare	☐ Hospital	☐ Airport
☒ Residential	☐ Offices	☐ Shopping	☐ Other

Risk Analysis (RA)

(Required for all RMT field projects.)

"TYPE 1" Site Acknowledgment Statement (if applicable):

As an employee of RMT, Inc., I have reviewed the Risk Analysis (RA). I hereby acknowledge that I have received the RA, and that I agree that the work area is a "**Type 1**" site that does not require a detailed Health & Safety Plan (HSP). If during work activities there are additional hazards identified, I will communicate those to the Project Manager (PM) and the Health & Safety Coordinator (HSC), and an updated RA will be prepared.

Signatures of RMT Site Personnel:

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

4. Hazard Evaluation

Potential Chemical, Biological, or Radiological Hazards

Complete (1) Substance Name (be specific)	Specific Applicable OSHA Standard (if any)	Physical State (2) (S, L, G, Aq, Vap, F, P)	Max. (3) Conc. Level Per Physical State	Potential Routes of Exposure (4) (Inh, Ing, Abs, Con, Ext)	Warning Properties (G, P, N)	General (5) Control Measures (Eng., Admin., PPE)	IP (6) (eV)	VP (6) (mm HG)	LEL (6) (%)	UEL (6) (%)	IDLH (7)	ACGIH TLV (C, ST, TWA) (8) (R) or (T) (9)	OSHA PEL (C, ST, TWA) (8) (R) or (T) (9)
Toluene		Aq, L, Vap	123 ppm	Inh, Abs, Ing, Con	GGPPP	PPE	8.82	21	1.1	7.1	500 ppm	500 ppm TWA	200 ppm C 200 ppm 500 ppm (10-min. maximum peak)
Xylenes		Aq, L, Vap	11 ppm	Inh, Abs, Ing, Con		PPE	8.44-8.56	7-9	0.9-1.1	6.7-7.0	900 ppm	100 ppm TWA 150 ppm STEL	100 ppm (435 mg/m3)
Ethyl Benzene		Aq, L, Vap	1.88 ppm	Inh, Ing, Con		PPE	8.76	7	0.8	6.7	800 ppm (10%LEL)	100 ppm TWA 125 ppm STEL	100 ppm (435 mg/m3)
Bis-(2-ethylhexyl) phthalate (DEHP) a.k.a. Di-sec octyl phthalate		Aq, L, S	14 ppm (Aq), 14,000 ppm (S)	Inh, Ing, Con		PPE	n/a	<0.01	0.3 (474oF)	n/a	Ca [5000 mg/m³]	5 mg/m3 TWA	5 mg/m3

(1) Use OSHA regulated name, not elemental forms. If available, attach MSDS. Identify any sample preservative or O&M chemicals or subcontractor chemicals in this table also.
(2) S = Solids, L = Liquid, G = Gas, Aq = Aqueous, Vap = Vapor, F = Fume, P = Airborne Particulate
(3) If available, attach laboratory results or summary tables.
(4) Inh = Inhalation Hazard, Ing = Ingestion Hazard, Abs = Absorption Hazard, Con = Contact Hazard, Ext = External Exposure Hazard
(5) See the following sections for detailed control measures: personal protection equipment (PPE), Air Monitoring (Admin), or Site Control (Admin and Eng.).
(6) IP = Ionization Potential, VP = Vapor Pressure, LEL = Lower Explosive Limit, UEL = Upper Explosive Limit, N/A = Not Applicable, N.D. = Not Determined
(7) IDLH = Immediately Dangerous to Life and Health. NEVER enter IDLH conditions on site without proper respiratory protection.
(8) C = Ceiling Value, ST = Short-Term Exposure Limit, TWA = Time-Weighted Average, None Est. = None Established
(9) R = Respirable Limit, T = Total Limit
(10) Warning Properties: Good (G), Poor (P), None (N)

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

4. Hazard Evaluation (continued)

Site Specific Physical Hazards

HAZARD	SPECIFIC CONTROL MEASURE

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☐	Aboveground Storage Tanks (AST)	Be aware of any above ground storage tanks and the type of material being stored in them. Be aware of the potential of spills, fires, explosions, etc., while working near the tanks. Stay clear of tanks whenever possible, and be aware of any equipment operators near the tank(s).
☒	Animals (dogs, etc.)	Be aware of any animals on site or adjacent to the site. Appropriate care should be taken if any feral (wild) animals are encountered.
☐	Blasting/Explosives	RMT personnel shall not handle any explosive devices or materials. RMT personnel should understand the blasting procedures being used by the subcontractor, and all of the associated health & safety precautions. The subcontractor shall handle, store, and use the explosives in accordance with 29 CFR 1926.900, Subpart H and U.
☐	Boat or Barge	A boat or barge should be used that is adequately stable for the type of activity conducted. The boat or barge should have all of the appropriate and current licensing and registrations required by the applicable regulatory agencies. All applicable laws and regulations will be followed when launching the boat or barge, and when navigating to and from the work site. Personal floatation devices should always be worn while navigating the boat or barge. The boat must be equipped with the following approved United States Coast Guard (USCG) safety equipment: – A Type I, II, or III personal flotation device (PFD) for every person aboard (should be worn while navigating) The following equipment is recommended: – A Type IV throwable PFD – Audible distress signal device (air horn, whistle) – Fire extinguisher (if engine-propelled) – Auxiliary propulsion (spare paddles, trolling motor) – Bow and stern lines – Anchor and anchor line – First aid kit – Visual distress signal device(s) (flares, dyes) – Additional PFDs Be familiar with local weather and tidal characteristics. Do not conduct sampling from a boat/barge when threatening weather is imminent, or poor visibility exists. Sampling from a boat is prohibited in water containing substances likely to cause injury upon short-term or prolonged contact. Sampling from a boat is prohibited when the temperature of the water is high or low enough to cause injury upon short-term or prolonged exposure. Avoid sampling from a boat when unsafe water turbulence (waves) exists. Avoid standing in a boat. Always use the buddy system when sampling from a boat or barge; on person should be on shore with visual contact of the barge and should be able to summon emergency assistance if needed Be familiar with local weather and tidal characteristics. Work on a boat or barge will not be performed when threatening or severe weather is impending or present..
☒	Briars or Thistles	Be aware of any briars or thistles on site. Wear appropriate clothing and gloves. Avoid contact with briars or thistles whenever possible.

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Business Traffic	Be aware of traffic patterns associated with local businesses near the work site. Allow traffic to enter and exit the businesses in such a manner to avoid creating traffic hazards, back-ups, delays, or potential accident situations.
☐	Cement Dust	Stay clear of mixing operations and avoid contact with, or breathing of the dust.
☐	Chain Saws	Stay clear of any chain saw operations. Subcontractor is responsible for the safe use of chain saws on site.
☒	Cleaning Agents	Use caution of applying cleaning agent to equipment. Use gloves, safety glasses, splash shields, and protective clothing as needed.
☐	Client Activities	Be aware of client activities at or adjacent to the site. Work activities should be coordinated with other site activities to avoid conflicts.
☒	Cold Stress	Work schedules may be modified when temperatures are below 20° F as measured by the wind chill factor. Take frequent breaks to warm up. Drink plenty of fluids. Wear appropriate clothing, and monitor for cold stress symptoms (frostbite, hypothermia, etc.).
☒	Compressed Air or Gas Cylinders	Compressed air or gas cylinders should be clearly marked, and they should be stored, transported, and secured in an approved manner.
☐	Compressed Air/Gas or Pressurized Liquids Hoses, Lines & Fittings	Compressed air or gas, or pressurized liquid lines or hoses should be inspected at least daily, or in the event a leak develops, or if a line or hose is run over or crimped.
☒	Concrete/Masonry/ Foundations	No construction loads shall be placed on a concrete structure or portion of a concrete structure unless a person who is qualified in structural design has determined that the structure or portion of the structure is capable of supporting the loads. All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the hazard of impalement. No employee shall be permitted to work under concrete buckets while buckets are being elevated or lowered into position. To the extent practical, elevated concrete buckets shall be routed so that no employee, or the fewest number of employees, are exposed to the hazards associated with falling concrete buckets. A limited access zone shall be established whenever a masonry wall is being constructed. All masonry walls over eight feet in height shall be adequately braced to prevent overturning and to prevent collapse unless the wall is adequately supported so that it will not overturn or collapse. The bracing shall remain in place until permanent supporting elements of the structure are in place.
☐	Confined Spaces (tanks, vaults, vessels, trenches, manholes, some excavations, etc.)	The scope of this project does not entail entry into confined spaces. Confined spaces will not be entered unless a confined space entry permit has been completed, signed, and approved, and all participating personnel are trained in confined space entry procedures, including safety, and rescue procedures. Real and potential hazards of confined space are not addressed by this hazard assessment, and health and safety plan.
☒	Cutting Tools	Stay clear of contractors' cutting tools, especially saws and torches. Be aware that cutting operations could create other hazards, such as falling objects, or shifting materials, etc. Safety glasses should be worn while using cutting tools. Spark-proof tools should be used when working in areas of potential explosive or flammable conditions.
☐	Demolition Activities	Stay clear of walls, ceilings, roofs, etc., as they are being demolished.

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Demolition Debris	Demolition material should only be handled by appropriate equipment because of sharp points, edges, etc. Demolition material may also pose a trip hazard, fall, or puncture hazard, so avoid walking or climbing on debris piles, etc.
☒	Drums	If drums are used on-site, they should be clearly labeled with the name of the contents. Drums should only be handled with the appropriate equipment. Drums discovered during excavations, etc., shall not be opened or moved until appropriate identification can be performed. At a minimum, Level B protection is required for sampling any unlabeled drums discovered during remediation procedures.
☐	Dust/Particulates (PNOR)(Particulates Not Otherwise Regulated) (OSHA PEL = 15 mg./m³, total) (OSHA PEL = 5 mg./m³, respirable)	For general dust, work should be performed up-wind if possible. If conditions warrant it, monitoring should be done with a PM-10. Monitoring should occur at least 3 times per day, and every time re-entering the site. Readings should be taken downwind from the work area or inside the equipment as indicated by the conditions on site. If the OSHA PEL is exceeded, or is likely to be exceeded, engineering or administrative controls should be used, or a dust respirator must be worn. For hazardous dusts, a detailed air monitoring plan and a respiratory protection plan should be developed for the site activities.
☐	Elevated Work	For any construction work activities elevated 6 feet or more, or other non-construction activities elevated 4 feet or more, fall protection must be provided. Caution should be taken on catwalks and ladders because of potential slippery conditions, or the potential for footwear to catch on the surfaces.
☐	Energized Sources (electrical equipment or hookups, lines, etc.,) (Lockout/Tagout)	Contractors for all electrical activities, and any facility equipment with moving parts should follow proper lock-out/tag-out procedures, and only properly trained employees will perform the work. Employees will not perform any lock-out/tag-out activities unless personnel are properly trained in lockout/tagout procedures. Heed any caution signs or labels.
☒	Equipment Exhaust	Equipment exhaust should be ventilated away from the work area while drilling inside structures. Industrial fans can be used to move exhaust out of the area.
☐	Ergonomic Issues (job hazard analysis)	Ergonomic hazards will be addressed on a site-specific basis once mobilization to the field has occurred. Workstations will be evaluated on an individual basis.
☒	Evening Work	If work is performed during the evening hours, work shall be limited by the availability and the quality of artificial lighting. Care should also be taken to avoid slip, trip, and fall hazards that are not as easy to identify during low light conditions.
☐	Excavations	Stay clear of excavation walls. RMT personnel will not enter an excavation, in accordance with 1926 Sub Part P. Subcontractor must provide a competent person on site, if one is required by the planned activities. Side cuts should conform to 1926 Subpart P requirements, or shoring should be used. All open excavations should be secured using traffic cones, barrier tape, or barricade signs stating "Do Not Enter Excavations", especially if left open overnight.
☐	Explosives	Be aware of potential explosive materials and how to identify them. No smoking is allowed on-site or near where potential explosive materials may be present.
☐	Facility Conveyors (product or waste lines)	Stay clear of facility conveyors, product process lines, and waste disposal lines. Be aware of any client specific health and safety requirements to work in these areas.
☐	Facility Equipment/Machinery	Be aware of active and moving client equipment on site.

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Facility Piping - above ground	Stay clear of above ground pipes. Client is responsible to identify all applicable aboveground facility pipes prior to any work activities in the area. Pipes can be overhead hazards, or trip hazards. Pipes can be hazardous because of the material flowing through them, such as steam, natural gas, toxic chemicals, etc. Some pipes are also coated with hazardous material such as asbestos.
☒	Facility Piping - below ground	Client is responsible to identify all applicable underground facility pipe locations prior to any subsurface activities.
☐	Fall Hazard	Proper tie-off, harnesses, railings, etc. should be used when performing work on ladders, scaffolding, man-lifts, or on the roof of buildings, etc. Stay clear of the edges of pits, trenches, quarries, etc.
☒	Falling Objects	Be aware of any potential falling objects or materials on site. Stay clear of any areas identified as potential falling object areas.
☒	Fences	Be aware of fences in disrepair that may be trip hazards, or may have materials that could cause punctures or cuts. Use caution when crossing over or under fences.
☒	Field Equipment	If field equipment is heavy or awkward to carry, get assistance or use carts to help move around the site.
☒	Field Vehicle	RMT personnel shall follow all applicable state and federal traffic laws while traveling to and from the site, and while working on the site. In particular the following laws should be followed: speed limits, parking restrictions, use of wipers and lights during precipitation events, limiting cell phone use, etc. It is the responsibility of the driver to verify that all safety equipment on the vehicle is working properly before they drive the vehicle. In particular the following items should be checked: tire pressure, tire tread, windshield wipers, windshield washer, headlights, tail lights, brake lights, spare tire, fire extinguisher, first aid kit, etc.
☒	Fire Hazards	Eliminate sources of ignition in work areas that have ignitable materials. Provide an ABC fire extinguisher in close proximity to the support zone.
☐	Flooded Areas	Do not drive through flooded areas or standing water. Do not wade into moving water, or water deeper than 2 feet without adequate assistance.
☒	Flying Debris/ Eye Injuries	Be aware of any flying debris on site and wear protective eyewear when necessary.
☐	Fork Lifts	Be aware of forklift patterns, and stay clear of those routes.
☒	Hand Tools	Use only the appropriate tool for the task at hand. Use the tool(s) as designed, described, and intended by the manufacturer.
☒	Heat Stress	The work schedule may be modified if the ambient temperature is more than 80° F. Take breaks as necessary, and drink plenty of fluids. If necessary, wear sunscreen and sunglasses on bright days. Monitor site personnel for signs of heat stress symptoms (heat rash, heat cramps, heat exhaustion, or heat stroke).
☒	Heavy Equipment.	Contractor is responsible for safe operation of equipment. All mobile heavy equipment must have a functioning backup alarm, and operators must comply with equipment manufacturer's instructions. Maintain proper distance and remain in line of sight of operator and out of reach of equipment. Isolate equipment swings, if possible. Make eye contact with the equipment operator before approaching the equipment. Understand and review hand signals, and wear orange safety vest, if necessary.

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Heavy Lifting	Use proper lifting procedures and equipment when handling heavy objects such as drums, manhole covers, tank covers, etc.
☐	High Pressure Gas Lines, etc.	Be aware of high pressure gas lines, and follow approved safety precautions when working with or around the lines.
☐	Highway Traffic	Traffic control within the right-of-way will be in accordance with the WDOT "Work Zone Safety – Guidelines for Construction, Maintenance, and Utility Operations" procedures. Work may be restricted within specific lanes during peak traffic times. Verify peak traffic times, and review planned activities with the WDOT, so that appropriate lane closures can be coordinated.
☒	Housekeeping	All field vehicles, job trailers, and field offices will be properly cleaned and organized to prevent cluttered work and storage areas.
☐	Hunters/Firing Range, etc.	Be aware of surrounding activities that may involve hunting, firearms, etc. that may not be in your immediate area, but could be create an unsafe work environment.
☐	Ice (thin)	When project activities include either crossing ice or working directly on the ice, a detailed plan should be developed that will be used to continually evaluate the ice conditions, and to determine when work should be terminated due to unsafe conditions. All staff working on the ice will wear an appropriate and approved personal floatation device. Other emergency equipment such as ropes, a throwable floatation device, a means to warm a wet and cold worker, etc. must be available. A buddy system should also be used for this type of work, such that one person is always on shore or at least on previously determined safe ice.
☒	Insects (ticks, bees, spiders, etc.)	Site workers with known allergies to insect bites should carry their own medication. In case of emergencies, inform fellow workers of any severe allergies. Use insect repellant as necessary, and as specifically allowed on site. If possible, wear long-sleeved shirts and pants. If appropriate, check for ticks at the end of each day. Have other appropriate first aid supplies handy for bites.
☒	Irate Neighbors	Be aware of the potential for irate neighbors or outsiders that may interfere with work activities, or that may potentially damage equipment or on-site materials, etc.
☐	Ladders	Ladders should only be used if they are in good condition, conform to OSHA requirements, and if they will be used in an appropriate manner. Be especially cautious of slipping on ladders when the ladder or footwear is wet or dirty.
☐	Landfill Gas (Methane, CO2, Hydrogen Sulfide)	Avoid breathing gas, especially in low oxygen areas (simple asphyxiant). Potentially flammable and explosive, so keep ignition sources away from gas. Explosive conditions of LEL >5% in a work area should be ventilated as soon as possible, or the area should be evacuated.
☐	Leachate (Municipal Solid Waste - MSW)	MSW leachate may contain hazardous biological substances, so avoid physical contact with leachate and, if possible, stay up-wind. If contact is made with leachate, wash affected areas thoroughly with soap and water. If boots contact leachate they should be thoroughly washed with soap and water also.
☐	Lead	Wear gloves when in contact with lead contaminated soil, etc. Thoroughly wash hands and arms when daily work is completed.

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Long Hours/Fatigue	Long work hours can lead to fatigue, and fatigue can lead to the physical inability to perform the work in a safe manner, or travel to, or from, a work site in a safe manner. If long work hours are scheduled, or if the scheduled work takes longer than planned, field staff should determine if fatigue is, or will be, an issue. Field staff should evaluate whether they are able to complete the work in a safe manner, or whether they are able to travel in a safe manner. If fatigue is an issue, appropriate breaks should be planned or taken, including overnight stays when necessary.
☒	Material Handling	Move containers and heavy material only with the proper equipment, and secure them to prevent dropping, falling, or loss of control during transport. Stay clear of material handling operations, especially near slopes. Do not stand down the slope from equipment, supplies or materials being moved above on the slope, or being deployed onto the slope.
☒	Material Storage	Stored material may be a falling hazard, or a crush hazard. Do not stand adjacent to materials stacked up, such as pipes, geosynthetic rolls, etc., or in the area of deployment.
☐	Methane Gas (Landfill Gas)	Explosive conditions (5% LEL) will be ventilated, if encountered, prior to working in an area. Methane is a simple asphyxiant.
☐	Mine or Quarry	No work shall be performed within 15 feet (or other designated client setback, whichever is greatest) of the mine or quarry walls. Be aware of the potential for falling rocks or slope failures.
☐	Municipal Solid Waste (MSW)	MSW may contain hazardous biological substances, so avoid physical contact, and if possible stay up-wind. Wear appropriate PPE, such as gloves, safety shoes, and safety glasses. Wash hands, arms, and face after working near MSW. Reusable PPE and equipment should be thoroughly decontaminated after exposure to MSW. MSW may also contain sharp objects with the potential to puncture PPE.
☐	Natural Gas	Natural gas is flammable and explosive. Keep ignition sources away from gas sources. Use spark proof tools when working with gas lines, etc.
☒	Noise	Hearing protection must be worn when noise levels exceed 85 dBA in the work area. If you need to raise your voice to be heard at the work site, then hearing protection should be worn. Hearing protection will be worn near drill rigs.
☒	Overhead Hazards	Pay attention to overhead equipment, piping, and structures. A hard hat must be worn at all times when overhead hazards are present on site.
☒	Pedestrian Traffic (public, client, workers)	Be aware of pedestrian traffic patterns and, route traffic around the exclusion zone(s), as necessary, to avoid distractions and the potential for exposures or accidents. Use appropriate barricades and caution tape to mark work areas.
☒	Poisonous Plants	Be able to identify any local poisonous plants and avoid them if possible, or wear protective clothing as necessary. When removing potentially exposed clothing or PPE, the clothing or PPE should be carefully and thoroughly washed or decontaminated.
☐	Portable Heaters	Be aware of portable heater locations and stay a safe distance from them.
☒	Power Washing Equipment	Stay clear of the power washing nozzles and equipment.
☐	Propane Tanks	Be aware of propane tank locations, and any gas lines leading to or from the tanks.

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☐	Radiation (ionizing)	Exposure to ionizing radiation can be controlled by one of three methods. Time, distance, or shielding. Limit your time near the radioactive source. Keep your distance from the radioactive source. Shield yourself from the radioactive source with appropriate shielding material. If the radioactive source(s) are from RMT equipment, the RMT employee using the equipment needs required training to use the equipment, and must be monitored using a dosimeter badge.
☐	Rock Blasting	Contractor is responsible for following safe blasting protocol. Heed all contractor warnings at time of blasting and stay well clear until safe to return to area, as indicated by the contractor.
☒	Sample Preservative Chemicals:	Wear safety glasses and nitrile gloves when adding preservative chemicals to sample bottles or vials. Have clean wash water near by.
☐	Scaffolding	Stay clear of scaffolding. Be aware of the OSHA safety requirements for using constructing and scaffolding.
☒	Severe Weather	Work may be suspended if dangerous weather conditions (lightening, tornadoes, high winds, heavy rain, freezing rain, etc.) occur. Be aware of changing weather conditions, and be prepared to take shelter as necessary. Potential shelters should be identified prior to beginning work.
☒	Sharp Objects	Wear appropriate gloves when handling sharp objects, or use appropriate equipment to move objects.
☒	Slippery Ground/Surfaces	Exercise caution, especially on slopes, field trailer floors and stairs, after a precipitation event. Use slip resistant boots, or implement surface preparations to eliminate the slippery nature of the surface prior to accessing the area. Spill control measures and general housekeeping should be utilized to help prevent slipping on wet floors, wet pavement, and general work areas.
☒	Slips, Trips, and Falls:	Maintain clear walkways for work areas.
☒	Snakes	Be aware of the potential for snakes in the area and wear snake boots, snake chaps, gaiters, or leggings as needed.
☒	Steam Cleaning Equipment	Stay clear of the steam cleaning nozzles and equipment.
☐	Steel Erection	All materials, equipment, and tools, which are not in use while aloft, shall be secured against accidental displacement. The controlling contractor shall bar other construction processes below steel erection unless overhead protection for the employees below is provided. Employees engaged in steel erection activities on a walking/working surfaces with an unprotected side or edge more than 15 feet above a lower level shall be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.
☒	Steep Slopes or Banks	Pay attention to footing and walking. Stay a safe distance from unstable or extremely steep slopes. Wear appropriate footwear. Be aware of potential slope or bank failures. Heavy equipment should not be operated on or near unstable slopes or banks.
☒	Strong Nuisance Odors	Strong odors should be ventilated before entering a work area, or a respirator shall be worn as needed.
☒	Sunburn	For extended periods of time outdoors on sunny days, sunglasses, long-sleeved shirts and long pants should be worn to help prevent sunburn and eye problems. Wear sunscreen as appropriate for the project.

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Surface Water	Working next to or on, bodies of water shall be done using the buddy system. Staff shall wear USCG-approved personal floatation devices when on or adjacent to bodies of water.
☒	Terrain	Uneven or steep terrain can cause hazardous conditions for walking and transporting equipment around the site. Site personnel should use caution when working on uneven surfaces, and they should avoid working down-slope from heavy equipment, or materials being moved or stored.
☒	Traffic (client, contractors, public, semi-trucks, forklifts, etc.)	Obey all posted speed limits. Park in designated areas only. Be aware of traffic patterns on site, and during access to the site. Use orange traffic cones and barrier warning tape, as needed, or if within 25 feet of the right-of-way. RMT personnel must wear orange safety vests when working in or near traffic areas..
☐	Trains/Railroad Tracks	Be aware of any train activities on the site, entering or leaving the site, or immediately adjacent to the site. Do not walk between the rails or on the railroad ties. When driving, stop at all railroad crossings, even if they are unmarked, and look in both directions before proceeding across the tracks.
☐	Transporting Hazardous Materials	RMT personnel who transport hazardous materials shall have the required DOT training prior to transporting materials, and will comply with all applicable DOT regulations and requirements for labeling, packaging, etc.
☐	Tree Cutting	Stay clear of tree cutting activities.
☐	Trenching	RMT personnel will not enter trenches not in accordance with 1926 Sub Part P. Be aware that some trenching conditions may result in a confined space condition.
☒	Trip Hazards (wires, cords, hoses, debris, corn stubble, uneven surfaces, etc.)	Temporary wires, cords, hoses, etc., should be properly located, marked, and protected to help prevent tripping and disruption to work activities. Trip hazards are particularly a problem early in the morning, late in the day, or under other poor lighting conditions.
☐	Under Ground Storage Tanks (USTs) (Septic Tanks)	If any unknown UST's are encountered, drilling or excavations will be terminated in that location until a new scope of work, Risk Assessment and Health & Safety Plan can be developed.
☒	Uneven Surfaces	Be aware of uneven walking or driving surfaces and exercise caution when moving around the site.
☐	Utilities – Overhead (electrical, telephone, cable TV, etc.)	A subcontractor, the client, or RMT will locate and identify all overhead utilities. The owner or client will be responsible for identifying all applicable overhead utilities, product lines, pipes, and aboveground tanks. A minimum clearance of 20 feet must be maintained between equipment and overhead utility lines.
☒	Utilities – Underground (electric, gas, telephone, water, storm sewer, sanitary sewer, cable TV, etc.).	A subcontractor, the client, or RMT will call Digger's Hotline to locate all underground utilities. The owner or client will be responsible for marking all applicable on-site underground utilities, product lines, pipes, and tanks.
☒	Waterways	Exercise caution near, around, or in waterways. Harnesses should be worn when working in, or within 4 feet of, the waterway, especially when attempting to sample from shore or a boat or barge. All applicable laws and regulations will be followed when navigating a boat or barge to and from a work site.

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☐	Welding Tools	Stay clear of welding operations, and do not look directly at the welding process without appropriate eyewear and shield.
☐	Wisconsin Department of Transportation (WDOT) Work	Follow the appropriate WDOT guidelines regarding: – Work Zone Safety – Guidelines for Construction, Maintenance, and Utility Operations – Safety Directives Applicable to Subcontractor's Activities – Foot Protection – Eye Protection – Protective Headgear – Hard Hats – Confined Spaces – IHLR 32.61 – Safety Vest – Personal Safety Equipment Requirements on Railroad Property
☐	WDOT Traffic Control	**Traffic Control:** Traffic control within the right-of-way will be in accordance with the WDOT "Work Zone Safety – Guidelines for Construction, Maintenance, and Utility Operations" procedures. Work may be restricted within specific lanes during peak traffic times. Verify peak traffic times, and review planned activities with the WDOT, so that appropriate lane closures can be coordinated.

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

I. General Information

Client Name:	**L.E. Carpenter & Company**	**Project #:**	**6527.26**	**Task #:**
Project Name:	**L.E. Carpenter Site Work**	**Project Manager:**	**Nicholas Clevett**	
Prepared By:	**Jennifer Overvoorde**	**Date:**	**November 6, 2008**	
Approved By:	**Nicholas Clevett** (PM)	**Approved By:**	**Jennifer Overvoode** (HSC)	
Date:	11/14/08	**Date:**	11/14/08	

Proposed Date(s) of RMT Work: **November 2008 to December 2009.**

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

ON-SITE PROJECT TEAM MEMBER	ON-SITE PROJECT RESPONSIBILITIES
Scot Middlebrook	RMT Site Health and Safety Representative (Supervisor)
	Project Engineer
Jim Dexter	Project Hydrogeologist
Jennifer Overvoorde	Project Technical Coordinator
various RMT staff	Project Scientist
various RMT staff	Observation and Documentation
various RMT staff	Soil Sampling
various RMT staff	Groundwater Sampling
	Surveying

(1) Field projects will be audited for H&S compliance if they meet the requirements of the audit program.

Any required construction/demolition activities: ☒ No ☐ Yes If Yes, complete Section 2

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

2. Construction Tasks: [work tasks to be performed by RMT staff or RMT subcontractors]

Civil

- ☐ Sewer (utility)
- ☐ Water (utility)
- ☐ Electric (utility)
- ☐ Communications (utility)
- ☐ Siding
- ☐ Roofing
- ☐ Drywall
- ☐ Flooring
- ☐ Ceilings
- ☐ Casework
- ☐ Masonry
- ☐ Escalator
- ☐ Steel (erection)
- ☐ Pre-cast (erection)
- ☐ Concrete (erection)
- ☐ Re-bar
- ☐ Elevator
- ☐ Fireproofing
- ☐ Windows
- ☐ Landscaping
- ☐ Painting
- ☐ Insulation
- ☐ Doors
- ☐ Finish Concrete

Mechanical

- ☐ Insulation
- ☐ Millwright
- ☐ Fire Protection
- ☐ Boiler
- ☐ Industrial Ventilation
- ☐ Steel Fabrication/Erection

Other

- ☐ Electrical
- ☐ Demolition (attach a detailed "**Demolition Plan**")

- ☐ Others
- ☐ Others
- ☐ Others

Estimated Direct-Hire RMT Employees:

Home Office: ☒ Not Applicable ☐ Specify:

Craft Labor: ☒ Not Applicable ☐ Specify:

Craft Quantity

Craft Quantity

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

3. Applicable Safety Standards or Regulations:

☒ Federal OSHA ☒ State OSHA ☐ Owner/Client

Specific Standards:	29 CFR 1910 (OSHA)	29 CFR 1926 (Other Regulations)
☒ Medical Services and First Aid	1910.151	1926.50
☐ Hazard Communication (HAZCOM)	1910.1200	1926.59
☐ Lead Exposure	1910.1025	1926.62
☒ HAZWOPER	1910.120	1926.65
☒ Personal Protective Equipment (PPE)	1910.132-138	1926.95-107
☐ Respiratory Protection	1910.134	1926.103
☐ Ventilation	1910.94	1926.57
☐ Noise Exposure	1910.95	1926.52
☐ Illumination	N/A	1926.56
☐ Fire Protection	1910.157	1926.24 and 150-155
☐ Sanitation	1910.141	1926.51
☐ Materials Handling (rigging, etc.)	1910.176	1926.250-251
☐ Welding/Cutting	1910.251-255	1926.350-354
☐ Lockout/Tagout	1910.147	1926.417
☐ Electrical (flexible cords, etc.)	1910.305	1926.400-449
☐ Scaffolding	1910.28-29	1926.450-454
☐ Fall Protection (elevated work)	1910.23-29, 1910.66-68	1926.104-107; 500-503
☐ Ladders/Stairways	1910.25-27	1926.1050 and 1060
☐ Cranes, Derricks, Hoists, Elevators, etc.	1910.179-181	1926.550-555
☐ Aerial Lifts	1910.66-68	1926.556
☐ Earth Moving Equipment	N/A	1926.602
☐ Powered Industrial Trucks (forklifts)	1910.178	1926.602
☐ Excavations and Trenching	N/A	1926.650-652
☐ Concrete and Masonry	N/A	1926.700-706
☐ Steel Erection	N/A	1926.750-761
☐ Demolition	N/A	1926.850-860
☐ Asbestos	1910.1001	1926.1101
☐ Confined Space Entry	1910.146	1926.21
☐ Commercial Diving	1910.401-441	1926.1071-1092

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

☐ Compressed Gases	1910.101-105	N/A
☐ Ionizing Radiation	1910.1096	1926.53
☐ Benzene	1910.1028	1926.1128
☐ Cadmium	1910.1027	1926.1127
☐ Tools - Hand and Power	N/A	1926.300-307
☐ Blasting and Using Explosives	N/A	1926.900-914

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

4. Training Required

(* required for all "Type 3" sites; but minimum recommended)

Check "A" if training required for everyone, and check "T" if training required for specific task.

A	T	SUBJECT	REFERENCE	
			29 CFR 1910	29 CFR 1926 or Other
☒	☐	HAZWOPER 40 hour*	1910.120	1926.65
☐	☒	3-Day HAZWOPER Supervised On-Site*	1910.120	1926.65
☒	☐	8-Hour HAZWOPER Refresher*	1910.120	1926.65
☐	☐	8-Hour Supervisor HAZWOPER*	1910.120	1926.65
☐	☒	First Aid, CPR*	1910.151	1926.23,.50
☐	☒	Respiratory Protection	1910.134	1926.103
☐	☐	Confined Space ☐ Permit attached	1910.146	1926.21
☐	☐	Mine Safety (MSHA)	N/A	30 CFR 48.8
☐	☐	Lockout/Tagout ☐ Permit attached	1910.147	1926.417
☐	☐	Bloodborne Pathogens	1910.1030	N/A
☐	☐	Noise Exposure	1910.95	1926.52
☐	☐	Competent Person	N/A	1926.32,.450,.650
☐	☐	Construction Health and Safety OSHA 10-Hour	N/A	1926.21
☐	☐	Demolition	N/A	1926.850
☐	☐	Excavations ☐ Permit attached	N/A	1926.650-652
☐	☐	Electrical Work	1910.332	1926.400-.449
☐	☐	Ladders/Stairways	N/A	1926.1050-1060
☐	☐	Scaffolding	1910.28	1926.450-454
☐	☐	Fall Protection	1910.23-29; 1910.66-68	1926.104,.501
☐	☐	Commercial Diving	1910.410	1926.1071-1092
☐	☐	Hot Work ☐ Permit attached	1910.251-255	1926.350
☐	☐	Lead Awareness	1910.1025	1926.62
☐	☐	Asbestos Awareness	1910.1001	1926.1101
☐	☐	Cadmium	1910.1027	1926.1127
☐	☐	Benzene	1910.1028	1926.1128
☐	☐	Ionizing Radiation	1910.1096	1926.53; 10 CFR 19.12
☐	☐	Troxler or NITON Gauge User	1910.1096	10 CFR 19.12
☐	☐	Radiation Safety Program	1910.1096	10 CFR 20.1101
☐	☐	Hazard Communication (HAZCOM)	1910.1200	1926.59
☐	☐	DOT Hazardous Materials Shipping	1910.1201	49 CFR 172.704

Client-specific training: ☒ Not Applicable ☐ Specify

Site-specific orientation: ☒ Not Applicable ☐ Specify

Competent person: ☒ Not Applicable ☐ Specify

Direct-hire employee training/certification: ☒ Not Applicable ☐ Specify

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

5. Medical Surveillance

Surveillance Required: * required for all "Type 3" sites; baseline is minimum recommended
** Specify frequency below

	29 CFR 1910	29 CFR 1926 or Other
☒ HAZWOPER Physical - Baseline*	1910.120	1926.65
☐ HAZWOPER Physical – Annual	1910.120	1926.65
☒ HAZWOPER Physical - Biennial*	1910.120	1926.65
☒ OSHA Respiratory Protection Questionnaire	1910.134	1926.103
☒ Respiratory Certification Exam	1910.134	1926.103
☐ Arsenic (urine) **	1910.1018	N/A
☐ Asbestos **	1910.1001	1926.1101
☐ Cadmium (blood) **	1910.1027	1926.1127
☐ Lead/ZPP (blood) **	1910.1025	1926.62
☐ Mercury (blood) **	N/A	N/A
☐ PCB **	N/A	N/A
☐ Vinyl Chloride **	1910.1017	1926.117
☐ Hepatitis B Vaccine (series) **	1910.1030	N/A
☐ Tetanus/Diphtheria	N/A	Stay Current
☐ Stress Test	N/A	Only as requested
☐ Visual Acuity Test	N/A	Only as requested
☐ Hearing Test (Audiometry)	N/A	Only as requested
☐ Pulmonary Function	N/A	Only as requested

Client-specific drug testing[1]: ☒ Not Applicable ☐ Specify

Client-specific medical monitoring[1]: ☒ Not Applicable ☐ Specify

Site-specific medical monitoring: ☒ Not Applicable ☐ Specify

**Frequency of medical monitoring: ☒ Not Applicable ☐ Specify

[1] Client required drug testing or medical monitoring should be coordinated through the CHSM.

Note: RMT has a "Drug and Substance Abuse" policy (#45). RMT may require employees or subcontractors to be tested upon reasonable suspicion, following accidents or incidents during work activities, or during travel to or from a project site. Client policies may be more strict in regard to procedures following an accident. Project managers must be aware of these and inform employees and subcontractors of any additional requirements.

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

6. Personal Protective Equipment (PPE)

Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work tasks:

Specific RMT Job Task or Function	Minimum Level of Protection			
RMT Site Visitors—Must be escorted	☒ D			
Decontaminate all equipment using an industrial detergent (e.g. alconox) and rinse between sample locations.	☒ D	☐ C	☐ B	☐ A
Level D: Safety glasses (ANSI); Safety shoes (ANSI); Nitrile gloves				
Collect water elevation measurements.	☒ D	☐ C	☐ B	☐ A
Level D: Safety glasses (ANSI); Safety shoes (ANSI); Nitrile gloves				
Collect groundwater samples using low-flow sampling methods	☒ D	☐ C	☐ B	☐ A
Level D: Safety glasses (ANSI); Safety shoes (ANSI); Nitrile gloves				
Observe and document monitoring well(s) and observation point(s) installation, log soil boring.	☒ D	☐ C	☐ B	☐ A
Level D: Safety glasses (ANSI); Safety shoes (ANSI); Nitrile gloves				
Collect soil sample(s)	☒ D	☐ C	☐ B	☐ A
Level D: Safety glasses (ANSI); Safety shoes (ANSI); Nitrile gloves				
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

Specific RMT Job Task or Function	Minimum Level of Protection			
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A
	☐ D	☐ C	☐ B	☐ A

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

Criteria for changing protection levels are as follows:

EVACUATION[2] or PROTECTION LEVEL CHANGE[3] CRITERIA	APPROVALS REQUIRED[1]		
	HSR	HSC	CHSM
Site Evacuation Plan: ☒ Not Applicable ☐ Specify or Attach Plan:			
Change to Level D when: ☐ Not Applicable ☐ Specify	☒		
Change to Level C when: ☐ Not Applicable ☐ Specify	☒	☒	☒
Change to Level B when: ☐ Not Applicable ☐ Specify	☒	☒	☒
Change to Level A when: ☐ Not Applicable ☐ Specify	☒	☒	☒

(1) HSR: Health & Safety Supervisor On Site
HSC: Health & Safety Coordinator
CHSM: Corporate Health & Safety Manager

(2) General Recommendations: Evacuate the area when LEL readings are >10% LEL in the atmosphere, or when PID readings are greater than the PEL in the breathing zone.

(3) General Recommendation: To Level C when PID readings are greater than the PEL in the breathing zone. To Level B or A only after detailed evaluation and planning.

Note: Changes to the level of protection shall be made only after the required approvals are obtained. All changes shall be recorded in the field log and reported to the Project Manager as soon as possible. RMT's H&S goal is to avoid using respiratory protection unless it is absolutely necessary or required. Administrative controls or engineering controls should always be considered as a means to reduce potential exposures, before PPE is required or considered.

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

7. Air Monitoring[1]

The following monitoring instruments shall be used on site to measure airborne contaminant concentrations in Either the breathing zone, or as part of the overall site **Air Monitoring Plan** (attach detailed plan):

MONITORING EQUIPMENT	LOCATION OF MONITORING	FREQUENCY OF MONITORING	ACTION LEVELS
☐ Combustible Gas Indicator	☐ N/A ☐ Monitoring Plan Attached ☐ Confined Space ☐ Specify	☐ Continuously when potential combustible gases or lack of oxygen are suspected. ☐ Specify	5-10% LEL: continue with caution > 10 % LEL: evacuate the area ☐ Specify
☐ O2 Monitor ☐ CO Monitor ☐ H_2S Monitor	☐ N/A ☐ Confined Space ☐ Specify	☐ Continuously when excess oxygen (>22.5%) or lack of oxygen (<19.5%) are suspected. ☐ Specify	< 19.5% Oxygen: evacuate the area; supplied air may be needed > 22.5% Oxygen: evacuate the area; potential fire hazard ☐ Specify
☐ Colorimetric Tubes Type: Type: Type:	☐ N/A ☐ Specify ☐ Sample Container ☐ Confined Space ☐ Specify	☐ Periodically during sampling for analytical purposes only ☐ Whenever noticeable odor is present ☐ Specify	☐ Specify
☒ PID Lamp Needed: ☐ 9.8 eV ☒ 10.6 eV ☐ 11.7 eV Calibration Gas: Isobutylene Correction Factor:	☐ N/A ☐ Sample Container ☐ Confined Space ☒ near breathing zone during sampling.	☒ Periodically during sampling for analytical purposes only ☐ Specify ☐ Specify ☐ Specify	☐ Specify
☐ FID	☐ N/A ☐ Specify	☐ Specify	☐ Specify
☐ Mini-RAM	☐ N/A ☐ Specify	☐ Specify	☐ Specify
☐ Other:	☐ Specify	☐ Specify	☐ Specify
☐ Laboratory Supported ☐ Personal ☐ Area ☐ Perimeter	☐ N/A ☐ Specify	☐ Specify	☐ Specify

[1] Whenever air monitoring is required to be performed, a detailed **Air-Monitoring Plan** should be developed and attached to the HSP. The plan should include **Monitoring Locations, Frequency of Readings**, and any **Action Levels** being used to control the work site.

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

8. Site Controls and Work Zones (describe in detail)

Facility Alarms or Signals: ☒ Not Applicable ☐ Specify

Work Permits Required: ☒ Not Applicable ☐ Specify

Work Traffic Issues: ☒ Not Applicable ☐ Specify

Parking Issues: ☒ Not Applicable ☐ Specify

Railway Traffic Issues: ☒ Not Applicable ☐ Specify

Support Zone(s):

☒ RMT field vehicle ☐ Job Trailer On Site ☐ Other:

Contamination Reduction Zone(s):

☒ Field vehicle ☐ Facility restroom/utility room ☐ Other:

Exclusion Zone(s):

☒ Area immediately surrounding work area ☐ Other:

Site Entry Procedures:

☒ **Notify Site H&S Representative.**

☒ **Read H&S Plan and sign Acknowledgment Statement**

☐ Check in with the facility contact person ☐ Specify

☐ Check in with facility security guard. ☐ Specify

☒ **Wear proper personal protective equipment.**

☐ Attend facility orientation ☐ Specify

☒ **Conduct daily safety meeting (document).**

☐ Other: ☐ Specify

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

Decontamination Procedures:

Personnel:

Work is to be performed in Level D or Modified Level D, and minimal contamination is expected, follow standard decontamination procedures, and good personal hygiene. Disposable PPE should be removed, contained, and disposed in an appropriate manner. Prior arrangements should be made if disposal is planned for at the project site. Site workers should plan and stage for wash water and soap at the site, prior to beginning the work. Site workers should wash hands and any exposed skin extremely well with soap and water, prior to leaving the contamination reduction zone, eating, drinking, driving, or leaving the site. Any soiled or contaminated clothing should be removed and handled appropriately, by either washing as soon as possible, or if necessary, disposing. Soiled or contaminated clothing should be carefully bagged prior to disposal or washing, to reduce potential exposure.

Equipment:

Site workers should plan and stage for the appropriate decontamination method at the site, prior to beginning the work. Any contaminated single-use disposable equipment or PPE should be appropriately containerized and disposed as soon as possible in an appropriate manner. Prior arrangements should be made if disposal is planned for at the project site. Contaminated equipment or PPE that will be re-used should be handled and cleaned while wearing the appropriate PPE. Equipment is decontaminated using Alconox soap and de-ionized water.

Disposal of Investigation-derived Material:

☐ Leave on site for disposal.

☒ Other: RMT arranges to have IDW properly disposed of by a qualified subcontractor.

Work Limitations (time of day, buddy system, etc.):

☐ Buddy system required for some tasks Specify

☒ Work will be performed during daylight hours only

☐ Work will be performed using artificial light.

Describe or attach a lighting plan:

☒ No eating, drinking, or smoking in contamination reduction zone(s) or exclusion zone(s)

☒ When temperatures are either above 80°F or below 20°F, work schedules may be modified

☐ Other site-specific limitations:

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

Radiation Safety:

- ☒ Radiation information is not applicable to this project.
- ☐ Notify RSO.
- ☐ Wear dosimeter badge when handling gauge.
- ☐ Post applicable radiation signs and documents.
- ☐ Post emergency numbers.
- ☐ Provide at least two lock systems for overnight storage.
- ☐ Maintain storage at least 15 feet from full-time workstations.
- ☐ Block, brace, and securely lock the gauge during "all" transportation.
- ☐ Limit "public" exposure to gauge while in use.
- ☐ Provide sketch of gauge storage to RSO.

Acknowledgment Statement:

As an employee of RMT, Inc., I have reviewed the Hazard Assessment (HA)/Health & Safety Plan (HSP). I hereby acknowledge that I have received the **required level of training and medical surveillance**, that I am knowledgeable about the contents of this site-specific RA/HSP, and that I will use personal protective equipment (PPE) and follow procedures specified in the HSP.

Signatures of RMT Site Personnel:

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

Health and Safety Field Audit Documentation:

If this project has been selected as a field audit candidate, the auditor will review a copy of this RA/HSP and make comments, edits, additions, or deletions on the copy. The audit copy of this document will then be forwarded to the office HSC for review. After review, the HSC will then forward the copy to the Project Manager for review and filing.

_____ (auditor) Date: _____

RMT PROJECT/FIELD SAFETY AUDIT FORM

Project Name: _____ Office Location: _____

Project Number: _____ Date of Audit: _____

	General	Yes	No	N/A	Corrective Action Notes
1	For RMT projects with temporary offices, are OSHA and job-site warning posters posted and are job-site injury records kept?				
2	Are all RMT personnel current on training requirements (i.e., 40-Hour HAZWOPER, 8-Hour Refresher)?				
3	Is training documentation for RMT employees available on site?				
4	Are appropriate RMT personnel current with medical surveillance protocol?				
5	Is at least one RMT employee on site currently trained in CPR and First Aid?				
6	Is there a stocked first aid kit located near/in job trailers?				
7	Are all containers labeled to clearly identify their contents?				
8	Are hot work zones established for hazardous waste operation and enforced?				
9	Are compressed gas cylinders being used on site properly secured?				
10	Are daily, pre-work safety meetings being held?				
	RMT Subcontractors				
11	Were subcontractors qualified for the project by using RMT's subcontractor H&S Qualification form?				
12	Are subcontractors using appropriate personal protective equipment to protect their employees?				
13	Have all non-RMT employees on site been informed as to possible hazards?				
14	Does the subcontractor have a stocked first aid kit in their job trailer?				
	RMT H&S Plan				
15	Has the H&S plan been reviewed and signed by all on-site RMT personnel?				
16	Are H&S procedures listed in the RMT H&S plan being followed by RMT personnel?				
17	Does the RMT H&S plan address all apparent hazards at this site?				
18	Is the RMT H&S plan specific to the Project operations/RMT project responsibilities?				
19	Is appropriate PPE identified on the RMT H&S plan?				
20	Is the PPE being utilized by RMT personnel as directed in the H&S plan?				
21	Are medical facilities identified on the RMT H&S plan?				

Check Yes, No or N/A for each item

For all non-compliant responses, enter description and corrective action(s) on notes page

RMT PROJECT/FIELD SAFETY AUDIT FORM

Project Name: _____ Office Location: _____

Project Number: _____ Date of Audit: _____

	Hazard Communication	Yes	No	N/A	Corrective Action Notes
22	Are MSDSs for RMT-supplied materials available?				
23	Are MSDS for subcontractor-supplied materials available?				
24	Have employees received hazard communication training?				
25	Are hazardous substances clearly marked?				
26	Is there an Emergency Response Plan in place in case of unintentional release (i.e., spill kit)?				
	Fire Protection/Prevention				
27	Is fire-fighting equipment available and in proper working condition?				
28	Have RMT personnel been trained in use of fire-fighting equipment?				
29	Are "no smoking" signs posted in appropriate locations?				
	Electrical/Power Tools				
30	Are electrical dangers posted?				
31	Are ground fault circuit interrupters used?				
32	Are terminal/discount/breaker dead front boxes equipped with covers?				
33	Have known underground/overhead utilities been identified and clearly marked?				
34	Are power tools properly grounded or double insulated?				
35	Are mechanical ties and guards in use with power tools?				
36	Is there an appropriate Lockout/Tagout (LOTO) procedure in place?				
	Ladders				
37	Are ladders inspected and properly maintained (e.g., not painted)?				
38	Are ladders properly secured to prevent slipping, sliding, or falling?				
39	Do side rails extend 36 inches above the top of the landing?				
40	Are stepladders fully open when in use?				
41	Are metal ladders being used around electrical equipment?				

Check Yes, No or N/A for each item

For all non-compliant responses, enter description and corrective action(s) on notes page

RMT PROJECT/FIELD SAFETY AUDIT FORM

Project Name: _____ Office Location: _____

Project Number: _____ Date of Audit: _____

	Scaffolding	Yes	No	N/A	Corrective Action Notes
42	Have employees received training in proper scaffold use?				
43	Is there a competent person on site?				
44	Are all connections secure and scaffold equipment in good working order?				
45	Is scaffold tied into structure when it exceeds 4 times the base width of the scaffold?				
46	Are working areas free of debris, snow, grease, ice?				
47	Are workers protected from falling objects?				
48	Is the scaffold plumb and square with cross-bracing?				
49	Are guard rails, intermediate rails, toe-boards, and end rails in place for scaffolds over 10 ft.?				
	Manholes and Permit-Required Confined Space Entry				
50	Has access and egress been provided?				
51	Has an entry permit been obtained?				
52	Have hazards been properly identified?				
53	Is air monitoring equipment on site, appropriate, calibrated, and in use?				
54	Are areas being ventilated before entry and during occupation?				
55	Have entrant, attendant, and rescue personnel been identified?				
56	Is proper rescue equipment on site? Inspected?				
57	Is appropriate lighting provided?				
	Motorized Vehicles				
58	Have operators received training?				
59	Are brakes, lights, horn, seat belts, backup lights or warning signals intact and functioning?				
60	Are personnel carried in a safe manner?				
61	Are fire extinguishers carried, if appropriate?				

Check Yes, No or N/A for each item

For all non-compliant responses, enter description and corrective action(s) on notes page

RMT PROJECT/FIELD SAFETY AUDIT FORM

Project Name: _____ Office Location: _____

Project Number: _____ Date of Audit: _____

	Excavations	Yes	No	N/A	Corrective Action Notes
62	Are excavations inspected daily?				
63	Is there any excavation entry by RMT staff?				
64	Is the competent person overseeing the trenching excavation work on site?				
65	Is shoring, sloping or benching appropriate?				
66	Is access and egress provided for employees working in excavations of 4 feet or greater in depth?				
67	Are materials stored within 2 feet of the excavation?				
68	Is the excavation barricaded?				
69	Have soils been classified (if sloping and benching is used as the protective system for employees)?				
	Water Safety				
70	Are watercraft inspected before use for leaks, damage, etc.?				
71	Is necessary emergency gear (life jackets or rings, fire extinguishers, flares, etc.) available?				
72	Are employees trained on proper safety protocols involving wading and walking in water?				
73	Are employees using the "buddy system" when taking samples in water?				
	Other Items				
74					
75					
76					
77					
78					
80					

HSC Signature: _____ **Date:** _____ **PM Signature:** _____ **Date:** _____

Check Yes, No or N/A for each item

For all non-compliant responses, enter description and corrective action(s) on notes page

RMT PROJECT/FIELD SAFETY AUDIT FORM

Notes Page

ITEM #	COMMENTS AND CORRECTIVE ACTIONS	DEADLINE FOR CORRECTION(S)	DATE COMPLETE	INITIALS

HSC Signature: _____ **Date:** _____

PM Signature: _____ **Date:** _____

Daily Safety Meeting Sign-in

Daily Hazard Review Topic:

Animals (dogs, etc.)

Briars or Thistles

Business Traffic

Cleaning Agents

Cold Stress

Compressed Air or Gas Cylinders

Cutting Tools

Drums

Equipment Exhaust

Evening Work

Fences

Field Equipment

Field Vehicle

Fire Hazards

Flooded Areas

Flying Debris/ Eye Injuries

Hand Tools

Heat Stress

Heavy Equipment

Heavy Lifting

Housekeeping

Insects (ticks, bees, spiders, etc.)

Long Hours/Fatigue

Material Handling

Material Storage

Noise

Pedestrian Traffic (public, client, workers)

Poisonous Plants

Power Washing Equipment

Sample Preservative Chemicals

Severe Weather

Daily Safety Meeting Sign-in

Sharp Objects

Slippery Ground/Surfaces

Slips, Trips, and Falls:

Snakes

Steam Cleaning Equipment

Steep Slopes or Banks

Strong Nuisance Odors

Sunburn

Surface Water

Terrain

Traffic (client, contractors, public, semi-trucks, forklifts, etc.)

Trip Hazards (wires, cords, hoses, debris, corn stubble, uneven surfaces, etc.)

Uneven Surfaces

Utilities – Underground (electric, gas, telephone, water, storm sewer, sanitary sewer, cable TV, etc.).

Waterways

Daily Safety Meeting Sign-in

Acknowledgment Statement:

As an affected employee of RMT, Inc., I hereby acknowledge that I have reviewed the contents of this site-specific HSP and the **daily safety meeting topic**, and that I will use the applicable personal protective equipment (PPE) and follow the procedures specified in the HSP.

Signatures of all onsite RMT Personnel, including Direct-Hires (Required):

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

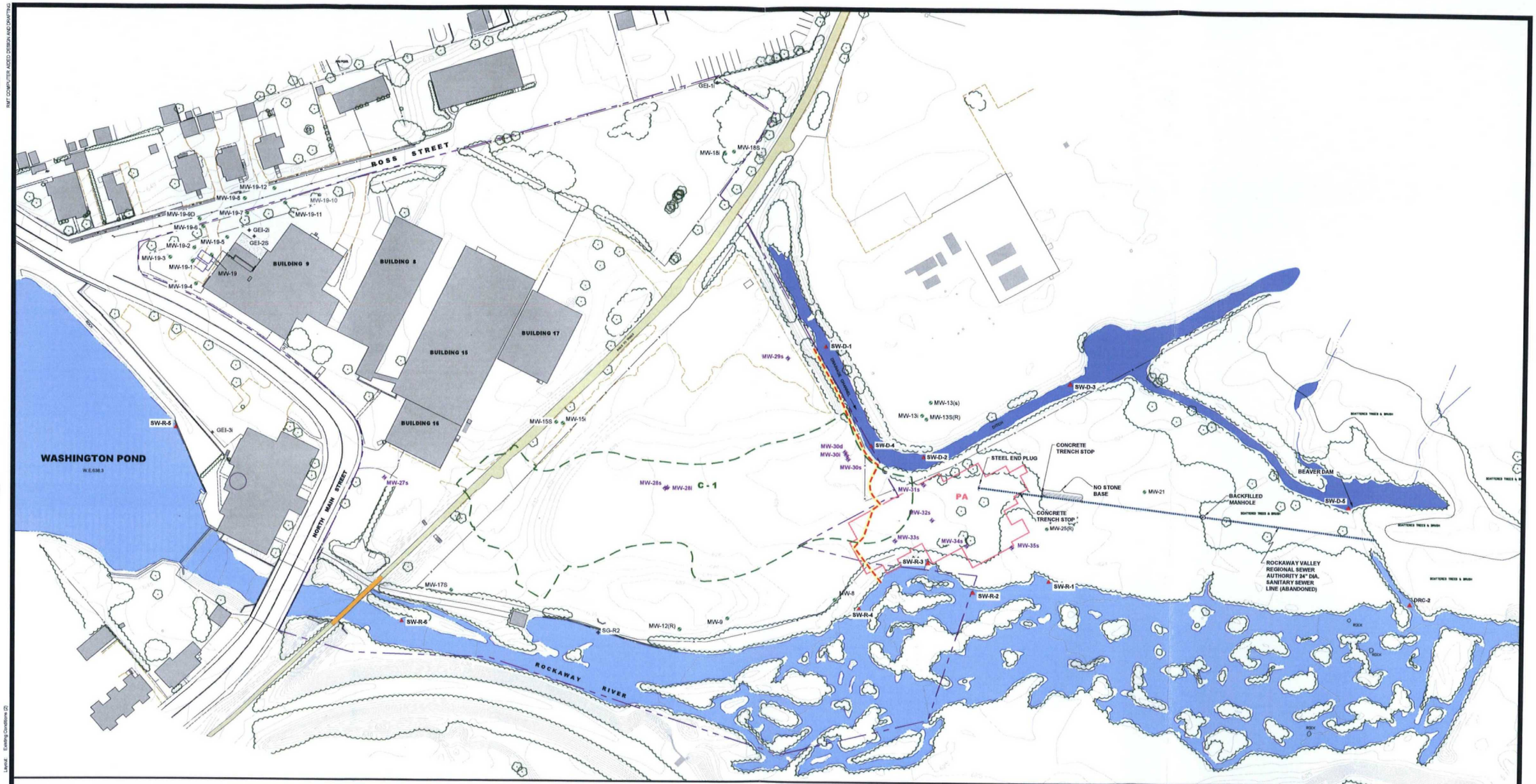
_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____



LEGEND

- APPROXIMATE PROPERTY LINE
- FENCE LINE
- TREES
- MW-25(R) — GROUNDWATER ELEVATION MONITORING WELL LOCATION AND NUMBER (s = shallow, i = intermediate, d = deep)
- MW-29s — PRMP MONITORING WELL LOCATION AND NUMBER (s = shallow, i = intermediate, d = deep)
- SG-R1 — RIVER POINT SURFACE WATER ELEVATION
- SG-D1 — DRAINAGE CHANNEL POINT SURFACE WATER ELEVATION
- GEI-2i — PIEZOMETER LOCATION
- SW-R-1 — SURFACE WATER SAMPLING LOCATION (D = DITCH; R = RIVER)
- 630 — POST-REMEDIATION GROUND SURFACE ELEVATIONS CONTOUR INTERVAL = 1 ft.
- PA — AREA WHERE PCB IMPACTED SOILS WERE EXCAVATED
- C-1 — OUTLINE OF 2005 SOURCE REDUCTION AREA AND SUBSURFACE SLURRY MONOLITH
- WESTERN BOUNDARY OF REGULATED WETLAND
- ABANDONED ROCKAWAY REGIONAL SEWER LINE

NOTES

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC SURVEY PROVIDED BYJAMES M.STEWART, INC. LAND SURVEYORS, DRAWING NO 2793-03.DWG, DATED 02-14-02 AS REVISED 04-10-07 (DRAWING NO. 314907REV.DWG).
2. FORMER BUILDING OPERATIONS
   - BUILDING 9: RAW MATERIAL, DRUM STORAGE, AND PRINTING
   - BUILDING 8: LAMINATION
   - BUILDING 15 and 17: INSPECTION, STORAGE, AND DISTRIBUTION
   - BUILDING 16: OFFICES
3. AS DESCRIBED IN THE November 2005 RAR (SEE FIGURE 9 IN THAT REPORT), THE SLURRY MONOLITH AT AND PARALLEL TO THE DRAINAGE CHANNEL DITCH ENDS APPROXIMATELY 10 FEET WEST OF THE ACTUAL WATERS EDGE.

N

0 60' 120' 180' 240'
SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

L.E. CARPENTER
WHARTON, NEW JERSEY

EXISTING CONDITIONS

DRAWN BY: SL, KW	DRAWING SCALE:	PROJECT NO.	J:\06527\28
CHECKED BY: JD,JO	SHOWN	FILE NO.	6527.28.12.dwg
APPROVED BY: JD	DATE PRINTED:	**FIGURE 2**	
DATE: September 2008			

RMT

3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022

RMT COMPUTER AIDED DESIGN AND DRAFTING
Layout: Existing Conditions (2)
Drawing Name: J:\06527\28\6527.28.12.dwg
Operator Name: SAM LUCADO
Drawing Plot Scale: 1:40
Dwg Size: 0.82 Mb
Plot Date: April 2008
Plot Time: 4:30 PM

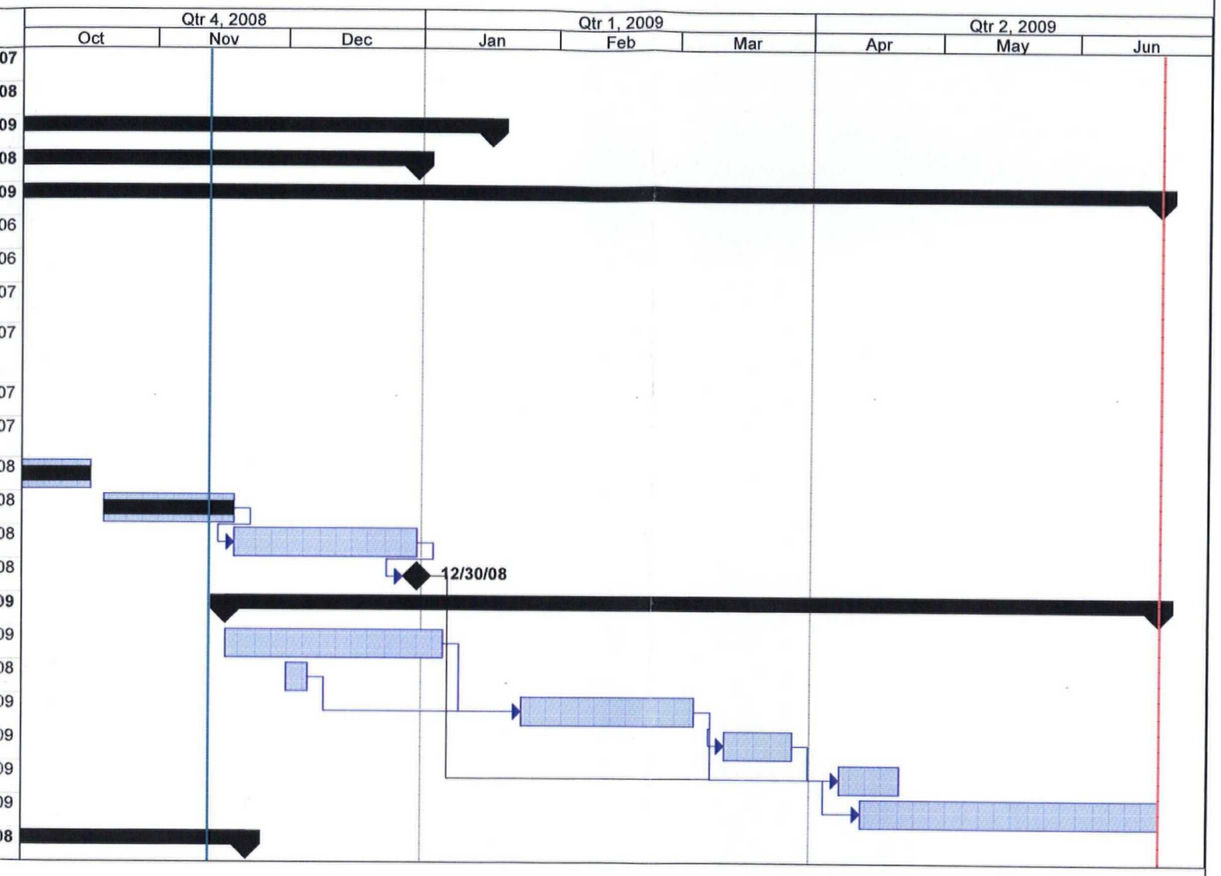
Appendix H
Project Schedule

MW19HS1 RIW

L. E. Carpenter & Company ~ Wharton NJ
Master Project Schedule

USEPA ID No. NJD002168748
Thu 11/13/08

ID		Task Name	Duration	Start	Finish
1		**SOURCE REDUCTION**	**918 days**	**Fri 4/16/04**	**Wed 10/24/07**
19		**Post Remedial Monitoring Plan [PRMP] IMPLEMENTATION**	**726 days**	**Fri 7/1/05**	**Sat 4/12/08**
115		**QUARTERLY MONITORING AND REPORTING**	**755 days**	**Mon 2/27/06**	**Fri 1/16/09**
144		**WETLAND AREA [WHARTON ENTERPRISES] MONITORING AND REPORTING**	**676 days**	**Tue 5/30/06**	**Tue 12/30/08**
160		**MW19/HOT SPOT 1 AREA**	**865 days**	**Mon 2/27/06**	**Fri 6/19/09**
161	✓	MW19/Hot Spot 1 Soil Gas Investigation	4 days	Mon 2/27/06	Thu 3/2/06
162	✓	Prepare and submit the MW19/Hot Spot 1 Soil Gas Investigation Report	37 days	Mon 3/20/06	Tue 5/9/06
163	✓	Regulatory review and comment on MW19/Hot Spot 1 Soil Gas Investigation Report	291 days	Wed 5/10/06	Wed 6/20/07
164	✓	Prepare and Submit RMT Response Document [45-Day Extension Request] [MW-19/Hot Spot 1 Soil Gas Investigation Comments/NOD] dated June 20, 2007	19 days	Thu 6/21/07	Tue 7/17/07
165		Regulatory approval of the 45-Day RASR extension	0 days	Fri 7/27/07	Fri 7/27/07
166	✓	Perfrom Subsurface Investigation, Evaluate Remedial Alternatives, Prepare and Submit the RASR	54 days	Thu 6/21/07	Tue 9/4/07
167	✓	NOD Oct 16, 2008 [NJDEP Review of the RASR]	292 days	Wed 9/5/07	Thu 10/16/08
168	✓	Respond to NOD [Prepare & Submit RIW]	30 edays	Mon 10/20/08	Wed 11/19/08
169		USEPA & NJDEP Review of MW19HS1 2008 RIW	30 days	Wed 11/19/08	Tue 12/30/08
170		2008 MW19HS1 RIW Approved	0 days	Tue 12/30/08	Tue 12/30/08
171		**2008 MW19HS1 RIW Implementation**	**155 days**	**Mon 11/17/08**	**Fri 6/19/09**
172		Bldg 9 Demolition Assessment & Permitting	50 edays	Mon 11/17/08	Tue 1/6/09
173		Pre-Demolition Surveying	5 days	Mon 12/1/08	Fri 12/5/08
174		Bldg 9 Demolition	40 edays	Fri 1/23/09	Wed 3/4/09
175		Post Demolition Surveying, Restoration & Revegetation	12 days	Thu 3/12/09	Fri 3/27/09
176		MW19HS1 RIW Sampling and Analysis	14 edays	Tue 4/7/09	Tue 4/21/09
177		Preparation and Submittal of a MW19HS1 RIR/FFS	50 days	Mon 4/13/09	Fri 6/19/09
178		**SOURCE AREA GROUNDWATER INVESTIGATION**	**108 days**	**Wed 6/25/08**	**Sat 11/22/08**



Thu 11/13/08

Task | Split | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Split | Rolled Up Milestone | Rolled Up Progress | External Tasks | Project Summary | External Milestone | Deadline

edays: elapsed days or calendar days