REMEDIAL INVESTIGATION REPORT (AOC-1)

NJ TRANSIT

Former Allied Building Supply Co.
Linden Station Parking Lot 2
101 West Elizabeth Avenue
City of Linden, Union County, New Jersey
Program Interest No. 012948
NJDEP Case No. 93-06-24-1425

OCTOBER 2022

Dewberry

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EXECUTIVE SUMMARY

On behalf of the New Jersey Transit Corporation (NJ TRANSIT), Dewberry Engineers Inc. (Dewberry) has prepared this Remedial Investigation Report (RIR) summarizing the groundwater sampling-related remedial activities and results at the former Allied Building Supply Co. site, located at 101 West Elizabeth Avenue, Linden, Union County, New Jersey. The site is the current location of the NJ TRANSIT Linden Station Parking Lot 2. The New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program (SRP) Program Interest Number for this site is 012948, and the Case Number is 93-06-24-1425. The Licensed Site Remediation Professional (LSRP) of Record for the site is Mr. John Q. Robinson, Jr., LSRP Number 748586, of Dewberry.

The former Allied Building Supply Co. site was previously used as a building supply yard and has been the subject of remediation and on-going groundwater monitoring since 1993, when a release of gasoline was discovered during the removal of a 2,000-gallon leaded gasoline underground storage tank (UST), Area of Concern-1 (AOC-1). Petroleum-impacted soils were removed during the UST closure activities, and the results of post-excavation soil samples were in compliance with the NJDEP cleanup levels in effect at that time. Six monitoring wells were installed and sampled, and the results indicated the presence of petroleum-related benzene, toluene, ethylbenzene, and total xylenes (BTEX) in groundwater at concentrations greater than their respective NJDEP Class II-A Ground Water Quality Standards (GWQS). A property-wide Classification Exception Area (CEA), based on a monitored natural attenuation (MNA) remedial strategy, was established for BTEX in 1998. The NJDEP issued a letter of No Further Action NFA-A (Limited Restricted Use) for the AOC-1 UST in 1998. The site was acquired by NJ TRANSIT in 2000 and converted into Linden Station Parking Lot 2. A Biennial Certification Monitoring Report for the CEA was submitted to the NJDEP in 2009 and approved by the Department in 2010.

The objective of this investigation is to complete the remedial activities associated with the site and for the LSRP to issue an unrestricted AOC-specific Response Action Outcome (RAO) for the AOC-1 groundwater. The groundwater sampling program implemented in 2022 was conducted to assess if BTEX contaminants are still present in groundwater at and surrounding AOC-1 at concentrations greater than the NJDEP Class II-A GWQS.

On April 14, 2022, Dewberry's drilling subcontractor, Subsurface Environmental Technologies, LLC, conducted a geophysical survey at and surrounding AOC-1 at the site. The geophysical work was designed to both identify the presence or absence of the former permanent monitoring wells located beneath the asphalt-paved parking lot and screen the proposed drilling locations for potential underground utility conflicts. Based on the results of the geophysical survey, none of the locations of six former monitoring wells were identified. In addition, the proposed drilling locations were cleared for the presence of subsurface utilities.

Four temporary well points were installed, developed, and sampled for BTEX on April 14, 2022. The temporary well points were installed at the location of three former permanent wells (MW-2, MW-5, MW-6), and a new location upgradient of MW-1 surrounding the former UST source area (AOC-1). The analytical results indicated that there were no BTEX compounds detected in the temporary well points. A monitoring well, MW-1R, was also installed and developed on April 14, 2022 to assess groundwater conditions and quality at AOC-1. Two rounds of groundwater samples were collected from this well for BTEX analysis: the first on April 28, 2022 (which was during the time of the seasonal high water level at the site) and the second on July 6, 2022. The analytical results from both sampling events indicated that the BTEX compounds

detected in the groundwater samples were below the NJDEP Class II-A GWQS. Based on these findings, the groundwater remedy of natural attenuation was successful and remediation of residual benzene in the groundwater associated with AOC-1 is complete. Therefore, the NJDEP should remove the CEA from the site, and the LSRP of Record will issue an unrestricted use Response Action Outcome (RAO) for the AOC.

1.0 INTRODUCTION

1.1 General

On behalf of the New Jersey Transit Corporation (NJ TRANSIT), Dewberry Engineers Inc. (Dewberry) has prepared this Remedial Investigation Report (RIR) summarizing the remedial activities and results at the former Allied Building Supply Co. site, located at 101 West Elizabeth Avenue, Linden, Union County, New Jersey. The site is the current location of the NJ TRANSIT Linden Station Parking Lot 2. The New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program (SRP) Program Interest Number for this site is 012948, and the Case Number is 93-06-24-1425. The Licensed Site Remediation Professional (LSRP) of Record for the site is Mr. John Q. Robinson, Jr., LSRP Number 748586, of Dewberry.

The objective of this remedial investigation (RI) is to complete the groundwater-related remedial activities associated with the site and for the LSRP to issue an unrestricted AOC-specific Response Action Outcome (RAO) for Area of Concern-1 (AOC-1) groundwater. AOC-1 is a former [previously remediated] underground storage tank (UST) AOC. The groundwater sampling program implemented in 2022 was conducted to assess if BTEX contaminants are still present in groundwater at and surrounding AOC-1 at concentrations greater than the NJDEP Class II-A GWQS.

The RI activities discussed in this report were completed in accordance with the Site Remediation Reform Act (SRRA), New Jersey Statutes Annotated (N.J.S.A.) 58:10C-1 et seq.; the Administrative Requirements for the Remediation of Contaminated Sites (ARRCS), New Jersey Administrative Code (N.J.A.C.) 7:26C; and Technical Requirements for Site Remediation (TRSR), N.J.A.C. 7:26E.

The sampling work was performed by Dewberry in accordance with the NJDEP Field Sampling Procedures Manual (August 2005; Last Updated April 2011) and implemented in accordance with a Dewberry Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP). The QAPP is provided in **Appendix A**.

1.2 Environmental History

The former Allied Building Supply Co. site was previously used as a building supply yard and has been the subject of remediation and on-going groundwater monitoring since 1993 when a release of gasoline was discovered during the removal of a 2,000-gallon leaded gasoline UST, AOC-1. Petroleum-impacted soils were removed during the UST closure activities, and the results of post-excavation soil samples were in compliance with the NJDEP cleanup levels in effect at that time. Six monitoring wells were installed and sampled, and the results indicated the presence of petroleum-related benzene, toluene, ethylbenzene, and total xylenes (BTEX) in groundwater at concentrations greater than their respective NJDEP Class II-A Ground Water Quality Standards (GWQS). A property-wide Classification Exception Area (CEA), based on a monitored natural attenuation (MNA) remedial strategy, was established for BTEX in 1998. The NJDEP issued a letter of No Further Action NFA-A (Limited Restricted Use) for the AOC-1 UST in 1998. The site was acquired by NJ TRANSIT in 2000 and converted into Linden Station Parking Lot 2. A Biennial Certification Monitoring Report for the CEA was submitted to the NJDEP in 2009 and approved by the Department in 2010.

2.0 PHYSICAL SETTING

2.1 Site Description

The site is the former Allied Building Supply Co. property. It is currently used as a parking lot for NJ TRANSIT commuters and consists of an asphalt-paved parking lot with several landscaped, grassy islands.

The site is located on West Elizabeth Avenue in the City of Linden. **Figure 1** shows the site location on a U.S. Geological Survey (USGS) topographic quadrangle map. The property is 2.8 acres in size and is identified as Block 254, Lot 10 in the New Jersey State and Union County tax records. The site is bordered to the northeast by another parking lot, to the southeast by parking and the elevated railroad tracks (NJ TRANSIT's Northeast Corridor), to the northwest by West Elizabeth Avenue and primarily commercial development, and to the southwest by a building under construction, which appears to be residential development. **Figure 2** presents an aerial photograph showing the location of the site and surrounding land use.

2.2 Geology and Hydrogeology

The site is located in the Piedmont Physiographic Province of New Jersey. The Piedmont Physiographic Province is underlain by slightly folded and faulted sedimentary rocks of Triassic and Jurassic age. The Piedmont is chiefly a low-rolling plain divided by a series of higher ridges. The shallow geology in the vicinity of the site consists of predominantly fill material overlying continuous glacial till of late Wisconsinian glaciofluvial deposits. The till consists of silty sand to sandy material.

According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) custom Soil Resource Report for Union County, New Jersey, the shallow soil at the site and to the north has been classified as Urban land (UR), non-native fill material covered by pavement, concrete, buildings, and other structures.

Groundwater at the site reportedly occurs greater than 6 feet below ground surface (bgs) (NRCS Custom Web Soil Survey, 2015). A Conceptual Site Model is presented as **Figure 3**.

2.1 Drainage and Topography

The surface elevation of the site is approximately 20 feet above mean sea level, based on the 2014 USGS 7.5-minute topographic map of the Roselle quadrangle. The site is currently covered with asphalt and/or concrete pavement, as well as isolated manicured grassy islands. Stormwater surface runoff either percolates into the soil or flows overland to storm drains from the southwestern site boundary generally southwest towards Morse's Creek.

2.2 Surface Water Bodies and Wetlands

Morse's Creek flows from northwest to southeast and is located to the southwest of Lot 2 (Figure 1). No wetlands exist at or near the site.

2.3 Land Use and Development

Off-site land uses proximal to the site are generally residential (to the southeast across the railroad tracks) and commercial (to the southwest and to the southeast across Elizabeth Avenue). New Jersey State Route 9 is the main road that passes northeast-southwest through the City of Linden, approximately one-half mile southeast of the site. Elizabeth Avenue, also running northeast-southwest, is the main street adjacent to the northwest of the railroad tracks. NJ TRANSIT's rail lines run northeast-southwest paralleling Elizabeth Avenue through Linden and then extend further to the northwest and southeast.

The site is primarily covered by asphalt pavement/concrete and railroad tracks and has no naturally vegetated areas. Various small businesses and townhouses are located along Elizabeth Avenue. A building under construction is located directly adjacent to the southwest of Lot 2.

3.0 PREVIOUS UST CLOSURE AND SITE ASSESSMENT

In 1993, a release/discharge of gasoline was discovered at the site during the removal of a 2,000-gallon leaded gasoline UST by the former property owner (Allied Building Supply Co.). The UST was removed in accordance with a 1993 Underground Storage Tank Closure Plan. Approximately 70 tons of petroleum-impacted soils were excavated and removed during the UST closure activities. The analytical results of post-excavation soil samples were in compliance with the NJDEP cleanup levels in effect at that time, with the exception of two soil samples that exceeded the Impact-to-Ground Water Soil Cleanup Criteria (IGWSCC) for total xylenes. A second round of soil sampling conducted in 1994 at the locations of the total xylene IGWSCC exceedances indicated that all concentrations were below the applicable levels. This area of concern was designated at the time as AOC-1.

A groundwater monitoring program was implemented and six monitoring wells were installed and sampled between 1994 and 1996. The analytical results indicated the presence of petroleum-related BTEX in groundwater only in MW-1 (located at the former UST source area) at concentrations greater than their respective NJDEP Class II-A GWQS. The NJDEP issued a letter of Limited Restricted Use, NFA for AOC-1 in 1998, conditional on the establishment of a groundwater CEA. The CEA proposal was submitted to and approved by the NJDEP in 1998 for BTEX. The CEA boundary was established at the Lot 2 property line. The property was subsequently purchased by NJ TRANSIT, and the site was converted into an asphalt-paved commuter parking lot for the adjacent NJ TRANSIT Linden Station. Prior to this investigation, no additional groundwater sampling had been conducted since establishment of the CEA. A CEA Biennial Certification was submitted to the NJDEP in 2009 and approved by the Department in 2010.

A request for information regarding the six monitoring wells was submitted by Dewberry to the NJDEP Bureau of Well Permitting on August 11, 2022. The NJDEP responded and provided monitoring well records and well abandonment reports for five of the six former monitoring wells. There was no information available regarding well MW-1 at the site.

The UST-related historical documents for AOC-1 are presented in **Appendix B**.

4.0 REMEDIAL INVESTIGATION OBJECTIVE

The objective of the RI-related groundwater sampling program executed by Dewberry is to assess if BTEX contaminants remain present in groundwater at AOC-1 at concentrations above the NJDEP Class II-A GWQS. Compliance with RI requirements in the NJDEP TRSR, N.J.A.C. 7:26E, and associated deadlines were achieved through implementation of the following scope of work:

- Use of geophysics tools to identify the presence of underground utilities and the locations of six former monitoring wells at and around AOC-1;
- Installation and sampling of four temporary well points for BTEX to assess groundwater quality at and around AOC-1;
- Comparison of the temporary well point analytical results with the NJDEP Class II-A GWQS;
- Installation of monitoring well MW-1R within the AOC-1 former UST source area;
- Collection of two rounds of groundwater samples for BTEX analysis from well MW-1R;
- Comparison of the well MW-1R analytical results with the NJDEP Class II-A GWQS; and
- Preparation of a RIR for groundwater.

4.1 Remediation Standards

The applicable remediation standards for groundwater at this site are the NJDEP Class II-A Ground Water Quality Standards (GWQS). All groundwater samples collected during the RI field sampling program will compared against the GWQS.

5.0 REMEDIAL INVESTIGATION SUMMARY

5.1 Geophysical Survey

Prior to conducting fieldwork, a site-specific HASP was prepared and a site reconnaissance was conducted to inspect access for the drilling rig and to mark out the proposed temporary well point and monitoring well locations.

On April 14, 2022, a geophysical survey was conducted by Subsurface Environmental Technologies, LLC (SET) of Bordentown, New Jersey at the proposed groundwater sampling locations. The geophysical survey was designed to both identify the presence or absence of the former permanent monitoring wells located at the site and to screen the proposed drilling locations for underground utilities. The geophysical survey consisted of the collection of electromagnetic (EM) metal detection data throughout the accessible portions of the investigation area along parallel transects located 5 feet apart. Ground penetrating radar (GPR), metal detection, and magnetometry data was collected over the former and proposed well locations. Line tracing data was also collected in an effort to detect buried utilities. The findings of the geophysical survey indicated that, although two subsurface metallic anomalies were detected, none of the six former monitoring wells were located, and the proposed drilling locations were cleared for the presence of subsurface utilities (**Appendix C**).

5.2 Temporary Well Point Installation/Sampling

Prior to conducting the investigation activities at AOC-1, Dewberry prepared a site-specific HASP and, prior to mobilization, Dewberry's drilling subcontractor, SET, contacted the New Jersey "One-Call" Notification System to identify and mark out underground utilities at the site.

On April 14, 2022, SET (a New Jersey-licensed well driller) installed and developed four temporary well points at and surrounding AOC-1. The temporary well points were installed at the location of three former permanent monitoring wells (MW-2, MW-5, MW-6) and a new location directly upgradient of former monitoring well MW-1 (**Figure 4**). SET utilized SoftDig to a depth of 5 feet below ground surface (bgs) at the drilling locations to avoid damaging subsurface utilities. A Dewberry field geologist oversaw and documented the field activities.

The temporary well points were constructed with 1-inch diameter polyvinyl chloride (PVC) riser and pre-packed PVC well screens and installed to depths of 15 feet bgs, with the exception of well point TWP-3 that was installed to a depth of 28 feet bgs. The temporary well point construction diagrams are provided in **Appendix D**.

The temporary well points were gauged for fluid levels using a decontaminated water level indicator to the nearest 0.01 foot. The well points were developed after installation using disposal bailers. Investigation-derived waste (IDW), such as soil cuttings and purged groundwater, was containerized separately in appropriately labeled 55-gallon drums, for subsequent off-site disposal by NJ TRANSIT. The drums were temporarily staged on-site and later transported to Veolia Environmental Services in Flanders, New Jersey, a permitted facility.

Dewberry sampled the temporary well points on April 14, 2022 (same day as installation). A total of four groundwater samples were collected into appropriate laboratory glassware, labeled, and secured in an ice-filled cooler for transport to the laboratory. The groundwater samples and quality assurance samples including a blind duplicate (Dup_4-14-22), a field blank (FB_4-14-22), and a trip blank, were submitted to Hampton-Clarke, Inc. (HCI) of Fairfield, New Jersey, a NJDEP-certified laboratory (NELAC/NJ No. 07071), for BTEX (benzene, toluene, ethylbenzene, and total xylenes) analysis via United States Environmental Protection Agency (USEPA) SW-846 Method 8260B.

5.3 Monitoring Well Installation/Sampling

Under Dewberry observation, SET installed monitoring well MW-1R on April 14, 2022 in approximately the same location as former monitoring well MW-1 (**Figure 4**). The monitoring well was constructed with 2-inch diameter PVC well screen and riser and installed to a depth of 15 feet bgs. Sand was used to fill the annular space to a depth of approximately 1 to 2 feet above the top of the well screen, followed by a 2-foot thick bentonite seal. The remainder of the annular space was filled with a cement-bentonite grout. The surface of the well was completed with a flush mount protective casing and steel manway/cover.

Well development was conducted on the day of well installation using a peristaltic pump. Approximately 35 gallons were purged from the well during development. The monitoring well was surveyed for location and vertically to the nearest 0.01 foot and was gauged for fluid levels via a decontaminated water level indicator.

IDW associated with the installation of the monitoring well, such as soil cuttings and purged groundwater, was containerized separately in appropriately labeled 55-gallon drums for subsequent off-site disposal by

NJ TRANSIT. The drums were temporarily staged on-site and later transported to the Veolia Environmental Services facility in Flanders, New Jersey.

Monitoring well MW-1R was gauged, purged, and sampled on April 28, 2022 (initial event) and July 6, 2022 (confirmation event). Each groundwater sample was collected using a dedicated bailer. The water level at the time of sampling during the April sampling event was 9.28 feet below the top of the inner well casing (elevation 18.95 feet using the North American Vertical Datum 1988 [NAVD88]). The water level at the time of sampling during the July sampling event was 9.80 feet below the top of the inner well casing (elevation 19.12 feet using the North American Vertical Datum 1988 [NAVD88]). The monitoring well was purged utilizing a submersible whale pump. Purge water during each sampling event was monitored using a U-52 Horiba multi-meter for the parameters: temperature; pH; specific conductance; oxygen reduction potential; dissolved oxygen; and turbidity. The Field Sampling Data Sheets are presented in **Appendix E**.

The groundwater samples collected on April 28 and July 6, 2022 were placed into appropriate laboratory glassware, labeled, and secured in ice-filled coolers for transport to the laboratory. The groundwater samples and quality assurance samples, including blind duplicates (Dup_4-28-22 and Dup_7-6-22), field blanks (FB_4-28-22 and FB_7-6-22), and trip blanks, were submitted to HCI, a NJDEP-certified laboratory (NELAC/NJ No. 07071), for BTEX analysis via United States Environmental Protection Agency (USEPA) SW-846 Method 8260B.

Table 1 presents the Groundwater Sampling and Analysis Program Summary.

5.4 Groundwater Sample Analytical Results

The groundwater samples collected from the temporary well points were analyzed for BTEX. No BTEX compounds were detected in the groundwater samples, including the duplicate sample. The field blank and trip blank were also non-detect for BTEX. The temporary well point sample analytical results are presented in **Table 2**.

The groundwater samples collected from monitoring well MW-1R during the two rounds of sampling in April and July 2022 were also analyzed for BTEX. Benzene and toluene were not detected in the groundwater samples, including the duplicate samples, in either sampling round. Ethylbenzene and total xylenes were detected in the groundwater samples, including the duplicate samples, in both sampling rounds at levels below the NJDEP Class-II-A GWQS for these two compounds. In addition, the field blanks and trip blanks were non-detect for BTEX. The monitoring well sample analytical results are presented in **Table 3**.

The laboratory analytical data reports are provided in **Appendix F**.

5.5 Analytical Data Reliability

The laboratory analytical data for the groundwater sampling events were provided by the NJDEP-certified laboratory. In all cases, these analytical data met the Quality Assurance/Quality Control metrics used to evaluate reliable analytical data. Analysis of benzene during the April 2022 sampling event was complicated by the presence of total xylenes which caused interference and raised the detection limit above 1 ug/L. This issue was resolved as documented in Appendix F. The LSRP of Record (John Robinson) reviewed the analytical results and did not identify instances where the reporting limits (RLs) exceeded the applicable remediation standards. The Electronic Data Deliverables (EDDs) were submitted to the NJDEP and the submission confirmatory email is included in **Appendix G**.

6.0 RECEPTOR EVALUATION

The initial Receptor Evaluation was submitted to the NJDEP on July 18, 2011. In accordance with N.J.A.C 7:26E-1.12(d), an updated Receptor Evaluation was not prepared because:

- A new AOC was not identified,
- A new receptor was not identified; and
- A new expose pathway was not identified.

6.1 Ecological Evaluation

An ecological evaluation is conducted on a site where co-occurrence of the following exists:

1) Environmentally sensitive natural resources (ESNRs): According to the NJDEP Ecological Evaluation Technical Guidance, August 2018, ESNRs are habitats where concern for plant and wildlife exposure to site Contaminants of Potential Ecological Concern (COPECs) is paramount and also includes man-made features, such as ditches, waste lagoons, and impoundments;
2) Presence of COPECs at the AOC and in the ESNR habitat; and
3) The presence of a contaminant migration pathway.

There are no ESNRs located in close proximity (within 200 feet) of the site. The COPECs for AOC-1 was petroleum-based BTEX. The groundwater sample collected indicated that all contaminants of concern were either not detected or detected at concentrations below the NJDEP Class II-A GWQS. Therefore, no further ecological evaluation is required for the site.

7.0 CONCLUSION

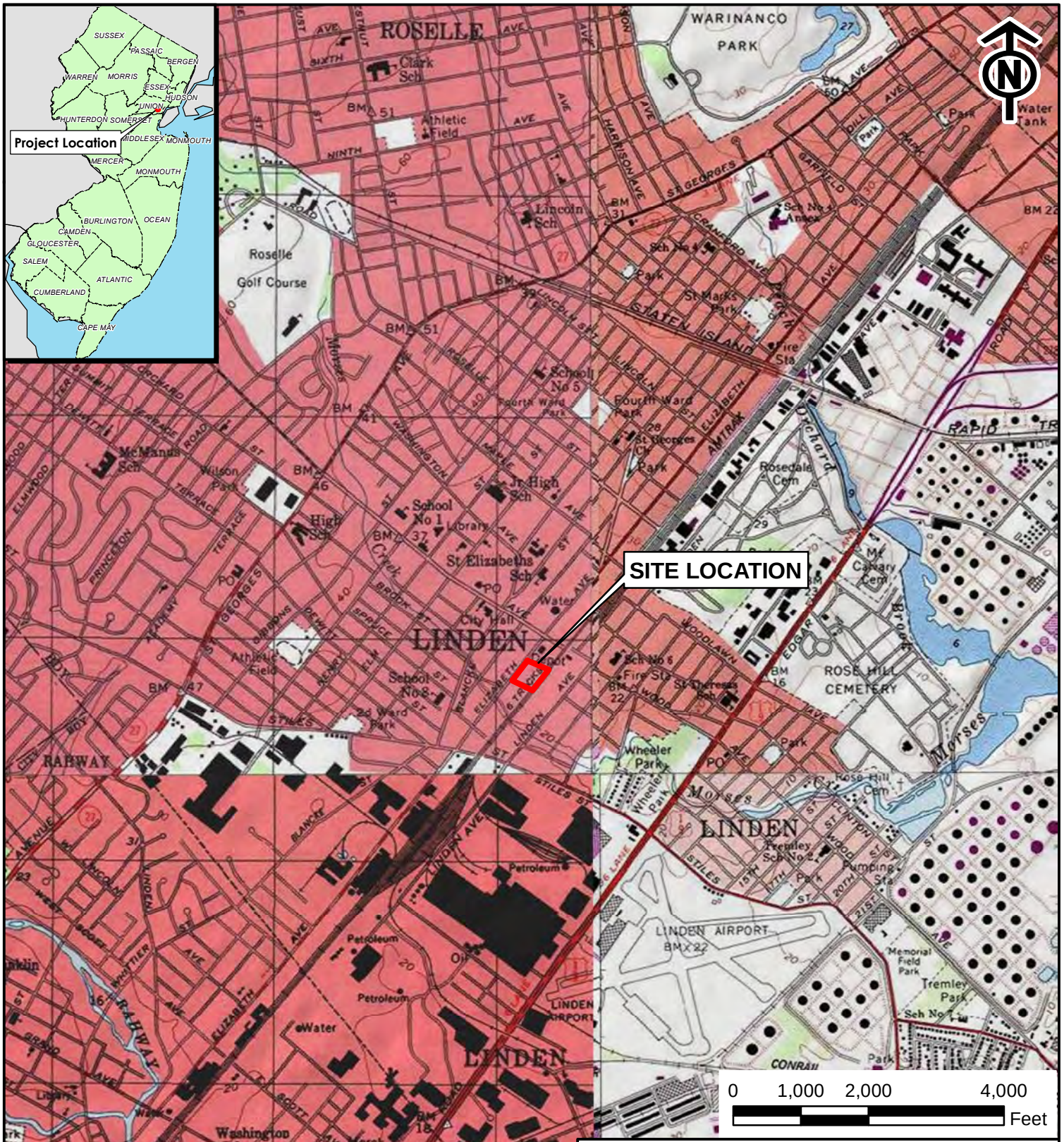
Groundwater investigation activities were conducted at AOC-1 during the first three quarters of 2022. Four temporary well points were installed, developed, and sampled for BTEX on April 14, 2022. The results of the investigation indicated that there were no BTEX compounds detected in any of the temporary well point groundwater samples, the duplicate samples, the field blanks, or the trip blanks.

A geophysical survey was conducted in an attempt to locate six former monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6. Two magnetic anomalies were detected in the vicinity of two of the wells but conclusive evidence of the presence of the former monitoring wells was not identified. Administrative well abandonment records for the former monitoring wells are presented in **Appendix H**.

Monitoring well MW-1R was situated within the former UST source area (AOC-1). Therefore, the groundwater sampling performed by Dewberry met the NJDEP's requirements of biasing groundwater sampling to the suspected location of greatest concentration. Well MW-1R was installed and sampled for BTEX on April 28, 2022 and sampled again on July 6, 2022. The groundwater analytical results indicated that all BTEX compounds in the samples collected from well MW-1R were detected at concentrations below the NJDEP Class II-A GWQS. Well MW-1R was abandoned on August 3, 2022 and the well abandonment report is presented in **Appendix I**.

Based on these findings, the groundwater remedy of natural attenuation was successful and remediation of residual benzene in the groundwater associated with AOC-1 is complete. Therefore, the NJDEP should remove the CEA from the site, and the LSRP of Record will issue an unrestricted use Response Action Outcome (RAO) for the AOC.

FIGURES



NJ TRANSIT
The Way To Go!

SITE LOCATION MAP

Allied Building Supply Co.
101 West Elizabeth Ave., Block 254, Lot 10
Linden, Union County, New Jersey

SCALE: 1" = 2000'

DATE: October 2022

Dewberry

FIGURE 1

Source: U.S.G.S. Topographic Maps Roselle, Elizabeth, Perth Amboy & Arthur Kill, NJ

Path: Q:\50102665 - NJT\50102686_LindenStationParkingLot2_RA\GIS\Mxd\NJT_Linden_SiteLocationMap.mxd



Source: Nearmap Imagery Online Service, ESRI.

NJ TRANSIT
The Way To Go!

AERIAL SITE MAP

Allied Building Supply Co.
101 West Elizabeth Ave., Block 254, Lot 10
Linden, Union County, New Jersey

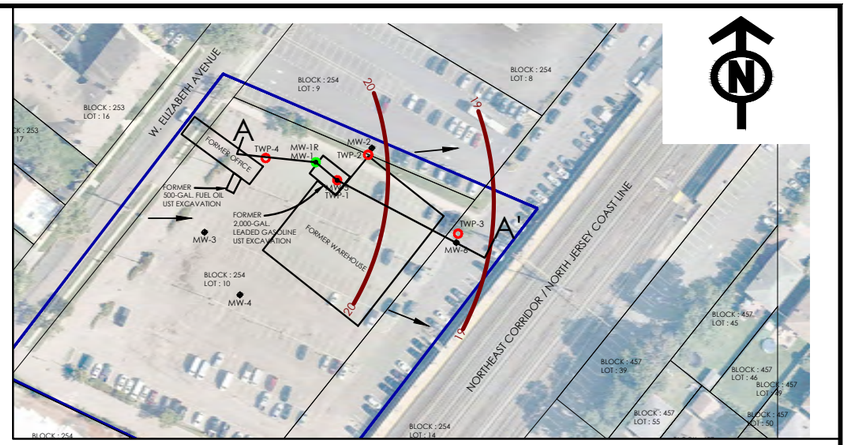
SCALE: 1" = 100'

DATE: October 2022

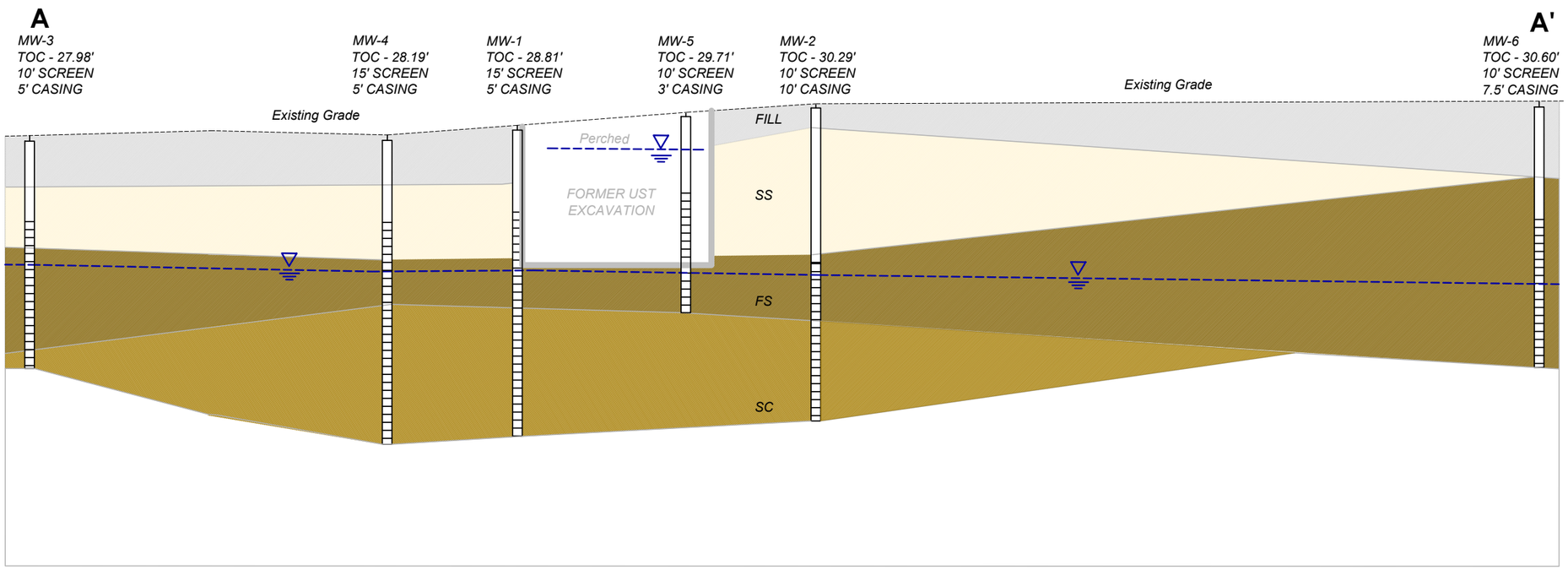
Dewberry

FIGURE 2

Path: Q:\50102665 - NJT\50102686_LindenStationParkingLot2_RA\GIS\Mxd\NJT_Linden_AerialMapCSM.mxd



KEY MAP
SCALE: 1"=150'



MW-3
0'-3' - Fill
3'-7' - Red-Brown silty sand
7'-14' - Red-Brown M/F sand
14'-15' - Red-Brown silty clay

MW-4
0'-3' - Fill
3'-8" - Red-Brown silty sand
8'-11' - Red-Brown M/F sand
11'-20' - Red-Brown silty clay

MW-5
0'-13' - Fill - Red clayey fine sand

MW-2
0'-1.5' Fill
1.5'-9.5' - Red-Brown silty sand
9.5'-14' - Red-Brown M/F sand
14'-20' - Red-Brown silty clay

MW-6
0'-5' - Fill - Brown clay
5'-17.5' - Red clayey fine sand

LEGEND

- FILL ..... FILL
- SS ..... SILTY SAND
- FS ..... MEDIUM-FINE SAND
- SC ..... SILTY CLAY
- GROUNDWATER TABLE
- TOC - Top of Casing

0 8 16
4 12
VERTICAL SCALE (in feet)

0 20 40
10 30
HORIZONTAL SCALE (in feet)

NJ TRANSIT *The Way To Go!*

CONCEPTUAL SITE MODEL

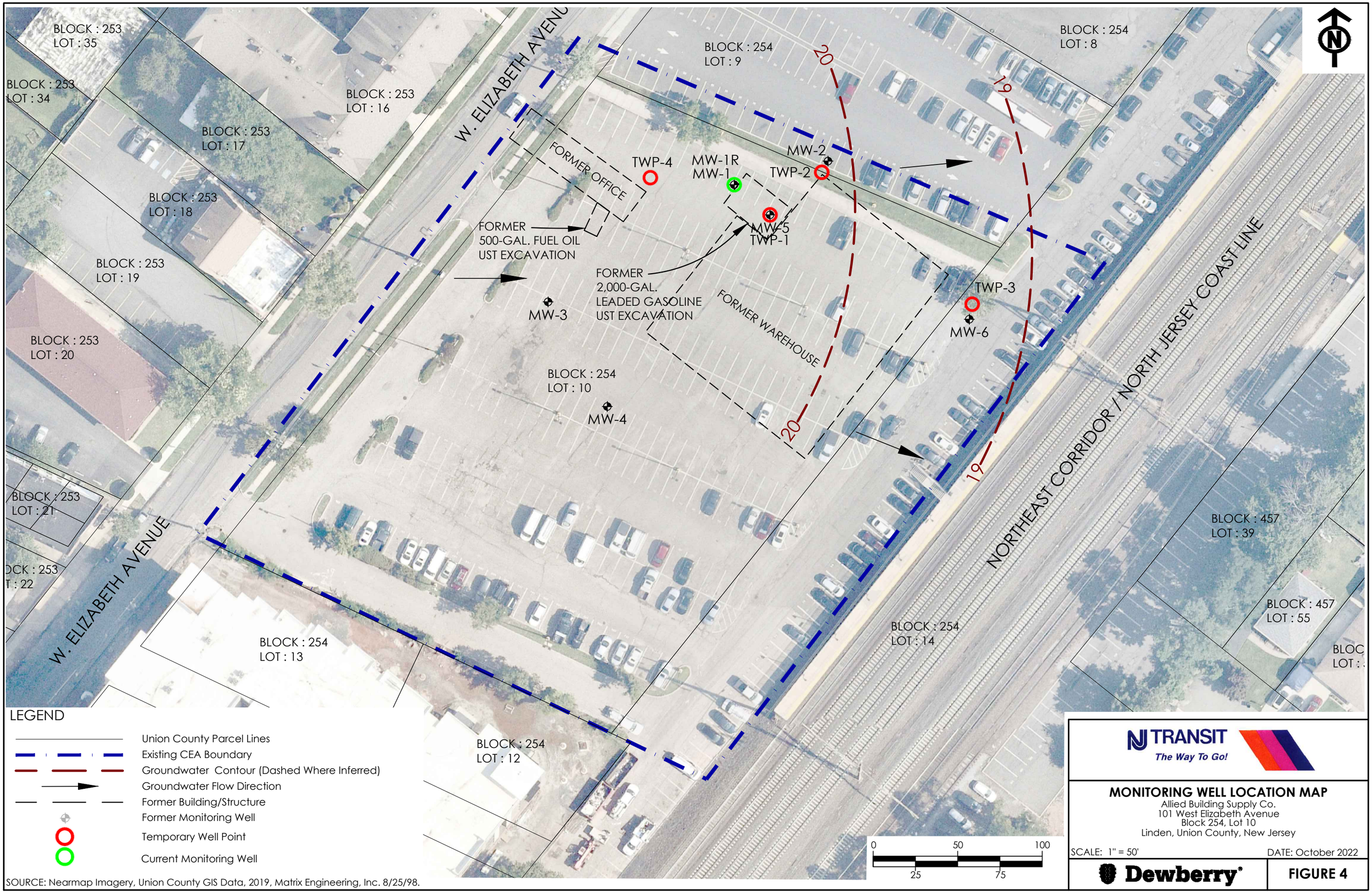
Allied Building Supply Co.
101 West Elizabeth Avenue
Block 254, Lot 10
Linden, Union County, New Jersey

SCALE: As Shown
DATE: October 2022

Dewberry

FIGURE 3

C:\Users\rzirpoli\appdata\local\temp\AcPublish_25784\Linden_MonitoringWellLocationMap.dwg Oct 19, 2022



SOURCE: Nearmap Imagery, Union County GIS Data, 2019, Matrix Engineering, Inc. 8/25/98.

NJ TRANSIT
The Way To Go!

MONITORING WELL LOCATION MAP

Allied Building Supply Co.
101 West Elizabeth Avenue
Block 254, Lot 10
Linden, Union County, New Jersey

SCALE: 1" = 50'

DATE: October 2022

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FIGURE 4

DEWBERRY ENGINEERS INC., PARSIPPANY, NJ CADD FILE: C:\Users\rzirpoli\appdata\local\temp\AcPublish_25783\Linden_MonitoringWellLocationMap.dwg Oct 19, 2022

TABLES

TABLE 1
GROUNDWATER SAMPLING AND ANALYSIS PROGRAM SUMMARY
NJ TRANSIT
ALLIED BUILDING SUPPLY CO., NJ TRANSIT LINDEN STATION LOT 2
CITY OF LINDEN, UNION COUNTY, NEW JERSEY
SRP PI # 012948

Sample ID	Sample Type	Sample Depth (ft)	Sample Date	Analyses
TWP-1	Groundwater	3.0-13.0	4/14/2022	BTEX
TWP-2	Groundwater	5.0-15.0	4/14/2022	BTEX
TWP-3	Groundwater	18.0-28.0	4/14/2022	BTEX
TWP-4	Groundwater	5.0-15.0	4/14/2022	BTEX
MW-1R	Groundwater	5.0-15.0	4/28/2022	BTEX
MW-1R	Groundwater	5.0-15.0	7/6/2022	BTEX

Notes:
BTEX - benzene, toluene, ethylbenzene, and xylenes

TABLE 2
TEMPORARY WELL POINT GROUNDWATER SAMPLING ANALYTICAL RESULTS
NJ TRANSIT
ALLIED BUILDING SUPPLY CO., LINDEN STATION LOT 2
CITY OF LINDEN, UNION COUNTY, NJ
SRP PI # 012948

Client ID	NJAC 7:9C	**TWP-1**			**TWP-2**			**TWP-3**			**TWP-4**			**DUP-4-14-22**			**FB_4-14-2**			**Trip Blank**		
Lab Sample ID	GW QualStds	AD30164-001			AD30164-002			AD30164-003			AD30164-004			AD30164-005			AD30164-006			AD30164-007		
Sampling Date	ClassII A	4/14/2022			4/14/2022			4/14/2022			4/14/2022			4/14/2022			4/14/2022			4/13/2022		
Matrix	Higher Values	Water			Water			Water			Water			Water			Water			Water		
Dilution Factor		1			1			1			1			1			1			1		
Unit	ug/l	ug/l			ug/l			ug/l			ug/l			ug/l			ug/l			ug/l		
		Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
WATER BY 8260D																						
Benzene	1	ND		0.5	ND		0.5	ND		0.5	ND		0.5	ND		0.5	ND		0.5	ND		0.5
Ethylbenzene	700	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0
m-Xylene & p-Xylene	1000	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0
o-Xylene	1000	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0
Toluene	600	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0
Total Conc	1000	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0	ND		1.0

*+ : LCS and/or LCSD is outside acceptance limits, high biased.
J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U : Indicates the analyte was analyzed for but not detected.

TABLE 3
PERMANENT WELL GROUNDWATER SAMPLING ANALYTICAL RESULTS
NJ TRANSIT
ALLIED BUILDING SUPPLIES CO., LINDEN STATION LOT 2
CITY OF LINDEN, UNION COUNTY, NJ
SRP PI # 012948

Client ID	NJAC 7:9C	**MW-1R**			**DUP_4-28-22**			**FB_4-28-22**			**Trip Blank**		
Lab Sample ID	GW QualStds	AD30446-001			AD30446-002			AD30446-003			AD30446-004		
Sampling Date	ClassII A	4/28/2022			4/28/2022			4/28/2022			4/27/2022		
Matrix	Higher Values	Water			Water			Water			Water		
Dilution Factor		1			1			1			1		
Unit	ug/l	ug/l			ug/l			ug/l			ug/l		
		Result	Q	RL	Result	Q	RL	Result	Q	RL	Result	Q	RL
WATER BY 8260D													
Benzene	1	ND		0.50	ND		0.50	ND		0.50	ND		0.50
Ethylbenzene	700	440		1.0	390		1.0	ND		1.0	ND		1.0
m-Xylene & p-Xylene	1000	940		1.0	880		1.0	ND		1.0	ND		1.0
o-Xylene	1000	ND		1.0	ND		1.0	ND		1.0	ND		1.0
Toluene	600	ND		1.0	ND		1.0	ND		1.0	ND		1.0
Xylenes (Total)	1000	940		1.0	880		1.0	ND		1.0	ND		1.0

Client ID	NJAC 7:9C	**MW-1R**			**DUP_4-28-22**			**FB_4-28-22**			**Trip Blank**		
Lab Sample ID	GW QualStds	AD31818001-001			AD31818001-002			AD31818001-003			AD31818001-004		
Sampling Date	ClassII A	7/6/2022			7/6/2022			7/6/2022			7/6/2022		
Matrix	Higher Values	Water			Water			Water			Water		
Dilution Factor		1			1			1			1		
Unit	ug/l	ug/l			ug/l			ug/l			ug/l		
		Result	Q	RL	Result	Q	RL	Result	Q	RL	Result	Q	RL
WATER BY 8260D													
Benzene	1	ND		0.5	ND		0.5	ND		0.50	ND		0.50
Ethylbenzene	700	140		1.0	160		1.0	ND		1.0	ND		1.0
m-Xylene & p-Xylene	1000	230		1.0	280		1.0	ND		1.0	ND		1.0
o-Xylene	1000	1.2		1.0	1.5		1.0	ND		1.0	ND		1.0
Toluene	600	ND		1.0	ND		1.0	ND		1.0	ND		1.0
Xyles (Total)	1000	231		1.0	281		1.0	ND		1.0	ND		1.0

*+ : LCS and/or LCSD is outside acceptance limits, high biased.
J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U : Indicates the analyte was analyzed for but not detected.

APPENDIX A:
Quality Assurance Project Plan

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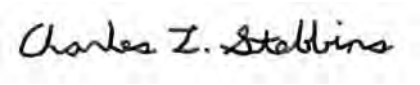
1.0 TITLE AND APPROVAL PAGE

Title: Quality Assurance Project Plan
Project Name/Property Name: Allied Building Supply Co. – Linden Station Lot 2, XX Elizabeth Avenue, Linden, Union County
Property/Site Location: New Jersey
Organization Name: Dewberry Engineers Inc.
Person Responsible for Conducting the Remediation: New Jersey Transit Corporation
Effective Date of Plan: January 18, 2022
Responsible Program: New Jersey Department of Environmental Protection - Site Remediation Program



John Robinson, LSRP, Dewberry Engineers Inc.
LSRP Name and Organizational Affiliation

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Quality Assurance Manager Name and Organizational Affiliation

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2.0 PROJECT DEFINITION AND BACKGROUND

On behalf of the New Jersey Transit Corporation (NJT), Dewberry Engineers Inc. (Dewberry) prepared this Quality Assurance Project Plan (QAPP) for the Allied Building Supply Co. located at XX Elizabeth Avenue, Linden, Union County, New Jersey. This QAPP was prepared using guidance from the New Jersey Department of Environmental Protection (NJDEP) and the U.S. Environmental Protection Agency's (USEPA) requirements for a QAPP, in accordance with the following guidelines:

1. New Jersey Administrative Code (NJAC) 7:26E-2.2, Supp.;
2. NJDEP "Field Sampling Procedures Manual (FSPM)," August 2005/Last Updated April 2011;
3. NJDEP QAPP Technical Guidance, April 2014;
4. NJDEP Data of Known Quality Protocols (DKQP) Technical Guidance, April 2014;
5. USEPA Guidance for the Data Quality Objectives Process, EPA QA/G-4, August 2000; and
6. USEPA Requirements for QAPPs, EPA QA/R-5, April 2001.

This QAPP was prepared to serve as the guidance document for the quality assurance/quality control (QA/QC) requirements for implementation of the investigation.

2.1 Project Definition

The Site is the former Allied Building Supply Co. The Site was previously used as a building supply yard and has been the subject of remediation and on-going groundwater monitoring since 1993, when a release of gasoline was discovered during the removal of a 2,000-gallon leaded gasoline underground storage tank (UST). Petroleum-impacted soils were removed during the UST closure activities, and the results of post-excavation soil samples were in compliance with the NJDEP cleanup levels in effect at that time. Six monitoring wells were installed and sampled, and the results indicated the presence of petroleum-related benzene, toluene, ethylbenzene, and total xylenes (BTEX) in groundwater at concentrations greater than their respective NJDEP Class II-A Ground Water Quality Standards (GWQS). A Classification Exception Area (CEA), based on monitored natural attenuation (MNA) and defined as the property boundary, was established for BTEX in 1998. The NJDEP issued a letter of No Further Action NFA-A (Limited Restricted Use) in 1998. The site was acquired by NJ TRANSIT in 2000 and converted into Linden Station Parking Lot 2. A Biennial Certification Monitoring Report for the CEA was submitted to the NJDEP and approved in 2010. Dewberry, on behalf of NJ TRANSIT, reviewed prior UST work completed by others to advise how to bring the site to regulatory closure.

The objective of this SI/RI is to finish the remedial activities associated with the Site and issue an unrestricted area of concern (AOC)-specific Response Action Outcome (RAO) for the Site.

The Site Investigation/Remedial Investigation (SI/RI) activities at the site will be completed in accordance with the NJDEP Technical Requirements for Site Remediation (TRSR) NJAC 7:26E, the Site Remediation

Reform Act (SRRA), New Jersey Statutory Act (NJSA) 58:10C-1 et seq., and the Administrative Requirements for the Remediation of Contaminated Sites (ARRCS) NJAC 7:26C. The field activities will be performed in accordance with the NJDEP Field Sampling Procedures Manual (FSPM) (August 2005; Last Updated April 2011), and implemented in accordance with a Dewberry site-specific Health and Safety Plan (HASP).

2.2 Project/Task Description

SI includes the installation of four temporary well points and sampling for benzene, toluene, ethylbenzene, and xylenes (BTEX). The RI consists of the installation of one permanent monitoring well and two consecutive quarterly rounds of sampling for BREX.

Activities	Anticipated Date(s) of Initiation	Anticipated Date(s) of Completion	Deliverable
SI implementation	03/15/2022	08/15/2022	Summary Email
RI Implementation	04/15/2022	07/15/2022	Summary Email
Prepare Site Investigation Report/Remedial Investigation Report (SIR/RIR)	05/01/2022	09/01/2022	SIR/RIR

3.0 PROJECT TEAM

The table below provides personnel name, their title, contact information, and responsibilities for this project.

Name	Title	Telephone Number	Organizational Affiliation	Responsibilities
Mike Matri	Director of Site-Remediation	845.783.5498	NJ TRANSIT	Project logistic and planning technical activities, project budget, and schedule
Charles Stebbins, LSRP	LSRP/Task Manager	973.576.9641	Dewberry Engineers Inc.	Day-to-day management of project including technical review of reports, budget, and schedule
John Robinson, LSRP	LSRP/Project Manager	973.576.9635	Dewberry Engineers Inc.	Day-to-day management of project including technical review of reports, budget, and schedule
Bill Pendexter	Quality Assurance Manager	973.576.9648	Dewberry Engineers Inc.	QA review of project deliverables

Name	Title	Telephone Number	Organizational Affiliation	Responsibilities
Thomas Cumello, PG	Health and Safety Officer/Field Supervisor	973.576.9685	Dewberry Engineers Inc.	HASP preparation and compliance/Field Supervision
Jameal Hammond	Assistant Engineer/Geologist	973.576.9645	Dewberry Engineers Inc.	Field Oversight
Michelle Kennedy	Environmental Laboratory Contact	973.244.9770 X119	Hampton Clarke	Environmental Laboratory Contact for all sampling analyses. Coordinate timely analysis of samples and provide final data

4.0 SAMPLING SCOPE OF WORK

The SI and RI sampling activities will be performed in accordance with this QAPP. According to the NJDEP TRSR Table 2-1 (Analytical Requirements for Petroleum Storage and Discharge Areas), the groundwater samples will be collected from the TWPs and analyzed for full Target Compound List/Target Analyte List constituents plus 30 additional, non-targeted peaks (TCL/TAL+30) and cyanide. TCL Base Neutral (BN) Secondary Ion Mass Spectrometry (SIMS) analyses will be done on the groundwater sample(s), so that the GWQS will be met. The groundwater samples will be analyzed by Hampton-Clarke Laboratory, located at 175 west Route 46, Fairfield, New Jersey. Laboratory analyses would be performed in accordance with the Standard Operating Procedures (SOPs) provided by Hampton-Clarke, as presented in Appendix A.
DATA QUALITY OBJECTIVES

The Data Quality Objectives (DQOs) for the project are to generate usable data of known and acceptable quality and integrity. DQOs are met by conducting field sampling and data collection activities in accordance with the FSPM and selecting an appropriate analytical methodology for sample analysis conducted by the selected laboratory.

The objectives for the Site are as follows:

- Benzene less than NJDEP's groundwater cleanup level of 1 micrograms per Liter (ug/L) – For benzene, the NJDEP Class II-A Groundwater Quality Standards (GWQS) is 1.0 ug/L
- Toluene less than NJDEP's groundwater cleanup level of 600 ug/L - For toluene, the NJDEP Class II-A GWQS is 600 ug/L
- Ethylenzene less than NJDEP's groundwater cleanup level of 700 ug/L - For ethylbenzene, the NJDEP Class II-A GWQS is 700 ug/L
- Total Xylenes– For M-xylene and P-xylene, and O-xylene, there are no NJDEP Class II-A GWQS.

The overall QA objective of the QAPP is to provide procedures which will verify that decisions based on laboratory and field data generated during this investigation are technically sound, statistically valid, and properly documented. The primary purpose of this Section is to define statistical acceptance criteria for

chemical data generated by the analytical laboratory. The measurement of quality includes the precision, accuracy, representativeness, comparability, and completeness parameters.

- Precision – Precision can be obtained by calculating the relative percent difference (RPD) between data obtained from duplicate sample analyses, and laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses. The RPD should not exceed an RPD of 30 percent for a water sample and 50 percent for a solid sample.
- Accuracy – Accuracy is the degree of agreement of a measured value and a known or true value. Analytical accuracy can be measured by measuring the percent recovery (%R) from samples spiked with reference standards (e.g., surrogate recoveries, laboratory control sample recoveries, matrix spike recoveries, reference material recoveries, etc.).
- Representativeness – Representativeness refers to selecting number of samples, sampling locations, and analyses in order to assess the site conditions.
- Completeness – Sampling completeness is determined by the number of valid samples collected relative to the number of samples planned for collection. Analytical completeness is determined by number of valid sample measurements relative to the number of valid samples collected.
- Comparability – Comparability is defined as the confidence level of one data set to another.

5.0 LABORATORY DELIVERABLES

NJDEP Level II, Level III, or NJDEP Reduced Data Deliverable/analytical laboratory DKQP will be ordered for the sampling data.

Electronic Data Deliverables (EDDs) will be processed and submitted to the NJDEP through the NJDEP Online Portal or via email.

6.0 FIELD SAMPLING PROCEDURES

The sample collection will comply with the NJDEP FSPM. Soil samples will be collected with a stainless-steel scoop or dedicated disposable sampling devices for surface and post-excavation soil samples. For sample collection using direct push technology and drill rig, samples will be collected from decontaminated carbon-steel split spoons or disposable macrocore liners.

Groundwater samples will be collected using dedicated polyethylene or Teflon-lined bailers. Other sampling methods will include the use of a stainless-steel submersible pump or peristaltic pump. A peristaltic pump will not be used for volatile and semi-volatile organic compounds (VOCs) as specified in the FSPM.

7.0 FIELD DOCUMENTATION

The sample containers will have proper identification/labels, including sample identification number, project number, project name (if needed abbreviated), analytical parameters, date and time of collection, sample depth, and as applicable preservative information. Each sample and sample collection method will be logged in the field log books. Field logs will record details such as purpose of work, area of work,

weather/day/time of the work, visual or field screening observations, field equipment calibration data, any deviation from the work plan, name and affiliations of visitors, subcontractors, the reason for visit, and any discussions related to the investigation and remediation activities at the site. The sampling details including sample identification number, date and time of collection, depth to groundwater (if known), and sample collection depth.

8.0 DECONTAMINATION

Reusable field equipment will be decontaminated to prevent cross-contamination prior to sampling and between sampling points. Decontamination will be completed by scrubbing the sampling equipment with laboratory-grade detergent and brush, rinsing it with tap water, and then rinsing with distilled/deionized water. Single-use/disposable sampling equipment will not be decontaminated.

9.0 SAMPLE HANDLING

The samples will be transported in coolers with ice to maintain a temperature of 4±2°C. A trip blank will accompany samples collected for VOCs. The samples will be accompanied by a completed chain-of-custody form.

10.0 ANALYTICAL METHODS, PRESERVATION, AND HOLD TIMES

The following table provides details regarding the analytical methods, preservation, and hold times associated with the different types of samples collected on this project. The waste characterization parameters may vary based on disposal facility requirements.

Analytical Parameter	Analytical Method	Sample Preservation	Sample Container	Holding Time
Groundwater Samples				
VOCs (BTEX)	SW846 5035/8260C	Cool, 4±2°C, HCl	3 200 ml glass vials	14 days until analysis

11.0 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

This section discusses field and laboratory QC requirements. Laboratory QC requirements are dictated, in large part, by the analytical methods.

The collection of duplicate samples provides an evaluation of the laboratory's and sampler's performance by comparing the analytical results of two samples from the same location. The sample should be submitted

to the laboratory as a "blind" sample. Duplicate requirements may be waived or expanded depending on the particular regulatory program or remedial phase involved. Collection of duplicate samples, if required, will be performed as per Section 2.5.7.1 of the FSPM, which is one duplicate sample per 20 samples.

For groundwater samples, one field blank per day will be collected to identify cross-contamination from sample equipment handling, sample preparation, storage, or transportation. Laboratory-provided water is passed through the field sampling devices and into the empty laboratory-provided containers. This procedure will demonstrate ambient conditions and equipment decontamination issues that can impact the sample data.

Because VOC analysis will be performed, one trip blank will be required for each cooler containing VOC samples.

Laboratory Quality Control Requirements

QC data are necessary to determine the precision and accuracy of the analyses and to demonstrate the absence of interferences and contamination of glassware and reagents. Laboratory-generated QC will consist of blanks, replicates, and standards (surrogate) injections. These will be prepared and analyzed at the method-required frequencies. Surrogates will be added to all samples requiring GC analyses (or as specified in the method). At a minimum, one method blank will be processed by the laboratory for every batch (up to 20 samples) analyzed. Blank samples will be analyzed in order to assess possible contamination and determine which corrective measures may be taken, if necessary.

Laboratory Duplicates

Replicate samples are aliquots of a single sample that are split upon arrival at the laboratory or prior to analysis. Laboratory duplicates are required by methods for inorganic analyses. Since it is anticipated that the concentrations of most organic parameters will be below the laboratory detection limits, precision data on replicate analyses will largely be derived from matrix spike duplicate data. Significant differences between two replicates that are split in a controlled laboratory environment will result in flagging (J or estimated, or * for duplicate analysis not within control limits) of the affected analytical results.

Surrogate Analysis

Surrogate spike analysis is used to determine the recovery efficiency of analytes in the sample preparation and analysis. The calculated percentage recovery of the spike is used as a measure of the accuracy of the total analytical method. A surrogate spike is prepared by adding to a sample (before extraction) a known amount of pure compound similar to that for which the sample is being analyzed. Surrogate compounds will be added to all samples that are to be analyzed for volatiles, semi-volatiles, and pesticides, including method blanks, duplicate samples, and matrix spikes using the compounds recommended in the respective methods. If a recovery does not fall within these limits, the corrective actions described in the method will be implemented.

Method Blanks

Method blanks will be run for all appropriate analyses to verify that the procedures used do not introduce contaminants that affect the analytical results. The method blank will be prepared by addition of all reagents to a substance of a similar matrix as the sample. This blank will then undergo all the procedures required for sample preparation. The resultant solution will be analyzed with the field samples prepared under identical conditions.

Deviations from the established QC criteria will be noted and reanalysis, or other corrective action, will be instituted as appropriate for the situation.

12.0 DATA REVIEW AND USABILITY

The data review and usability will encompass examining the fieldwork and laboratory analyses to determine any issues encountered that may jeopardize the usability of the data. The data review, which will be overseen by the LSRP, will compare the sample collection methods and the number/location of samples collected against what was proposed in the workplan. NJAC 7:26E does not specify requirements that the laboratory data be validated in-house or by a third party. If data validation is needed based on the project requirement or professional judgment, then the data will be reviewed and accepted, rejected, or qualified, as discussed in the Data Usability Assessment and Data Usability Evaluation Guidance Document. Data reliability will be discussed whether data validation is conducted or not. The data reviewer will contact the laboratory when any deficiency has been identified and will request further explanation. The corrective actions will be agreed on by the environmental consultant/LSRP and laboratory. If data is deemed unusable, then it will be flagged as rejected and/or will be appropriately flagged/qualified.

13.0 DATA MANAGEMENT AND DOCUMENTATION

Records generated during this project will be kept on file by Dewberry on behalf of O&R. These records may include field logbooks, field sampling forms, chain of custody forms, laboratory data deliverables, photographs, historic reports, this QAPP, and other relevant records.

Revisions and updates to this QAPP will be prepared as deemed necessary and/or based upon conditions observed in the field. A full revision to the QAPP will be prepared if work has not been completed within five years. This will ensure that laboratory changes or method improvements are addressed and that changes to program objectives or scope that may be made as a result of the information gathered in the initial program stages are incorporated into the overall QA/QC program.

Field Sample Collection Documents and Records	Analytical Laboratory Documents and Records	Data Assessment Documents and Records	Project File
• Site and field logbooks • Boring logs • Chain-of-custody forms • Field Data Sheets	• Sample receipt logs • Internal and external chain-of-custody forms • Equipment calibration logs • Sample preparation worksheets/logs • Sample analysis worksheets/run logs • Corrective action documentation (if required)	• Data validation reports • Field inspection checklist(s) • Laboratory Audit checklist (if performed) • Corrective action documentation (if required)	• The project file will be maintained by Dewberry's LSRP for a minimum period of 10 years following project completion.

APPENDIX A:
Analytical Laboratory SOPs

HAMPTON-CLARKE, INC.

STANDARD OPERATING PROCEDURE

DETERMINATION OF METALS USING INDUCTIVELY COUPLED PLASMA - 6010D (OPTIMA)

Prepared By: _____ Date: 6/20/19

Concurred By: _____ Date: 6/20/19
Technical Specialist

Approved By: _____ Date: 6/20/19
QA Officer

Approved By: _____ Date: 6/20/2019
Laboratory Director

DETERMINATION OF METALS USING INDUCTIVELY COUPLED PLASMA – 6010D (OPTIMA)
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Determination of Metals Using Inductively Coupled Plasma – 6010D (OPTIMA)

1.0 PURPOSE AND APPLICATION

1.1 The purpose of this procedure is to describe in detail the steps used in the performance of the analysis of metals in various media by Inductively Coupled Plasma Optical Emission Spectroscopy. This procedure describes the technique for the simultaneous multi-element determination of trace elements in solution.

1.2 This method is applicable to a large number of metals. All matrices - including groundwaters, aqueous samples, TCLP extracts, SPLP extracts, industrial wastes, soils, sludges, sediments and other solid wastes - require digestion prior to analysis.

1.3 This SOP is applicable to the elements and their reporting limits (RL) listed in Table 1.

2.0 REFERENCES

2.1 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW 846, 22nd Edition, EPA Method 6010D, Revision 4, July 2014.

2.2 Hampton-Clarke Quality Assurance Manual, current revision.

3.0 METHOD SUMMARY

3.1 The basis of the method is the measurement of atomic emission by an optical spectroscopic technique. Samples are nebulized and the aerosol produced is transported to the plasma torch where excitation occurs. Characteristic atomic-line emission spectra are produced by radio frequency inductively coupled plasma. The spectra are dispersed by a grating spectrometer and the intensities of the line emissions are monitored by photomultiplier cells. The photocurrents from the photomultiplier tubes are processed and controlled by a computer system.

4.0 SAMPLE COLLECTION, PRESERVATION AND STORAGE

4.1 Solid samples should be collected in 2 ounce glass jars. This volume will be sufficient to insure a representative sample, allow for replicate analysis, if required, and minimize waste disposal. If additional tests are being requested an 8 ounce jar is used. If the sample is an aqueous waste, the sample should be collected in a 16-ounce glass jar.

4.2 Holding time is 6 months days from date of collection.

4.3 Refrigerate samples at 4°C (± 2°C) upon receipt until analysis.

5.0 INTERFERENCES

5.1 Spectral interferences are caused by background emission from continuous or recombination phenomena, stray light from the line emission of high concentration elements, overlap of a spectral line from another element, or unresolved overlap of molecular band spectra.

5.1.1 Background emission and stray light can usually be compensated for by subtracting the background emission determined by measurements adjacent to the analyte wavelength peak. Spectral scans of samples or single element solutions in the analyte regions may indicate when alternate wavelengths are desirable because of severe spectral interference. These scans will also show whether the most appropriate estimate of the background emission is provided by an interpolation from measurements on both sides of the wavelength peak or by measured emission on only one side. The locations selected for the measurement of background intensity will be determined by the complexity of the spectrum adjacent to the wavelength peak. The locations used for routine measurement must be free of off-line spectral interference (interelement or molecular) or adequately corrected to reflect the same change in background intensity as occurs at the wavelength peak.

5.1.2 To determine the appropriate location for off-line background correction, scan the area on either side adjacent to the wavelength and record the apparent emission intensity from all other method analytes. This spectral information must be documented and kept on file. A computer routine is used for automatic correction on all determinations. If a wavelength other than the recommended wavelength is used, the analyst must determine and document both the overlapping and nearby spectral interference effects from all method analytes and common elements and provide for their automatic correction on all analyses. Perform tests to determine spectral interference using the ICSA.

5.1.3 Spectral overlaps are avoided by using an alternate wavelength and / or compensated by equations that correct for interelement contributions. The Optima 3000DV uses equations for interelement correction. The interfering elements are analyzed at the same time as the element of interest, as required. The analyst will apply interelement correction equations determined on their instruments with tested concentration ranges to compensate (off line or on line) for the effects of interfering elements.

5.1.4 When using interelement correction equations, interference express analyte concentration equivalents (i.e. false analyte concentrations) arising from 100 mg/L of the interference element. For example, assume that As is to be determined (at 193.696 nm) in a sample containing approximately 10 mg/L of Al. According to Table 2, 100 mg/L of Al would yield a false signal for As equivalent to approximately 1.3 mg/L. Therefore, the presence of 10 mg/L of Al would result in a false signal for As equivalent to approximately 0.13 mg/L.

5.1.5 Interelement corrections will vary depending upon the choice of background

correction points. Avoid selecting a background correction point where an interfering emission line may appear. Interelement corrections that constitute a major portion of an emission signal may not yield accurate data. Do not forget that some samples may contain uncommon elements that could contribute spectral interferences.

5.1.6 The intensities will vary not only with optical resolution but also with operating conditions (such as power, viewing height and argon flow rate). When using the recommended wavelengths, the analyst is required to determine and document for each wavelength the effect from referenced interferences (Table 5) as well as any other suspected interferences that may be specific to the instrument or matrix..

5.2 Physical interferences are effects associated with the sample nebulization and transport processes. Changes in viscosity and surface tension can cause significant inaccuracies, especially in samples containing high dissolved solids or high acid concentrations. If physical interferences are present, they must be reduced by diluting the sample. Another problem that can occur with high dissolved solids is salt buildup at the tip of the nebulizer, affecting aerosol flow rate and causing instrumental drift. This problem is controlled by using a high solids nebulizer.

5.3 Chemical interferences include molecular compound formation, ionization effects, and solute vaporization effects. Normally, these effects are not significant with the ICP technique, but if observed, can be minimized by careful selection of operating conditions (incident power, observation position, and so forth) and by matrix matching. Chemical interferences are highly dependent on matrix type and the specific analyte element.

5.4 Memory interferences result when analytes in a previous sample contribute to the signals measured in a new sample. Memory effects can result from sample deposition on the uptake tubing to the nebulizer and from the build up of sample material in the plasma torch and spray chamber. The site where these effects occur is dependent on the element and can be minimized by flushing the system with a rinse blank between samples. The possibility of memory interferences should be recognized within an analytical run and suitable rinse times should be used to reduce them. A rinse time of at least 60 seconds is used. If memory interference is suspected, the sample must be reanalyzed after a rinse period of sufficient length. Alternate rinse times may be established by the analyst based upon DQOs.

5.5 The dashes in Table 5 indicate that no measurable interferences were observed even at higher interferent concentrations.

6.0 SAFETY

6.1 Each reagent and chemical used in this method should be regarded as a potential health hazard and exposure should be as low as reasonably achievable.

6.2 Always wear safety goggles, gloves and protective clothing (Lab Coat) when working with theses chemicals and reagents.

6.3 Due to ultraviolet emissions, the ICP should only be viewed with the proper eye protection.

7.0 REQUIRED EQUIPMENT

7.1 Inductively Coupled Plasma Atomic Emission Spectrometer
(PE OPTIMA 8300DV / PE OPTIMA 4300DV/ OPTIMA 7300DV)

7.2 Computer (PC Positive).

7.3 Printer (Hewlett-Packard Laser Jet Series II).

7.4 Autosampler, Perkin-Elmer AS91

7.5 Variable speed peristaltic pump

7.6 Argon gas supply and compressed air and nitrogen supply, high purity (99.99%).

7.7 Eppendorf pipettes – assorted (20 to 5000 ul) with disposable tips, calibrated.

7.8 Volumetric flasks, Class A.

7.9 15 mL centrifuge tubes.

7.10 Air compressor.

7.11 Nitrogen gas supply, high purity (99.99%).

8.0 STANDARDS AND REAGENTS

8.1 Hydrochloric acid, conc. 36.5 - 38.0% (sp gr 1.19), trace metal grade.

8.2 Nitric acid, conc. 70.0 - 71.0% (sp gr 1.43), trace metal grade.

8.3 Deionized Water, conductivity < 2.0 uhoms/cm.

NOTE: All standards and blanks are acidified with 5% Nitric and Hydrochloric acid.

8.4 Rinse Blank - used to flush the instrument uptake system and nebulizer between standards, samples and check solutions (5% HNO_3, 5% HCl). Prepare a sufficient quantity to be used to flush the system between standards and samples.

8.5 Calibration Blanks - used in establishing the analytical curve. Prepared in the same concentration of acid as the calibration standard. For preparation use Table 1.

8.6 Standard calibration stock solutions - Purchased from commercial vendors. All purchased calibration standards must be traceable to NIST. Certificates of purity must accompany commercially prepared standards and are maintained on file in the Metals Laboratory.

8.6.1 Calibration Standards (ICS-2 , ICS-3 & ICS-4) - used to calibrate the instrument response with respect to analyte concentration. See Table 6 for concentrations. For preparation use Table 1.

8.6.2 Initial Calibration Standard 3 (ICS-3) - used to verify instrument performance after calibration. See Table 6 for element concentrations. For preparation use Table 1.

8.6.3 Initial Calibration Standard 2 (ICS-2) - used to verify instrument performance after calibration. Concentrations are the same as the RL. See Table 6 for element concentrations. For preparation use Table 1.

8.6.4 Linear Range Standard (LRS)- Establishes the highest concentration that may be reported without diluting the sample. See Table 6 for concentrations. For preparation use Table 1.

8.7 ICV – must be analyzed immediately following the ICSA(SIC). The quality control sample for the initial calibration verification must be in the same acid matrix as the calibration standards and in accordance with the instructions provided by the supplier. The concentration of the ICV must be near the midpoint of the calibtration curve. This sample must come from a different source other than that used for calibration. For preparation use Table 1. See table 6 for element concentration.

8.8 Initial Calibration Blank (ICB) - must analyzed immediately following ICV. See section 8.5. For preparation use Table 1.

8.9 Continuing Calibration Verification and Continuing Calibration Blank (CCV, and CCB) - used after every tenth sample (or more frequently if desired) and at the end of a sample run to verify instrument performance during analysis.

8.9.1 CCV - the instrument check standard for continuing calibration verification is prepared by the analyst by combining compatible elements at a concentration equivalent to the mid-points of their respective calibration curves. See Table 6 for element concentrations. For preparation use Table 1.

8.9.2 CCB - see section 8.5.

TABLE 1 -PREPARATION OF CALIBRATION STANDARDS

Solution	CAL 1	CAL 2	ICV 1	ICV 2	ICSA	LRS 1B	LRS 1C	LRS 2D	LL-SOIL	LL-LEACH	LL-AQ	B	Si	HNO3	HCL	FINAL VOL.
ICB/CCB														50mL	50ml	1000mL
ICS2 (SOIL)									10mL			.2mL	.1mL	50ml	50ml	1000ml
ICS2 (LEACH)										10mL		.2mL	.1mL	50ml	50ml	1000ml
ICS2 (AQ)											5mL	.1mL	.05ml	25mL	25ml	500mL
ICS3	5mL	5mL										.5mL	5ml	50ml	50ml	1000ml
ICS4	5mL	5mL										.5mL	5ml	25mL	25mL	500ml
ICSA					50mL									50ml	50ml	1000ml
LRS						50mL	50mL					2.5ml	12.5ml	25mL	25mL	500ml
LRS (alternate)						50mL		50ml				2.5ml	12.5ml	25mL	25mL	500ml
ICV/CCV			10ml	10ml								0.5ml*	5ml*	50ml	50ml	1000ml

*ICV/CCV must use different source from calibration standards

8.10 Spectral Interference Check (SIC = ICSA) - must be analyzed at the start of a sample run. The solution contains concentrations of interfering elements at levels that will provide an adequate test of the correction factors. The interference check sample is purchased from a Commercial Vendor (SCP Science). See Table 6 for element concentrations.

8.11 Interelement Correction Factors (IEC) - When interelement corrections are applied, IEC solutions are needed containing concentrations of the interfering elements at levels that will provide an adequate test of the correction factors.

8.11.1 Single Element solutions containing Al (500mg/L), B (5mg/L), Ba (50mg/L), Ca (500mg/L), Cu (25mg/L), Fe (400mg/L), Mg (500mg/L), Mn (25mg/L), Mo (50mg/L), Ni (50mg/L), Se 25mg/L), Si (25mg/L), Sn (25mg/L), Ti (25 mg/L), V (50mg/L) and Zn (25mg/L).

NOTE: Example interferences are found in Table 4. Actual interferences must be determined on each instrument and may vary.

8.12 LCS and MS/MSD Spiking Solutions - see table 7 for aqueous spiking concentrations. A solid Certified Reference Material is purchased from ERA (cat # 540) and is used for soils.

8.13 POST DIGESTION SPIKE – If the MS/MSD recoveries are unacceptable, the same sample from which the MS/MSD aliquots were prepped should be spiked with a post digestion spike. Add 0.2 ml of spiking solution to 20 ml portion of sample. Otherwise, another sample from the same preparation batch should be used as an alternative. An analyte spike should be recovered within 75-125% of the known value. If both the MS/MSD and Post Digestion Spike fail, then matrix effects are confirmed. See Table 7 for spiking concentrations.

8.14 Internal Standard Solution: 2ppm of Scanadium and 1ppm of Ytrium in 5% HNO3 and 5% HCL. Used on OPTIMA 4300DV, OPTIMA 7300DV, OPTIMA 8300.

8.15 For oil samples prepared by SW846 3031, prepare the Calibration Blanks, Calibration standards, calibration verification standards and IEC check standards with 2% HNO_3, 10% HCl and 1.5% H_2SO_4.

8.16 Intermediate Standard Solution for Boron and Silicon 100ppm. To a 50ml volumetric add 10 ml of deionized water, 2.5 ml of Nitric Acid, 2.5 ml Hydrochloric Acid, 5 ml of stock Boron (1000ug./ml) and 5ml stock Silicon (1000ug/ml). Bring to a final volume of 50ml with dieonized water.

9.0 INSTRUMENT SET-UP

9.1 Checking the system.

9.1.1 Argon supply: be sure that an adequate supply of argon is available and is connected to the system. Check that the cylinder valve is open and the regulator is set within the range of 550-825 kPa (80-120 psig).

9.1.2 Nitrogen supply: be sure that an adequate supply of nitrogen is available and is connected to the system. Check that the cylinder valve is open and the regulator for the nitrogen outlet pressure is set within the range of 220-825 kPa (30-120 psig).

9.1.3 Compressed air: check that the pressure for the air compressor, the prassure should be around 450 kPa (65 psig).

9.1.4 Cooling water supply: check that the cooling water supply is connected to the back of the instrument. Be sure the chiller is turned on and has been filled with water.

9.1.5 Sample introduction system: inspect the torch, glassware, and aerosol injector tube. The glassware should be clean (a small amount of deposits is acceptable in most cases). Check that the RF coil is clean. Be sure that the coil is dry. If necessary, use a soft cloth to dry it.

9.1.6 Peristaltic pump and tubing: change the pump tubing daily. Check that the pump rollers are clean and can move freely.

9.1.7 Drains: check that the spray chamber drain is properly set up on the pump so that waste is pumped out of the spray chamber. Empty the drain bottle if necessary.

9.1.8 Auto sampler: install the tray in the auto sampler and place the wash beaker in the rear left of the tray (location 0). Check that the sampling probe is installed at the correct height and the probe capillary is attached to the pump tubing for the sampling.

9.1.9 Printer: check that the printer is on and has an adequate supply of paper to print the results on.

9.2 Starting the instrument and accessories.

9.2.1 Put the main instrument switch on. Usually, this switch should remain on to avoid a waiting period for instrument startup

9.2.2 Put the RF generator standby switch on (if it is not already on).

9.2.3 Switch on the computer, monitor, and printer.

9.2.4 From program manager, double-click on the Win Lab32 icon. It will verify the instrument configuration such as: "auto sampler"; "plasma view"; etc.

9.2.5 Click the PLASMA switch to ON in the plasma control window (or press F9) to turn on the plasma. A successful ignition is indicated by the message on the status line on the computer. The yellow plasma on light on the front of the instrument will be on.

9.2.5.1 A stable plasma will be situated just above the inner quartz tube in the torch and will have a bright discharge.

9.2.5.2 Allow the plasma to warm up for 1/2 hour before starting analysis. This will allow the temperature of the sample introduction system to fully stabilize.

9.3 At the beginning of each day, once the instrument has had adequate time to warm-up (allow at least a ½ hour for stabilization) , profile the instrument.

9.3.1 Ignite torch and wait ½ hour for stabilization.

9.3.2 Select MANUAL for the run mode.

9.3.3 Go to METHOD and select PE1 axial / PE2 axial.

9.3.4 Go to "Results Data Set Name" and name the data as "Profile."

9.3.5 Place the sampler probe into a 1 ppm solution of Mn and Cu. Press ANALYZE SAMPLE button. The instrument will begin to analyze the sample.

9.3.6 When the instrument is finished analyzing, exit "Manual."

9.3.7 Go to "Exam" and press DATA, then press DATA SET, and then open "Profile."

9.3.8 Select profile ID, press OK.

9.3.9 Select Mn, press OK.

9.3.10 The Mn peak will be displayed. Go to FILE and then print.

9.3.11 Calculate the Cu/Mn ratio of mean corrected intensities. Record in run log. Save the printed report in the binder. Make sure the range is between 0.1-0.5. If it is outside the limit, the problem must be corrected before sample analysis may begin.

10.0 CALIBRATION AND SAMPLE ANALYSIS.

10.1 To analyze samples automatically a new sample information must be created file or an available sample information file must be modified (which must include the parameters needed to describe the sample).

NOTE: Modifying an existing file is the more common procedure.

10.1.1 To modify a saved sample information file, select FILE and click on OPEN and select SAMPLE INFO FILE. Select the sample information file that has been chosen for modification and click OK. Enter autosampler locations and ID on sample information file.. To save the file with a new name, Select FILE and click on SAVE AS and click on SAMPLE INFO FILE. When the save as dialog appears, type the desired name for the file and then click O.K.

10.1.2 Performing automated analysis.

10.1.2.1 To perform an automated analysis click on AUTO on the toolbar. Double-click on an entry field in the Method column and in the "Open Method" dialog box that appears, select a method.

10.1.2.2 To specify the name of the sample information file, click on OPEN at sample information file. Select the name of the sample information file. Then select the box in the "Defined In the Sample Info File" column. If only a portion of the samples in the sample information file need to be analyzed, type the individual locations in the "Locations" column. Use commas to separate the locations and ranges. Do not enter locations of blank, QC, check or calibration solutions (10-15,18,20,25-30; e.g.).

10.1.2.3 To save the results data set, click on OPEN at "Results Data Set Name". Type a new data set name (example batch name: B1749A) or select an existing one. Select SAVE DATA box to save the data. Select PRINT LOG box to print the data.

10.1.2.4 Select SET for automatic shutdown/startup of the instrument. Select options controlling time and events to occur at shutdown and startup.

10.1.2.5 Click on Analyze to open the automated analysis control window. There are two options for calibration and analysis:

1) Select ANALYZE ALL to calibrate and analyze samples.

2) First select CALIBRATE for calibration only. Once calibration is completed, click on ANALYZE SAMPLES to start analyzing samples.

11.0 CALCULATIONS

11.1 Analyze and report reagent (prep) blanks in the appropriate units, mg/L for water and mg/kg for soil (ppm).

11.2 If dilutions are performed, the appropriate factor(s) must be applied to the sample values, as well as MDL's.

11.3 Final concentrations (C_f) on solid matrices are calculated as follows:

$$C_f = \frac{C_s * V}{W} * \frac{1}{D}$$

where, C_s = sample concentration
V = final volume (ml)
W = sample weight (g)
D = dryness factor - dry weight as a decimal fraction (i.e. 80% dry weight is a 0.80 dryness factor)

11.4 Individual component percent recoveries (P) are calculated as follows:

$$P = \frac{(S - U) * 100}{T}$$

where, S = spiked sample conc. (mg/L)
U = unspiked sample conc. (mg/L)
T = theoretical spike (mg/L)

11.5 The relative percent difference (RPD) for each component is calculated as follows:

$$RPD = \frac{|(F - G)| * 100}{(F + G) / 2}$$

where, F = original sample result
G = duplicate result

11.6 The percent differences for each component for serial dilutions are calculated as follows:

$$\% \text{ difference} = \frac{I - S}{I} * 100$$

where, I = initial sample result
S = serial dilution result

12.0 QUALITY CONTROL

12.1 Prior to the analysis of samples the following requirements must be met (This must be repeated annually).

12.1.1 Background Correction Points must be determined prior to the analysis of samples and the information documented. Analyze low and high levels of single element solutions and plot them to view if any points are needed.

12.1.2 Interelement Correction Factors (IEC) - Determine the IEC prior to the analysis of samples and every 6 months thereafter.

12.1.2.1 The ICSA is run at the beginning of each analytical run.

12.1.3 Linear Range Standard (LRS) - Determine the LR for each element prior to the analysis of any samples. A standard at the LR must be analyzed for every element and recovered within 10%. The Linear Range Standard must be included with each analytical run.

12.1.4 Instrument Detection Limit (IDL) - The concentration equivalent to the analyte signal which is equal to three times the standard deviation of a series of ten replicate measurements of the calibration blank signal at the same wavelength. This must be done quarterly.

12.1.5 Method Detection Limit (MDL) - An MDL must be determined for each analyte prior to the analysis of any samples and ***annually*** thereafter. The initial MDL is determined by analyzing 7 (or more) spiked samples and 7 (or more) blank samples, which are prepared and analyzed on three separate days. The higher of the two values is then used as the MDL. Thereafter, all method blank results from the previous two years are used to calculate the MDL(blank) value, while MDL spiked samples are prepared and analyzed every quarter (minimum 2 samples per quarter). The spiked samples from the last two years are used to calculate the MDL(spike). After determining MDL(blank) and MDL(spike), the two values are compared, with the higher of the two values being used as the MDL.

12.1.6 Reporting Limit (RL) – The reporting limit is the level at which a hit for an analyte is reported. Any concentration below the RL is reported as ND. The RL is greater than the MDL but less than or equal to the regulatory limits.

12.1.7 Lower Limit of Quantitation Check Sample (LLQC) – must be analyzed after establishing the laboratory RL and on an as needed basis to demonstrate the desired detection capability. The LLQC is initially determined with seven replicate samples spiked at the RL, then processed through all preparation and analysis steps of the method. The mean recovery should be within 35% of the true value and the RSD $\leq$20%. This check is used to both establish and confirm the lowest quantitation limit. Thereafter, the LLQC must be confirmed quarterly by processing a single sample through all steps of the method and achieving a recovery within 35% of the true value.

12.2 Initial Calibration - A calibration curve must be run prior to sample analysis. A minimum correlation coefficient of 0.998 must be obtained to meet internal QC requirements. If the correlation coefficient of 0.998 is not met, a new calibration curve must be prepared and

analyzed. An initial calibration verification (ICV) is analyzed immediately after standardization and must be ± 10% recovery of known true value. If the ICV fails, it warrants corrective action, which includes, but not limited to recalibrating.

12.3 Instrument Check Standards - Check the instrument calibration by analyzing appropriate quality control check standards as follows:

12.3.1 The Mid Calibration Standard (ICS-3) should be run prior to the beginning of the batch run. The results should agree within 10 % of the true value.

If the result is not within the control limit, terminate the analysis, correct the problem and recalibrate the instrument. If this does not correct the problem, prepare new stock and calibration standards and repeat the calibration.

12.3.2 Low Calibration Standard (ICS-2) – This standard must be analyzed prior to sample analysis. The results are to agree within 20% of the true value. Concentrations in the ICS-2 must be at or below the RL.

12.3.3 Linear Range Standard (LRS) - This standard may be analyzed during sample analysis. The results are to agree within 10% of the true value. If the LRS is not run or if it fails, the Linear Range is instead the concentration of the highest calibration standard.

12.3.4 Initial Calibration Verification (ICV) - A quality control sample must be used daily for the ICV. The results are to agree within 10% of the true value. This standard must be prepared from a different stock source than the calibration standard.

If the result is not within the control limit, terminate the analysis, correct the problem, and recalibrate the instrument. If this does not correct the problem, prepare a new stock standard and a new calibration standard and repeat the calibration.

12.3.5 Analyze the Initial Calibration Blank (ICB) following the ICV. The blank results must be below 1/2 RL.

If the result is not within the control limit, terminate the analysis, correct the problem, recalibrate, and reanalyze the previous 10 samples.

12.3.6 For continuing calibration verification (CCV), analyze an appropriate instrument check standard containing the elements of interest every 10 samples and at the end of the analytical sequence. This check standard is used to determine instrument drift. If agreement is not within 10% of the true values, the analysis is out of control. The analysis must be terminated, the problem corrected, the instrument re-calibrated, and the preceding 10 samples re-analyzed.

12.3.7 Analyze the Continuing Calibration Blank (CCB) every 10 samples. The blank results must be below the RL.

If the result is not within the control limit, terminate the analysis, correct the problem, recalibrate, and reanalyze the previous 10 samples.

12.3.8 To verify inter-element and background correction factors, analyze the interference check samples at the beginning of the sample run or a minimum of once per day, whichever is more frequent. Results should fall within 20% of the true value. For the analytes that are not present in the interference check samples, the results must be less than the reporting limit.

12.4 Sample Quality Control

12.4.1 Sample must be analyzed within six months from date of collection.

12.4.2 All sample analyses must use the average of at least three integrations.

12.4.3 Dilute and reanalyze samples with target analytes that exceed the linear calibration range. All measurements (both target analytes and constituents which interfere with the target analytes) need to be within the instrument linear range where the correction equations are valid.

NOTE: For samples with Ag exceeding the Linear Range, the sample must be redigested at a lower concentration due to the likelihood of Ag having precipitated out of solution.

12.4.4 Method Blank (MB) - An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process. Method blanks are run a frequency of 1 per batch of 20 samples.

For a method blank to be acceptable for use with the accompanying samples, the concentration in the blank of any analyte of concern should not be higher than the highest of either:

1) ½ the reporting limit, or

2) Project specific requirements for that analyte, or

3) Ten percent of the measured concentration in the sample.

If the method blank exceeds the criteria, but the sample concentrations are below the Reporting Limit, then the sample data may be used despite the contamination of the Method Blank.

12.4.5 Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS and LCSD) - Each digestive batch must contain a LCS/LCSD pair. For aqueous samples, the LCS/LCSD must recover within 80-120%. For soil samples, the LCS/LCSD must recover

within the QC Performance Acceptance Limits specified on the Certified Reference Material data sheet. If the recovery is outside control limits the batch, including all associated samples, must be redigested and reanalyzed.

NOTE: If either the Method Blank or LCS cannot be considered aceeptable, the Method Blank or LCS should be reanalyzed once, and if still unacceptable, then all sample associated with the MB or LCS must be reprepped and reanalyzed.

12.4.5.1 If the RPD fails for both the Sample Duplicate and the MS/MSD pair, the batch can be accepted if the LCS/LCSD RPD is ≤20%. (See 12.4.6.3 and 12.4.7.2.)

12.4.6 Serial Dilution Analysis

12.4.6.1 For every sample matrix, a 1:5 serial dilution must be run with every batch. If the analyte concentration is sufficiently high (a factor of 5x above the Reporting Limit after dilution at a minimum) the serial dilution must be within 20% of the original determination. If not, a chemical or physical interference should be suspected.

12.4.6.2 See section 10.6 in order to calculate the percent recovery for each serial dilution.

12.4.7 Matrix Spike/Matrix Spike Duplicate/Post Spike

12.4.7.1 At least one pre-digestion spiked sample analysis must be performed on each group of samples of a similar matrix type, for each batch of samples, or for each 20 samples received, whichever is more frequent. Samples identified as field blanks cannot be used for spiked sample analysis.

12.4.7.2 Spike the unspiked aliquot of the sample at a minimum level of 10x the IDL (maximum of 100x) or mid-range of the working analyte curve. If the spike is not recovered within the specified limits, a matrix effect should be suspected.

12.4.7.3 Soil and aqueous Matrix Spike recovery must be within 75-125% and the RSD must be ≤20%. If the matrix spike recovery does not fall within the acceptance limits, matrix effects may be suspected. If an MS/MSD pair does not confirm either high or low recoveries the data may be accepted on the basis of the LCS recoveries - since the MS/MSD recoveries are displaying matrix interference effects.

12.4.7.4 POST DIGESTION SPIKE – If the MS/MSD recoveries are unacceptable, the same sample from which the MS/MSD aliquots were prepped should be spiked with a post digestion spike. Add 0.2 ml of spiking solution (see Table 8) to 20 ml portion of sample. Otherwise, another sample from the same preparation batch should be used as an alternative. An analyte spike should be recovered within 75-125% of the known value. If both the MS/MSD and Post Digestion

Spike fail, then matrix effects are confirmed. See Table 7 for spiking concentrations.

12.4.8 Duplicate Sample Analysis

12.4.8.1 At least one duplicate sample must be analyzed from each group of samples of a similar matrix type, for each 20 samples received. The relative percent difference is to be within 20% or established control chart limits, whichever is less.

12.4.8.2 If RPD is not within limit of 20%, the results can be accepted on the basis of RPD between LCS/LCSD.

12.4.8.3 See section 8.6 in order to calculate the relative percent difference between replicates.

13.0 NONCONFORMANCE AND CORRECTIVE ACTION

13.1 Any deviation from this procedure must be documented on a nonconformance memo.

13.2 Quality control samples outside the specified acceptance criteria must be documented on a nonconformance memo.

14.0 RECORDS MANAGEMENT/DOCUMENTATION

14.1 All data and calculation sheets, including QA\QC documentation, must be initialed and dated by the analyst.

14.2 These sheets must then be reviewed according to standard review policies. Upon satisfactory completion of review, as indicated by the Supervisor's or their designee signature, original sheets are to be retained by the Laboratory Supervisor in instrument-specific files. As necessary, these files will be indexed and archived.

14.3 Copies of data and calculation sheets and QC data will be submitted for QC review and final report preparation with completed Sample Routing Sheets. Final results will be entered into Aspen by the Laboratory Supervisor or his/her designee.

14.4 All analysis run logs, preparation logs, standard preparation logs and material procurement logs shall be maintained in the Metals Laboratory. As archival becomes necessary, all records shall be indexed and filed.

15.0 POLLUTION PREVENTION

15.1 The chemicals needed for these analyses are purchased as needed, therefore eliminating the disposal of unused expired standards.

15.2 The sample bottles provided are appropriate to obtain a representative sample, but limit the amount of sample required for disposal.

16.0 WASTE MANAGEMENT

16.1 Samples and chemicals are disposed of following the procedures outlined in SOP 7003 (Sample Storage and Disposal).

16.1.1 All samples and chemicals are collected in a 55 gallon drum. After retaining a large amount, the waste is pH adjusted to $\geq$5 units and the waste is disposed in the sanitary sewer with copious amounts of water.

17.0 ESTIMATION OF UNCERTAINTY OF MEASUREMENT

17.1 Refer to SOP No. 1013 for calculation of estimation of uncertainty associated with an analytical result. The calculated estimation of uncertainty for this method is listed below:

Aqueous

% Recovery	Mean X	S	SD2	SD3	RSD	Element
95	94.4	2.81724016	5.63448032	8.45172047	0.02984365	Aluminum
97	95.65	2.66112362	5.32224725	7.98337087	0.02782147	Antimony
98	97.2	2.30788123	4.61576247	6.9236437	0.02374363	Arsenic
101	99.2	2.68720164	5.37440327	8.06160491	0.02708873	Barium
100	97.15	2.64127162	5.28254325	7.92381487	0.02718756	Beryllium
99	96.25	2.3813972	4.7627944	7.1441916	0.02474179	Cadmium
98	96.95	2.78104486	5.56208972	8.34313459	0.02868535	Calcium
100	97.15	2.68082862	5.36165725	8.04248587	0.02759474	Chromium
101	98.35	2.64127162	5.28254325	7.92381487	0.02685584	Cobalt
100	96.7	2.57722821	5.15445643	7.73168464	0.02665179	Copper
101	97.7	3.24605023	6.49210046	9.73815069	0.03322467	Iron
98	95.95	2.7042851	5.4085702	8.1128553	0.02818432	Lead
99	98.55	2.50210438	5.00420875	7.50631313	0.02538919	Magnesium
101	97.7	2.83028732	5.66057464	8.49086196	0.02896916	Manganese
100	99.05	2.30502883	4.61005765	6.91508648	0.02327137	Molybdenum
101	98.85	2.60111312	5.20222624	7.80333937	0.02631374	Nickel
96	96.1	2.77014155	5.5402831	8.31042465	0.02882561	Selenium
99	95.4	2.66359472	5.32718944	7.99078417	0.02792028	Silver
99	96.95	2.92853475	5.8570695	8.78560425	0.03020665	Sodium
99	98.7	3.1472628	6.29452561	9.44178841	0.03188716	Thallium
100	98.8	3.17224808	6.34449616	9.51674425	0.03210777	Tin
98	98.05	2.23547946	4.47095892	6.70643838	0.02279938	Titanium
100	97.8	2.56699702	5.13399403	7.70099105	0.02624741	Vanadium
101	97.95	2.62528194	5.25056388	7.87584582	0.02680227	Zinc
99	96.05	2.92853475	5.8570695	8.78560425	0.03048969	Potassium

Aqueous cont'd

95% Upper Limit	95% Lower Limit	99% Upper Limit	99% Lower Limit	Element
100.0344803	88.7655197	102.85172	85.9482795	Aluminum
100.9722472	90.3277528	103.633371	87.6666291	Antimony
101.8157625	92.5842375	104.123644	90.2763563	Arsenic
104.5744033	93.8255967	107.261605	91.1383951	Barium
102.4325432	91.8674568	105.073815	89.2261851	Beryllium
101.0127944	91.4872056	103.394192	89.1058084	Cadmium
102.5120897	91.3879103	105.293135	88.6068654	Calcium
102.5116572	91.7883428	105.192486	89.1075141	Chromium
103.6325432	93.0674568	106.273815	90.4261851	Cobalt
101.8544564	91.5455436	104.431685	88.9683154	Copper
104.1921005	91.2078995	107.438151	87.9618493	Iron
101.3585702	90.5414298	104.062855	87.8371447	Lead
103.5542088	93.5457912	106.056313	91.0436869	Magnesium
103.3605746	92.0394254	106.190862	89.209138	Manganese
103.6600577	94.4399423	105.965086	92.1349135	Molybdenum
104.0522262	93.6477738	106.653339	91.0466606	Nickel
101.6402831	90.5597169	104.410425	87.7895753	Selenium
100.7271894	90.0728106	103.390784	87.4092158	Silver
102.8070695	91.0929305	105.735604	88.1643957	Sodium
104.9945256	92.4054744	108.141788	89.2582116	Thallium
105.1444962	92.4555038	108.316744	89.2832558	Tin
102.5209589	93.5790411	104.756438	91.3435616	Titanium
102.933994	92.666006	105.500991	90.0990089	Vanadium
103.2005639	92.6994361	105.825846	90.0741542	Zinc
101.9070695	90.1929305	104.835604	87.2643957	Potassium

Upper Limit	Lower Limit	Upper Limit	Lower Limit	
118.2429803	95.4570197	123.93947	89.7605296	Mercury

Soil

Mean X	Aver % Rec	S	SD2	SD3	RSD	Element
100.736842	100.933518	3.41308113	6.82616226	10.2392434	0.03388116	Aluminum
97.45	97.4725	2.7042851	5.4085702	8.1128553	0.02775049	Antimony
97.9	97.745	3.32296633	6.64593267	9.968899	0.03394245	Arsenic
102.85	102.8925	2.71981036	5.43962073	8.15943109	0.02644444	Barium
96.95	96.9975	1.9594575	3.91891499	5.87837249	0.02021101	Beryllium
99.3	99.365	2.69697687	5.39395373	8.0909306	0.02715989	Cadmium
101.35	101.2675	4.09460492	8.18920985	12.2838148	0.04040064	Calcium
101.9	101.995	2.51102831	5.02205661	7.53308492	0.02464208	Chromium
100.95	101.0975	2.76205492	5.52410984	8.28616475	0.02736062	Cobalt
99.65	99.7325	2.39022131	4.78044261	7.17066392	0.02398616	Copper
99.4	99.62	3.18549343	6.37098687	9.5564803	0.03204722	Iron
99.25	99.2125	2.76966652	5.53933304	8.30899956	0.02790596	Lead
98.5	98.525	2.70477161	5.40954322	8.11431484	0.02745961	Magnesium
100.8	100.84	2.44087991	4.88175982	7.32263973	0.02421508	Manganese
101.25	101.2625	2.63328892	5.26657784	7.89986675	0.02600779	Molybdenum
100.65	100.7325	2.92493815	5.84987629	8.77481444	0.02906049	Nickel
96.1	96.105	3.50788585	7.01577171	10.5236576	0.03650245	Selenium
96.4	96.47	2.76062541	5.52125081	8.28187622	0.02863719	Silver
99.75	99.9375	2.80741499	5.61482999	8.42224498	0.02814451	Sodium
102.95	103.0475	3.15352768	6.30705536	9.46058305	0.03063164	Thallium
102.85	102.6925	3.74552364	7.49104729	11.2365709	0.03641734	Tin
99.5	99.575	2.28265773	4.56531546	6.84797319	0.02294128	Titanium
101.15	101.2075	2.30045762	4.60091524	6.90137286	0.02274303	Vanadium
100.75	100.7875	3.04138127	6.08276253	9.1241438	0.03018741	Zinc
98.45	98.6225	2.7429335	5.48586701	8.22880051	0.02786118	Potassium

Mean X		S			RSD	
92.9	92.695	4.76721258	9.53442516	14.3016377	0.05131553	Mercury

Soil cont'd

95% Upper Limit	95% Lower Limit	99% Upper Limit	99% Lower Limit	Element
107.5630044	93.9106798	110.976085	90.4975987	Aluminum
102.8585702	92.0414298	105.562855	89.3371447	Antimony
104.5459327	91.2540673	107.868899	87.931101	Arsenic
108.2896207	97.4103793	111.009431	94.6905689	Barium
100.868915	93.031085	102.828372	91.0716275	Beryllium
104.6939537	93.9060463	107.390931	91.2090694	Cadmium
109.5392098	93.1607902	113.633815	89.0661852	Calcium
106.9220566	96.8779434	109.433085	94.3669151	Chromium
106.4741098	95.4258902	109.236165	92.6638352	Cobalt
104.4304426	94.8695574	106.820664	92.4793361	Copper
105.7709869	93.0290131	108.95648	89.8435197	Iron
104.789333	93.710667	107.559	90.9410004	Lead
103.9095432	93.0904568	106.614315	90.3856852	Magnesium
105.6817598	95.9182402	108.12264	93.4773603	Manganese
106.5165778	95.9834222	109.149867	93.3501332	Molybdenum
106.4998763	94.8001237	109.424814	91.8751856	Nickel
103.1157717	89.0842283	106.623658	85.5763424	Selenium
101.9212508	90.8787492	104.681876	88.1181238	Silver
105.36483	94.13517	108.172245	91.327755	Sodium
109.2570554	96.6429446	112.410583	93.489417	Thallium
110.3410473	95.3589527	114.086571	91.6134291	Tin
104.0653155	94.9346845	106.347973	92.6520268	Titanium
105.7509152	96.5490848	108.051373	94.2486271	Vanadium
106.8327625	94.6672375	109.874144	91.6258562	Zinc
103.935867	92.964133	106.678801	90.2211995	Potassium

95% Upper Limit	95% Lower Limit	99% Upper Limit	99% Lower Limit	
102.4344252	83.3655748	107.201638	78.5983623	Mercury

TABLE 2 REPORTING LIMITS & WAVELENGTHS

Element	Axial Wavelength (nm)			Radial Wavelength (nm)			Reporting limit			
	OPTIMA 8300DV	OPTIMA 4300DV	OPTIMA 7300DV	OPTIMA 8300DV	OPTIMA 4300DV	OPTIMA 7300DV	mg/L (water)	mg/kg (soil)	mg/L (TCLP)	mg/L (SPLP)
Al	308.2	328.1	308.2	308.2	308.2	308.2	0.2	200	1	1
Sb	206.8	206.8	206.8	n/a	n/a	n/a	0.02	2	0.07	0.07
As	189.0	189.0	189.0	n/a	n/a	n/a	0.02	2	0.1	0.1
B	249.8	249.8	n/a	n/a	n/a	n/a	0.2	20	n/a	n/a
Ba	233.5	233.5	233.5	n/a	n/a	n/a	0.05	10	0.25	0.25
Be	234.9	313.1	313.1	n/a	n/a	n/a	0.012	1.2	0.05	0.01
Cd	226.5	228.8	228.8	n/a	n/a	n/a	0.012	1.2	0.05	0.05
Ca	315.9	315.9	317.9	315.9	315.9	315.9	5	1000	5	5
Cr	206.2	267.7	267.7	n/a	n/a	n/a	0.05	5	0.1	0.1
Co	228.6	228.6	228.6	n/a	n/a	n/a	0.02	2.5	0.1	0.1
Cu	324.8	327.4	327.4	n/a	n/a	n/a	0.05	5	0.1	0.1
Fe	274.0	274.0	274.0	274.0	274.0	274.0	0.3	200	1	1
Pb	220.4	220.4	220.4	n/a	n/a	n/a	0.012	5	0.05	0.05
Mg	279.1	279.1	279.1	279.1	279.1	279.1	5	500	5	5
Mn	257.6	257.6	257.6	257.6	257.6	257.6	0.04	10	0.1	0.1
Mo	202.0	202.0	202.0	n/a	n/a	n/a	0.02	2.5	0.1	0.1
Na	n/a	n/a	n/a	589.6	589.6	589.6	5	250	n/a	25
Ni	231.6	231.6	231.6	n/a	n/a	n/a	0.05	5	0.1	0.1
K	n/a	n/a	n/a	766.5	766.5	766.5	5	500	5	5
Se	196.0	196.0	196.0	n/a	n/a	n/a	0.04	2.5	0.1	0.1
Ag	328.1	328.1	328.1	n/a	n/a	n/a	0.02	1.5	0.05	0.05
Tl	190.8	190.8	190.8	n/a	n/a	n/a	0.02	1.5	0.1	0.1
Sn	189.9	189.9	189.9	n/a	n/a	n/a	0.05	20	0.1	0.1
Ti	334.9	334.9	334.9	334.9	334.9	334.9	0.05	10	0.1	0.1
V	292.4	290.9	290.9	n/a	n/a	n/a	0.05	10	0.1	0.1
Zn	206.2	206.2	206.2	n/a	n/a	n/a	0.05	10	0.1	0.1

TABLE 3 REPORTING LIMITS

	Soil (mg/kg)	Aqueous (mg/L)	TCLP/SPLP (mg/L)
Al	200	0.2	1
Sb	4	0.02	0.07
As	4	0.02	0.1
Ba	10	0.05	0.25
Be	1.2	0.012	0.012
Cd	1.2	0.012	0.05
Ca	1000	5	5
Cr	5	0.05	0.1
Co	2.5	0.02	0.1
Cu	5	0.05	0.1
Fe	200	0.3	1
Pb	5	0.012	0.05
Mg	500	5	5
Mn	10	0.04	0.1
Mo	2.5	0.02	0.1
Ni	5	0.05	0.1
Se	3	0.04	0.1
Ag	1.5	0.02	0.05
Tl	1.5	0.02	0.1
Sn	20	0.05	0.1
Ti	10	0.05	0.1
V	10	0.05	0.1
Zn	10	0.05	0.1
Na	250	5	25-for SPLP only
K	500	5	5
B	2	0.2	0.2
Si	NR	NR	NR

RUN SUMMARY

I. Calibration

Blank Standard
Cal Standard (ICS-2)
Cal Standard (ICS-3)
Cal Standard (ICS-4)
LRS
ICS-3
ICS-2

II. Analysis

ICV
ICB
LRS
ICS-3
ICS-2
ICSA
CCV
CCB
Method Blank
LCS
LCSD
Sample
Sample Duplicate
MS
MSD
Post Spike
Serial Dilution (SD)
CCV
CCB
Run ≤10 Samples
CCV
CCB

TABLE 4
Potential Interferences
Analyte Concentration Equivalents arising from Interferences at the 100 Mg/L level [c]

Analyte	Wavelength (nm)	Interferant a,b									
		Al	Ca	Cr	Cu	Fe	Mg	Mn	Ni	Ti	V
Aluminum	308.215	--	--	--	--	--	--	0.21	--	--	1.4
Antimony	206.833	0.47	--	2.9	--	0.08	--	--	--	0.25	0.45
Arsenic	193.696	1.3	--	0.44	--	--	--	--	--	--	1.1
Barium	455.403	--	--	--	--	--	--	--	--	--	--
Beryllium	313.042	--	--	--	--	--	--	--	--	0.04	0.05
Cadmium	226.502	--	--	--	--	0.03	--	--	0.02	--	--
Calcium	315.933	--	--	0.08	--	0.01	0.01	0.04	--	0.03	0.03
Chromium	267.716	--	--	--	--	0.003	--	0.04	--	--	0.04
Cobalt	228.616	--	--	0.03	--	0.005	--	--	0.03	0.15	--
Copper	324.754	--	--	--	--	0.003	--	--	--	0.05	0.02
Iron	259.94	--	--	--	--	--	--	0.12	--	--	--
Lead	220.353	0.17	--	--	--	--	--	--	--	--	--
Magnesium	279.079	--	0.02	0.11	--	0.13	--	0.25	--	0.07	0.12
Manganese	257.61	0.005	--	0.01	--	0.002	0.002	--	--	--	--
Molybdenum	202.03	0.05	--	--	--	0.03	--	--	--	--	--
Nickel	231.604	--	--	--	--	--	--	--	--	--	--
Selenium	196.026	0.23	--	--	--	0.09	--	--	--	--	--
Sodium	588.995	--	--	--	--	--	--	--	--	0.08	--
Thallium	190.864	0.3	--	--	--	--	--	--	--	--	--
Vanadium	292.402	--	--	0.05	--	0.005	--	--	--	0.02	--
Zinc	213.856	--	--	--	0.14	--	--	--	0.29	--	--

[a] Dashes indicate that no interference was observed even when interferants were introduced at the following level:
Al, Ca, Mg, Fe, at - 1000 Mg/L.
Mn, Cr, Tl, V, Cu, at – 200 Mg/L.

[b] The figures recorded as analyte concentrations are not the actual observed concentration: To obtain those figures , add the listed concentration to the interferant figure.

[c] Interferences will be affected by background choice and other interferences may be present.

TABLE 5 - SPECIFIED CONTROL LIMITS

LRS	**± 10%**
ICS-2	**± 20%**
ICS-3	**± 10%**
ICV	**± 10%**
ICB	**< ½ RL**
ICSA	**80 - 120% (Interferents) &**
	± <RL (all others)
CCV	**± 10%**
CCB	**< RL**

ICS-2, ICS-3, ICV, ICB and ICSA, - If the calibration cannot be verified within the specified limits, terminate the analysis, correct the problem and recalibrate the instrument.

CCV AND CCB - If the calibration cannot be verified within the specified limits, reanalyze both the CCV and CCB. If the second analysis is outside the control limits, re-calibrate the instrument and reanalyze all of the samples which followed the last acceptable CCV and CCB.

TABLE 6 - CONCENTRATION FOR CONTROL SAMPLES

Linear Range Standard							
Element	Conc. (mg/L)		Element	Conc. (mg/L)		Element	Conc. (mg/L)
Sb	5		Co	5		Ni	10
Ag	1		Cr	10		Pb	10
Al	500		Cu	10		Se	5
As	10		Fe	400/200*		Sn	10
B	5		K	200		Tl	5
Ba	10		Mg	500		Ti	10
Be	5		Mn	10		V	10
Ca	500		Mo	10		Zn	10
Cd	5		Na	1000		Si	25

ICS-2 (Soil)							
Element	Conc. (mg/L)		Element	Conc. (mg/L)		Element	Conc. (mg/L)
Sb	0.04		Co	0.025		Ni	0.05
Ag	0.015		Cr	0.05		Pb	0.05
Al	2.00		Cu	0.05		Se	0.03
As	0.04		Fe	2.0		Sn	0.20
B	0.2		K	5.0		Tl	0.05
Ba	0.10		Mg	5.0		Ti	0.10
Be	0.012		Mn	0.10		V	0.10
Ca	10.0		Mo	0.025		Zn	0.10
Cd	0.012		Na	2.5		Si	0.10

ICS-2 (Aqueous)							
Element	Conc. (mg/L)		Element	Conc. (mg/L)		Element	Conc. (mg/L)
Sb	0.05		Co	0.02		Ni	0.05
Ag	0.02		Cr	0.05		Pb	0.05
Al	0.2		Cu	0.05		Se	0.05
As	0.04		Fe	0.3		Sn	0.05
B	0.2		K	5		Tl	0.05
Ba	0.05		Mg	5		Ti	0.05
Be	0.012		Mn	0.04		V	0.05
Ca	5		Mo	0.02		Zn	0.05
Cd	0.012		Na	5		Si	0.1

TABLE 6 - CONCENTRATION FOR CONTROL SAMPLES (CONT)

ICS-2 (Leachate)							
Element	Conc. (mg/L)		Element	Conc. (mg/L)		Element	Conc. (mg/L)
Sb	0.07		Co	0.1		Ni	0.1
Ag	0.05		Cr	0.1		Pb	0.05
Al	1		Cu	0.1		Se	0.1
As	0.1		Fe	1		Sn	0.1
B	0.2		K	5		Tl	0.1
Ba	0.25		Mg	5		Ti	0.1
Be	0.012		Mn	0.1		V	0.1
Ca	5		Mo	0.1		Zn	0.1
Cd	0.05		Na	25 (SPLP)		Si	0.1

ICS-3 & CCV&ICV							
Element	Conc.		Element	Conc.		Element	Conc.
Sb	0.5 ppm		Co	0.5 ppm		Ni	0.5 ppm
Ag	0.1 ppm		Cr	0.5 ppm		Pb	0.5 ppm
Al	5 ppm		Cu	0.5 ppm		Se	0.5 ppm
As	0.5 ppm		Fe	5 ppm		Sn	0.5 ppm
B	0.5 ppm		K	50 ppm		Tl	0.5 ppm
Ba	0.5 ppm		Mg	50 ppm		Ti	0.5 ppm
Be	0.5 ppm		Mn	0.5 ppm		V	0.5 ppm
Ca	50 ppm		Mo	0.5 ppm		Zn	0.5 ppm
Cd	0.5 ppm		Na	50 ppm		Si	5 ppm

ICS-4							
Element	Conc.		Element	Conc.		Element	Conc.
Sb	1 ppm		Co	1 ppm		Ni	1 ppm
Ag	0.2 ppm		Cr	1 ppm		Pb	1 ppm
Al	10 ppm		Cu	1 ppm		Se	1 ppm
As	1 ppm		Fe	10 ppm		Sn	1 ppm
B	1 ppm		K	100 ppm		Tl	1 ppm
Ba	1 ppm		Mg	100 ppm		Ti	1 ppm
Be	1 ppm		Mn	1 ppm		V	1 ppm
Ca	100 ppm		Mo	1 ppm		Zn	1 ppm
Cd	1 ppm		Na	100 ppm		Si	10 ppm

ICSA							
Element	Conc.		Element	Conc.		Element	Conc.
Al	500 ppm		Ca	500 ppm		Fe	200 ppm
Mg	500 ppm						

TABLE 7 - CONCENTRATION FOR SPIKING SOLUTIONS

LCS / LCSD							
Element	Conc.		Element	Conc.		Element	Conc.
Sb	0.5 ppm		Co	0.5 ppm		Ni	0.5 ppm
Ag	0.1 ppm		Cr	0.5 ppm		Pb	0.5 ppm
Al	5 ppm		Cu	0.5 ppm		Se	0.5 ppm
As	0.5 ppm		Fe	5 ppm		Sn	0.5 ppm
B	0.5 ppm		K	50 ppm		Tl	0.5 ppm
Ba	0.5 ppm		Mg	50 ppm		Ti	0.5 ppm
Be	0.5 ppm		Mn	0.5 ppm		V	0.5 ppm
Ca	50 ppm		Mo	0.5 ppm		Zn	0.5 ppm
Cd	0.5 ppm		Na	50 ppm		Si	0.5 ppm

MS / MSD/PS							
Element	Conc.		Element	Conc.		Element	Conc.
Sb	0.5 ppm		Co	0.5 ppm		Ni	0.5 ppm
Ag	0.1 ppm		Cr	0.5 ppm		Pb	0.5 ppm
Al	5 ppm		Cu	0.5 ppm		Se	0.5 ppm
As	0.5 ppm		Fe	5 ppm		Sn	0.5 ppm
B	0.5 ppm		K	50 ppm		Tl	0.5 ppm
Ba	0.5 ppm		Mg	50 ppm		Ti	0.5 ppm
Be	0.5 ppm		Mn	0.5 ppm		V	0.5 ppm
Ca	50 ppm		Mo	0.5 ppm		Zn	0.5 ppm
Cd	0.5 ppm		Na	50 ppm		Si	0.5 ppm

REVISION LOG SOP 4216B

	Rev. #	Initials	SECTION	REVISION
1/17/2019	1	RC	12.1.7	Updated the mean recovery to 35% from 30%. Also added that a single quarterly verification is required, not 7.
03/11/19	2	SRB	12.1.7	clarified quarterly verification method.
04/24/19	3	SRB	12.3.7	CCB limit changed from 1/2 RL to RL
	3	SRB	12.4.4.1	added RPD requirement to LCS section
	3	SRB	throughout	edited for punctuation, formatting
04/25/19	3	SRB	TOC	page numbers corrected
06/13/19	4	EJ	8.6, 8.7, 8.9	corrected Table 7 to Table 6
			8.12	corrected Table 8 to Table 7
			8.16	corrected spelling of Deionized water
			12.1.7	corrected spelling of detection
06/14/19	4	SRB	12.8	inserted 12.8.2: 3 rep requirement, renumbered 12.8.3 to 12.8.8
			12.3.8	replaced ICSA minimum of 2 per 8 hour with once per day
			8.6.3, 12.3.2	specified ICS-2 is equal to RL
			8.9	changed "or more frequently if required" to "... if desired"
			8.6.1	deleted reference to Table 2
			Table 6	updated to reflect current lab practice
			TOC	page numbers corrected
			8.11.1	corrected Table 3 to Table 4
06/20/19	4	SRB	12.1.5	updated MDL to new procedure
			12.3.3	added what to do if LRS fails, replaced "must" with "may"

SOP No.: 4207A

HAMPTON-CLARKE, INC.

STANDARD OPERATING PROCEDURE

DETERMINATION OF MERCURY IN SOILS/SEDIMENTS (SHW) SAMPLES USING THE MANUAL COLD VAPOR TECHNIQUE (7471B)

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DETERMINATION OF MERCURY IN SOILS/SEDIMENTS (SHW) SAMPLES USING THE MANUAL COLD VAPOR TECHNIQUE (7471B)

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DETERMINATION OF MERCURY IN SOILS/SEDIMENTS (SHW) SAMPLES USING THE MANUAL COLD VAPOR TECHNIQUE (7471B)

1.0 PURPOSE AND APPLICATION

1.1 This procedure measures total mercury (organic and inorganic) in soils, sediments, bottom deposits and sludges. All Samples must be subjected to an appropriate dissolution step prior to analysis. The Reporting Limit for soil samples is 0.0835 mg/kg or 0.5 ug/L in the digested solution.

2.0 REFERENCES

2.1 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Fourth Edition, Revision2, February 2007, Method 7471B.

2.2 Hampton Clarke Quality Assurance Manual, Current Revision.

3.0 METHOD SUMMARY

3.1 The flameless aa procedure is a physical method based on the absorption of radiation at 253.7 nm by mercury vapor. The mercury is reduced to the elemental state and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance (peak height) is measured as a function of mercury concentration and recorded.

3.2 A weighed portion of the sample is digested in acid for 2 minutes at 95°C, followed by oxidation with potassium permanganate. Mercury in the digested sample is measured by the cold vapor technique.

4.0 SAMPLE COLLECTION, PRESERVATION AND STORAGE

4.1 Samples should be collected in 2-ounce glass jars. This volume will be sufficient to insure a representative sample, allow for replicate analysis, if required, and minimize waste disposal. If additional tests are being requested an 8 ounce jar is used.

4.2 Holding time is 28 days from date of collection.

4.3 Refrigerate samples at 4°c (± 2°C) upon receipt until analysis.

5.0 SAFETY

5.1 Handle all chemicals appropriately.

5.2 Mercury compounds are highly toxic, therefore the appropriate apparel should be worn when performing this test, this includes: laboratory coat, safety glasses, and gloves.

5.3 Due to the possible release of toxic gases, acidification of the samples should be performed under a fume hood.

6.0 INTERFERENCES

6.1 Potassium permanganate is added to eliminate possible interference from sulfide. Concentrations as high as 20 mg/l of sulfide as sodium sulfide do not interfere with the recovery of added inorganic mercury from reagent water.

6.2 Copper has also been reported to interfere; however, copper concentrations as high as 10 mg/l had no effect on recovery of mercury from spiked samples.

6.3 Samples high in chlorides require additional permanganate, because during the oxidation step, chlorides are converted to free chlorine, which also absorbs radiation of 253 nm. Therefore care must be taken to ensure that any free chlorine is removed before the mercury is reduced and swept into the cell.

7.0 REQUIRED EQUIPMENT

7.1 Atomic absorption spectrometer: any atomic absorption spectrometer, which has an open sample compartment in which to mount the quartz cell. Instrument settings recommended by the manufacturer should be used. A background correction system is desirable but not necessary.

7.2 Radiation source for the determination of mercury, such as a hollow cathode lamp or electrode less discharge lamp.

7.3 Recording device: any recorder which is compatible with the spectrometer is suitable. Any atomic absorption spectrometer, which can print spectral peaks, is suitable.

7.4 All apparatus required for sample digestion described in procedures, including a block digestor capable of maintaining a temperature of 95°C.

7.5 Flow injection system consisting of:

7.5.1 Auto sampler with random access capabilities.

7.5.2 Peristaltic pumps: Pump controls the delivery of sample and the delivery of the reductant and acid carrier stream.

7.5.3 Switching Valve: Multiport valve used for injecting discrete sample volumes, determined by sample loop size, into a hydrochloric acid carrier stream. The carrier stream transports the sample volume to the chemifold.

7.5.4 Chemifold: Manifold where the sample, reductant and argon are merged and mixed thoroughly. (Figure 2)

7.5.5 Gas/liquid separator.

7.5.6 Flow meter: Capable of measuring flows of 0-250 mL/min.

7.5.7 Quartz Cell: Absorption cell consisting of a quartz cell 14 cm in length, i.e. = 7mm, with quartz end windows. The cell is positioned in the path of the light beam.

7.6 50ml Digestion Tubes

7.7 Block Digester, capable of maintaining sample temperature @ 95°C.

8.0 STANDARDS AND REAGENTS

8.1 Reagent water: deionized water from millipore system, conductivity < 2.0 umhos/cm

8.2 Nitric acid, conc.: reagent grade.

8.3 Hydrochloric acid, conc.: reagent grade.

8.4 3% HCl: 300 ml conc. HCl in 10l of di water.

8.5 Aqua regia: prepare immediately before use by carefully combining 3 parts conc. HCl and 1 part conc. HNO_3.

8.6 Stannous chloride: dissolve 13.2 g of SNCL2 to 1 l of 3% HCl.

8.7 Sodium chloride-hydroxylamine hydrochloride solution: dissolve 1200 g of sodium chloride and 1200 g of hydroxylamine hydrochloride in deionized water and dilute to 10 liters. Hydroxylamine sulfate may be used in place of hydroxylamine hydrochloride.

8.8 Potassium permanganate, 5% solution, w/v: dissolve 1000 g of potassium permanganate in 20l of deionized water.

8.9 Stock mercury solutions: two stock solutions are acquired from two different approved manufacturers. These solutions are certified by the manufacturer to be ± 1% of the stated concentration of 1000 mg/l. The initial and continuous calibration verification solutions are made up from a different stock solution than that of the calibration.

8.10 Mercury control intermediate standard (1mg/l) for icv and ccv: pipet 0.1ml of the stock mercury solution (8.9) and 2.5 mls of nitric acid into a 100ml flask containing to 90mls with di water. Dilute to 100ml with di water and mix. This working standard and the icv and ccv must be prepared fresh daily.

8.11 Mercury calibration intermediate solution (0.25 mg/l): pipet 125 ul of a stock mercury solution (8.9) and 12.5 mls of concentrated HNO3 into a 500ml volumetric flask containing 400 mls of di water. Dilute to 500ml with di water and mix. Prepare this solution from a different stock solution than (8.10). Prepare this solution fresh daily.

8.12 Laboratory control sample (soil) – purchased from era, cat# 540.

9.0 PROCEDURE (BLOCK DIGESTION)

Standard Preparation:

9.1 Calibration standards: The instrument is calibrated with the following points: 0, 0.2, 0.5, 1.0, 2.0, 5.0, 10.0 and 25 ug/L. Transfer 0, 0.02, 0.05, 0.10, 0.20, 0.50, 1.0 and 2.5 ml aliquots of the mercury intermediate standard ii (8.11) to a series of 50ml plastic digestion tubes.

9.2 Check standards: Prepare an ICV and CCV by pipeting 0.5mls and 0.25mls respectively of the mercury intermediate stock solution (8.10) to 50 ml digestion tubes.

Sample Preparation :

9.3 Weigh 0.15 g portions of the sample, and place in bottom of a 50ml plastic digestion tubes

9.4 Weigh 0.15 g portions of the solid LCS and LCSD, and place in bottom of a 50ml plastic digestion tubes

9.5 To the sample tube designated as the Matrix Spike and Matrix spike duplicate, add 0.25 ml of the Mercury control intermediate standard.

Sample and Standard Digestion Procedure:

9.6 To all the digestion tubes, add 1.25 ml of reagent water and 1.25 ml of aqua regia. Heat for 2 minutes in a digestion block at 95°C ± 3°.

9.7 Cool, add 12.5 ml reagent water and 3.75 ml potassium permanganate solution to each sample bottle except the for the ICV, STD 5.0, STD 10.0 and STD 25.0. For the previous four standards, reduce the volume of reagent water by the spike amount added to ensure all final volumes are equal: See below for volume to be added:

Standard	Reagent water (ml)
ICV/Std 5.0	12.0
Std 10.0	11.5
Std 25.0	10.0

9.8 . Let stand at least 15 minutes. Mix thoroughly and place in a digestion block for 30 minutes at 95°C ± 3°.

Note: If necessary, add additional portions of potassium permanganate crystals until purple color persists for atleast 15 minutes.

9.9 Cool and add 1.5 ml of sodium chloride-hydroxylamine hydrochloride to reduce the excess permanganate. Add **13.75** ml reagent water.

10.0 Analysis with Perkin Elmer Software

10.1 Starting AA Winlab Analyst

10.2 Double click on the **Start** button on the windows menu bar.

10.3 Select **Programs**, which displays all available programs in the start menu.

10.4 Select **FIMS** from the Program menu.

10.5 From the FIMS menu select **AA WINLAB ANALYST** .

10.6 Ensure that the FIMS power switch has been flipped to the ON position and that the cooling fan located at the rear of the FIMS case is rotating.

10.7 Opening Menu Options

10.8 Once the AAWinlab software has initiated a window will appear displaying five options will appear. From these options different areas of the AA Winlab software may be accessed quickly without the need of accessing the main tool bar.

10.8.1 **Use custom designed workspace**. Select this button to select from a list of preprogrammed workspaces for either automated or manual analysis.

10.8.2 **Use Basic Procedures for performing Automated Analysis** – Use this option in the event an automated analysis is desired, and the analyst wishes to configure the FIMS work space the automated analysis will use.

10.8.3 **Use Basic Procedures to perform Manual analysis** – This option is used when the analyst desires to use the instrument with out the auto sampler services and using the manual analysis software.

10.8.4 **Technique Bar** – This Bar is used to select which atomic spectroscopy technique the analyst wishes to access. ***Note** : *When the system is configured for COLD VAPOR only, the Flow Injected Mercury Hydride option will be the only option offered.*

10.8.5 **Tutorials and Reference** - For tutorial on the instrument.

10.8.6 **Tool Bars** – Access this button to enter the main portion of the PE software with out the benefit of quick access buttons (1-3).

10.9 In most cases click on **Use Custom workspace**, and select workspace **Auto2.fms** from the displayed list of workspaces. This will display three windows, which are used for monitoring instrument operation. Across the top of the screen will be the concentration window displaying the sample designation, concentration and time of injection. In the lower left hand corner will be the Examine Curve Window, which displays the curve points as they are run and their linearity in relation to each other. On the lower right hand window is the display peak window, which graphically displays the concentration data in a wire frame format.

10.10 reating Sample Info Files

10.11 From the top menu bar select **FILE** and then **NEW**. From the popup window displayed select **Sample Info File**. The Sample Info File Editor is then displayed. The sample info file editor is used to create sample information files, which the software translates, into auto sampler positions and consequently controls the auto sampler. *Care should be given to the creation of these files for if the SIF is incorrect, the instrument will not analyze the samples in the correct order leading to erroneous results.*

10.12 The first field of the SIF editor is the Description field where the name by which the SIF file will be saved under is recorded. It is a usual convention that the Batch number generated by the metals supervisor is used when generating this field.

10.13 Under the Parameters Common to All headers is the information that will be displayed with the data when the run is sent to the printer. Of the five fields, Batch ID, Analyst, Sample Volume, Volume Units, Weight Units, only Batch ID and Analyst are used. The other fields are left blank and consequently the Winlab software will fill default values into the blanks. Batch ID is generally the same as description and analyst is filled by the initials of the technician operating the instrument.

10.14 Parameters that vary by Sample

10.14.1 This section of the SIF editor is divided into six columns, Auto sampler Position, Sample ID, Sample Eight, Sample Units, User Dilution and Remarks. Of these six columns the analyst routinely uses only the Sample ID column.

10.14.2 The Auto sampler position column is fixed and cannot be modified by the analyst.

10.14.3 The Sample ID column of the SIF editor is the location that sample identifiers are entered into the system.

10.14.4 Sample weight, units and dilution columns are available to modification by the analyst, however these columns are not generally used, and their function being covered by Envirosoft forms after the run is completed.

10.14.5 Remarks column is generally not used as what ever is entered in this column is printed with the data and tends to clutter and confuse it.

10.15 The first nine positions in the SIF file are reserved for the Curve and Controls, so each and every SIF file will begin on position 10 which conforms to the first small (15ml) sized tube position on the auto sampler tray F.

10.15.1 In auto sampler position 10, in the Sample ID column, the analyst will begin typing out the sample designations to be analyzed on the run. Typically the run will begin with a Method Blank, two Laboratory Control Samples, two Matrix Spike samples a Sample Duplicate then the actual sample after which the rest of the samples in the run will be listed.

10.15.2 After all samples have been typed into the SIF editor it is good practice to review the physical positions of the samples to their positions in the SIF. If everything is in agreement click on **FILE** on the top tool bar and select **Save** . A pop up window will appear where the analyst will be able to type in the designation under which the file should be saved; this designation should match the Description window and generally the Batch ID in the SIF editor.

10.16 Once the SIF editor has saved the SIF file just created, and all the information held with in the SIF file is to the analyst's satisfaction, Click on the X at the upper right hand corner of the SIF editor to close it.

10.17 Beginning Automated Analysis

10.18 Click on the **AUTOMATED ANALYSIS** window on the top tool bar, and the automated analysis window is displayed. From this window Analyses may be queued, started and stopped.

10.19 Two tabs exist on this windows, **Setup** and **Analyze**, select the Set up tab to enter parameters pertaining to the analysis about to be done or Analyze to begin the actual analysis.

10.20 When preparing to begin an analysis click on the **Setup Tab** , go to the **SELECT SAMPLE INFO FILE** field in the lower third of the Auto Analysis window and select the **BROWSE** button. This displays all saved SIF files, scroll through the list until the desired SIF file is found and click on it then the **OK** button just to the right of the window. When the window has closed the chosen SIF file designation should be displayed in the SELECT SAMPLE INFO FILE field.

10.21 Directly across from the SELECT SAMPLE INFO FILE field is the **Result Data Set Name** field, click on the **BROWSE** button located to the right of the text. This displays a list of already completed analysis, for a first time analysis a designation must be typed into the **RESULTS NAME** field located in the upper third of the Result Data Set Window. Once the designation has been entered click on the **OK** button to the right of the Window to save the designation to the results directory. The window closes automatically at this point and the designation just entered appears in the Result Name Field.

10.22 In the top third of the Auto Analysis Window double click on the first field directly beneath **METHOD**. This displays the Methods dialog where an appropriate method may choose to direct the instrument during the analysis.

Methods available are:
HGDW – Drinking Water
HgH2O – 600 Series Waters
HGSW846 H2O – SW846 Waters
HGTCLP – TCLP
HGSOIL – Soil and solid waste

10.23 Once a method has been chosen double click the **method** on the Methods Dialogue window and the dialogue window will close and the chosen method will appear in the Auto Analysis Window under Method. Ensure that the BOX located beneath USE ENTIRE SAMPLE INFO File is checked this allows the software to access the SIF file indicated in the SELECT SAMPLE INFO FILE field.

10.24 In the event that a SIF file is not to be used, auto sampler positions may be typed into the USE AUTOSAMPLE POSITIONS LISTED BELOW column of the automated analysis window. Enter the numbers always using two digits separated by a comma. Example: 09,10,11,12,13,ECT. The software will take Sample designations from a SIF file and enter them in the appropriate sample positions.

10.25 Next check the DURING ANALYSIS line of the Automated Analysis Window making sure that the **Save Data** and **Print Log** boxes are checked. *If these boxes are not checked, the data from the run will be lost!*

10.26 Click on the **Analysis** tab of the Auto Analysis Window displaying the Analysis console. From this console the FIMS instrument and AS-91 Auto sampler are controlled. Ensure that all reagent vessels are full; check argon pressure and space remaining in the waste container, if all are to the analysts' satisfaction the analysis may begin.

10.27 Instrument Preparation

10.28 When beginning an analysis allow 30 min for the radiation source (lamp) to warm up and stabilize.

10.29 Prepare the peristaltic pump for operation. The peristaltic pump is composed of a central spindle and four flexible tubes.

10.30 The Peristaltic Pump Tubing must be inspected for ware after each run to insure the proper flow of reagents to the Chemifold.

10.31 Replacement of the tubing on a daily basis is recommended, however after the analysis of extremely long runs or analysis of extremely corrosive samples the tubing may need earlier replacement.

10.32 The peristaltic pump tubing comes in various colors, blue and yellow, black and red.

10.33 It is important to remember that tubing sizes affect the rate of flow of reagents into and out of the FIMS. Proper care should be taken when changing the pump tubing to ensure their proper placement (See Fig. 1).

10.33.1 Black – Waste line emerging from the rear of the Liquid Gas separator, occupying the largest caliber pump magazine and located on the bottom rear position of the pump assembly.

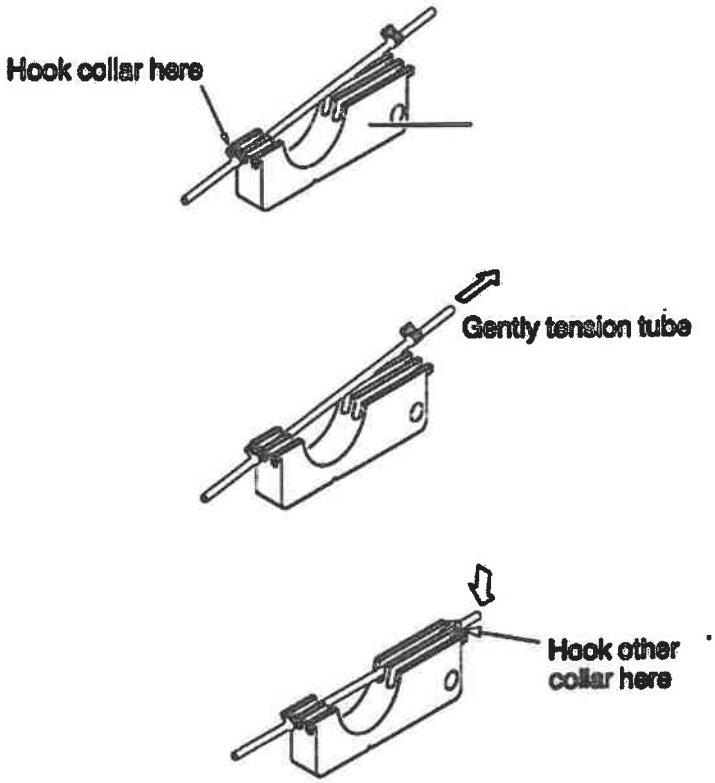
10.33.2 Red - Reductant feed line emerges from the second position of the Chemifold, occupying a standard pump magazine and is located on the top rear position of the pump assembly.

10.33.3 Blue and yellow

10.34 Carrier intake position (marked C) on top of the FIAS valve, occupies a standard pump magazine and is located on the top front location of the pump assembly.

10.35 Emerging from the Sample Waste port (marked S) on top of the FIAS valve occupies a standard pump magazine and is located on the bottom front location of the pump assembly.

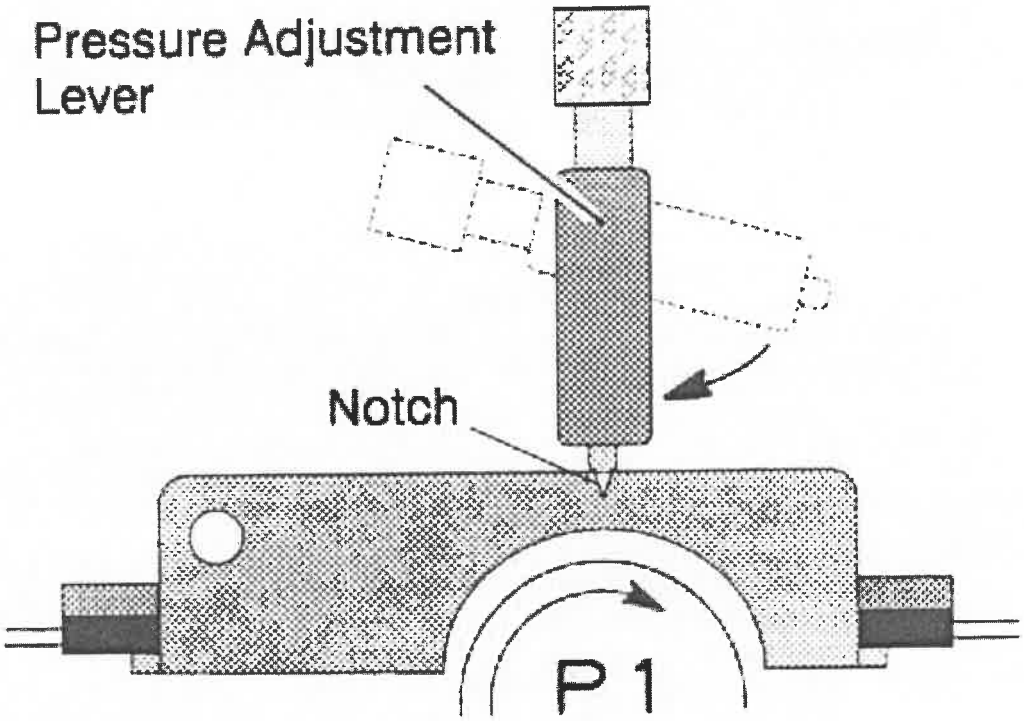
FIGURE 1



10.36 Starting the Peristaltic Pump

10.37 Once fresh tubing has been placed on the Instrument, swing the pressure adjustment lever (attached to the FIMS case) firmly into position. The adjustment lever will seat with a click when in the proper position. (See Fig. 2)

FIGURE 2



10.38 Insure that the pump magazine is properly seated then return to the PE Winlab software and click on the FIAS button on the top tool bar. This opens the FIAS window where the analyst can start and stop the peristaltic pump and change the position of the FIAS valve.

10.39 Click on the button just above the PUMP 1 designator to start the pumps. If the peristaltic pump fails to turn or emits a buzzing sound click on the PUMP 1 button again to stop the pump. *(A buzzing sound or failure to turn indicates an over pressure on the pump rotor. Check the pump magazines to ensure proper seating and placement.)*

10.40 If the pumps are started with out problem check tubing connections to ensure that reagent is flowing through the tubing. (By quickly unsealing a feed connection and resealing it a bubble is created which the analyst can use to gauge reagent flow).

10.40.1 If no reagent is flowing through the tubing ensure that the weighted end of the PTFE feed tubing is indeed in the reagent vessel and not blocked by any small particulate.

10.40.2 If the PTFE tubing is free of obstruction and submerged in the reagent vessel, gently apply pressure to the peristaltic pump magazine corresponding to the feed line. This gentle pressure will create a momentary stronger drawn in the tubing and effectively PRIME the feed line.

10.41 When reagent flow is satisfactory in both feed lines, the large waste tube should be bubbling at a Ratio of around 1 bubble per second to effectively drain the liquid gas separator.

10.41.1 If no bubbles appear, the liquid gas separator will begin to fill with fluid. (Never place the filter and cap on the Liquid Gas separator until the waste line of the pump has been primed.) This indicates that the waste line is not primed.

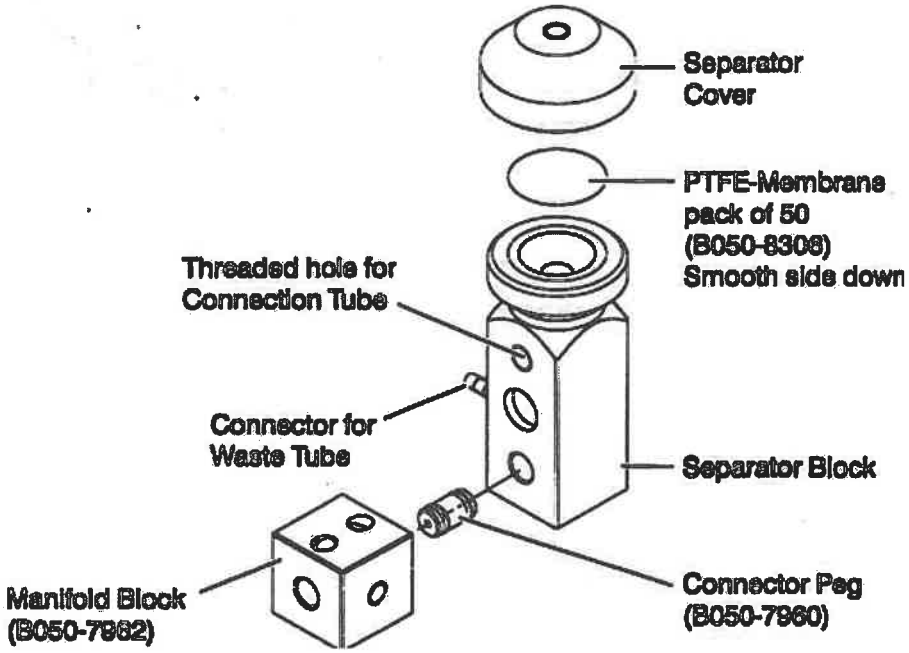
10.41.2 With gloved hands, place a finger firmly over the hole in the center of the liquid gas separator until the fluid trapped in the chamber is forced out and down the waste line. Repeat this action until the waste line begins to bubble and flow on its own. Allow the pump to continue turning once flow has been established.

10.42 Repeat this process on the Sample Waste line. Allow the Sipper to be submerged in the wash cup located in the rear of Tray-F (wash cup should contain DI H2O), and click on the FIAS VALVE button located on the FIAS Control window. The FIAS valve on the front of the FIMS should turn to the left, click the button again and observe the sample waste tube, DI water should be flowing through the tube.

10.43 If no water is flowing through the tube, check the bottom of the sipper for blockages.
10.44 If no blockage is found gently press on the pump magazine corresponding to the sample waste tube until flow is established.

10.45 Place a TE 37 Membrane Filter on the top of the liquid gas separator. The filter will have a rough and a smooth side, place the smooth side of the filter down when seating. Once the filter is seated, place the threaded cap on top of the liquid gas separator and tighten making sure that the membrane filter stays in place. Seat and tighten the PTFE gas tube which connects the liquid gas separator and the FIMS cell inlet

FIGURE 3



10.46 The FIMS is now ready to analyze samples. Ensure that sample tray is firmly seated on top of the AS-91 Auto sampler and that the "sipper" is positioned correctly so as not to meet the bottom of the sample tubes during the analyses. (Allowing the tube to touch the bottom of the sample tubes could allow particulate matter precipitating from the samples to clog the sipper)

10.47 Starting the Autorun

10.47.1 Click on the **AUTO** button from the top tool menu, and select the **analysis** tab on the Auto Analysis window.

10.47.2 To begin an auto analysis click on **Analyze All** . This initiates the FIMS instrument the AS-91 Auto sampler and will cause the samples to be analyzed in the sequence recorded in the SIF file.

10.47.3 As per the method selected on the Auto Sampler page, the instrument will first attempt to calibrate itself, and then check the ICV/ ICB and CCV/CCB, and relative standard deviation between injections. If the curve or any of the check standards fail to meet the programmed criteria, the instrument will stop the run and display an error message.

10.47.4 If for any reason the run is stopped prematurely the instrument must be reset before continuing!

10.48 To reset the instrument click on the **Reset** button on the Auto Analysis window. This will cause the instrument to start from the beginning of the SIF file.

10.49 Clear the Print queue of the previous run by clicking on **File**, **Preview** and then on the wastebasket icon on the middle right of the screen.

10.50 An analyst must check the LCS, MS 's and RPD of the Sample and MR per the QC section.

10.51 Shutting down the instrument

10.51.1 Fill a 250ml Beaker with 5% HNO3 and place both feed tubes and sipper into the beaker.

10.51.2 Click on the FIAS button on the top tool bar, click on PUMP 1 button and allow all liquid to be removed from the beaker before adding 50ml DI water.

10.51.3 Allow all of the DI water to be removed from the beaker and run pump an extra minute to dry tubes before clicking on PUMP 1 button again to stop pump.

10.51.4 Relieve pressure from pump magazines and switch FIMS off.

10.52 If all analysis is complete select File menu from top tool bar and select exit. This will close the AA Winlab software.

11.0 CALCULATIONS

11.1 Read the mercury value directly from the standard curve. Dilution factors are applied as necessary.

11.2 Report mercury concentrations based on the dry weight of the sample, and convert to mg/kg dry weight. The sample result or the detection limit for each sample must be corrected for the sample weight and percent solids before reporting.

11.3 Individual component percent recoveries (p) are calculated as follows:

$$P = \frac{(S - U) * 100}{}$$

where, S = spiked sample conc. (mg/l)
U = unspiked sample conc. (mg/l)

T T = theoretical spike (mg/l)

11.4 The relative percent difference (RPD) for each component is calculated as follows:

$$RPD = \frac{|(F - G)| * 100}{(F + G) / 2}$$

where, F = original sample result
G = duplicate result

12.0 QUALITY CONTROL

12.1 A batch will be defined as a maximum of 20 samples of the same matrix type.

12.2 Each soil batch will include the following qc samples:

a) One method blank (MB).
25ml of DI water.
b) Two laboratory control samples (LCS/LCSD).
0.15g of a purchased soil quality control sample
c) Two matrix spikes (MS & MSD). (10 ppb)
0.25ml of Hg Intermediate Standard (8.10) in .15g of sample
d) One method replicate (MR).

12.3 A calibration curve must be run prior to sample analysis. A minimum correlation coefficient of 0.995 must be obtained to meet internal QC requirements. If the correlation coefficient of 0.995 is not met, a new calibration curve must be prepared and analyzed. An initial calibration verification (ICV) is analyzed immediately after standardization and must be ± 10% recovery of known true value. If the ICV fails, it may be re-analyzed one additional time. A second failure warrants corrective action, which includes, but not limited to recalibrating.

12.4 For each analytical sequence, a continuing calibration verification (CCV) and a continuing calibration blank (CCB) are analyzed every 10 analytical samples. Continuing calibration verification must be within a ± 10% recovery of known true value. The continuing calibration blank must be less than the RL. If the CCV fails, the samples analyzed prior must be reanalyzed.

12.5 For each sample batch, a matrix spike/matrix spike duplicate pair is analyzed every 20 samples. Limits for the matrix spike recovery are 80-120% or as established by control chart data.

12.6 Duplicate digestions must agree within 20% or within limits established by control chart data. A duplicate sample is analyzed every 20 samples.

12.7 The instrument detection limit determination is performed on an annual basis.

12.8 For a method blank to be acceptable for use with the accompanying samples, the concentration in the blank of any analyte of concern should not be higher than the highest of either:

12.8.1 the RL, or

12.8.2 5% of the regulatory limit for that analyte, or

12.8.3 10% of the measured concentration in the sample.

12.9 The LCS/LCSD duplicate pair must be run with every 20 samples. Recovery must fall within the QC Performance Acceptance Limits set by the vendor. If the recovery falls outside the vendor limit, all samples associated with that set must be reprepped and reanalyzed. For calculation purposes, the "Certified Value" listed on the COA is used for the LCS True Value.

12.10 It is imperative to protect the samples from extraneous mercury contamination.

12.11 Reporting Limit (RL) – The reporting limit is the level at which a hit for an analyte is reported. Any concentration below the RL is reported as ND. The RL is greater than the MDL but less than or equal to the regulatory limit.

12.12 Measure of Uncertainty – Precision and Accuracy is calculated for this method.

13.0 NONCONFORMANCE AND CORRECTIVE ACTION

13.1 Any deviation from this procedure must be documented on a nonconformance memo.

13.2 Quality control samples outside the specified acceptance criteria stated in sections 12.1 to 12.10 must be documented on a nonconformance memo.

14.0 RECORD MANAGEMENT/DOCUMENTATION

14.1 All raw data associated with a particular sample is maintained in the batch folder. These folders are kept in the Metals lab in numerical order for a month and then removed to the warehouse for archiving.

15.0 POLLUTION PREVENTION

15.1 The chemicals needed for these analyses are purchased as needed, therefore eliminating the disposal of unused expired standards.

15.2 The sample bottles provided are appropriate to obtain a representative sample, but limit the amount of sample required for disposal.

16.0 WASTE MANAGEMENT

16.1 Samples and chemicals are disposed of following the procedures outlined in SOP 7003 (Sample Storage and Disposal).

16.1.1 All standards, reagents and samples are collected in a 55 gallon drum which is pH adjusted to be >/= 5 units. The drum is then disposed of in the sanitary sewer with copious amounts of water.

RUN SUMMARY

I. Calibration

Blank Standard
0.2ppb std
0.5ppb std
1ppb std
2ppb std
5ppb std
10ppb std
25ppb std

II. Analysis
ICV
ICB
Method Blank
LCS
LCSD

Sample
Sample Duplicate
Matrix Spike
Matrix Spike Duplicate
Sample
CCV
CCB
10 samples
CCV
CCB

REVISION LOG SOP No. 4207A

Date	Rev. #	Initials	REVISION
04/12/2012	1	RC	Updated signatures on coverpage, per OQA request
05/22/2012	2	RC	Section 10.1.4 – corrected final volume of di water added to match method
02/11/15	3	CA/EJ	Reviewed for laboratory practices. No changes required.
04/05/16	3	EJ	Review by Olufemi Adelartey. No changes required.
07/07/16	4	RC/SB	Incorporated calibration standards preparation into digestion procedure.
07/07/16	4	RC/SB	Removed duplicate preparationof ICV/CCV
1/23/18	5	RC/SB	Section 12.9- Clarified the limits used to evaluate LCS (QC Performance Acceptance Limits) set by vendor. The Certified Value from ERA is used as the True Value

HAMPTON-CLARKE, INC.

STANDARD OPERATING PROCEDURE

ANALYSIS OF BASE NEUTRAL/ACID EXTRACTABLE COMPOUNDS IN SOLID, AQUEOUS AND WASTE MATRICES USING GC/MS (8270D)

Prepared By: _____ Date: 7/21/16

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ANALYSIS OF BASE NEUTRAL/ACID EXTRACTABLE COMPOUNDS IN SOLID AND WASTE MATRICES USING GC/MS (8270D)

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Analysis Of Base Neutral/Acid Extractable Compounds In Solid, Aqueous And Waste Matrices Using GC/MS (8270D)

1.0 PURPOSE AND APPLICATION

1.1 This method covers the determination of a number of semi-volatile organic compounds that are partitioned into an organic solvent and are then analyzed on a gas chromatography/mass spectrometer. This SOP may qualitatively and quantitatively determine the parameters listed in Table 1. This is a gas chromatographic/mass spectrometry (GC/MS) SOP and is applicable to the determination of the compounds listed in Table1 in ground water, soil, solid, oil, municipal waste and discharge waters by following 8270D methodology.

1.2 This SOP is restricted to use by or under the supervision of analysts experienced in the use of a Gas chromatograph/mass spectrometer and in the interpretation of mass spectra

2.0 REFERENCES

2.1 Test Methods for Evaluating Solid Waste, SW-846, Fourth Edition, Method 8270D, Revision 4, February 2007.

2.2 Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Method 8000C, Revision 3, March 2003.

2.3 Hampton-Clarke Quality Assurance Manual, Current Revision.

2.4 DOD QSM v5.0

3.0 METHOD SUMMARY

3.1 Samples are extracted and prepared for analysis by GC/MS using the appropriate preparation procedure (see SOP #s 3000, 3001 or 3202).

3.2 An aliquot of the sample extract is injected into the gas chromatograph (GC) housing a capillary column. The GC is temperature programmed to separate the analytes, which are then detected with a mass spectrometer (MS).

3.3 Target analytes are identified by comparing their mass spectra with the spectra of standards. Quantition is performed by comparing the response of a specified major ion (quantitation ion) relative to an internal standard using an 8-point calibration.

4.0 INTERFERENCES

4.1 Solvents, reagents, glassware, and other sample processing hardware may yield artifacts and/or interferences to sample analysis. All these materials must be demonstrated to be free from interferences under the conditions of the analysis by analyzing method blanks. Specific selection of reagents and solvents may be necessary.

4.2 Interferences co extracted from the sample will vary considerable from source to source. If analysis of an extracted sample is prevented due to interferences, further cleanup of the sample extract may be necessary.

4.3 Phthalate esters contaminate many types of products commonly found in the laboratory. Plastics, in particular, must be avoided because phthalates are commonly used as plasticizers and are easily extracted from plastic materials. Serious phthalate contamination may occur at any time if consistent quality control is not practiced.

4.4 Matrix interferences may be caused by contaminants that are co extracted from the sample and/or emulsions may cause interference in the extraction of the compounds of interest.

4.5 Benzidine may be subject to losses during extraction and can exhibit poor chromatographic behavior.

4.6 Hexachlorocyclopentadiene is subject to photochemical decomposition in addition to thermal decomposition in the GC injection port.

4.7 N-Nitroso-di-phenylamine decomposes in the GC injection port and cannot be separated from Diphenylamine.

4.8 1,2-Diphenylhydrazine decomposes in the GC injection port and is detected as Azobenzene.

5.0 SAFETY

5.1 Each reagent and chemical used in this method should be regarded as a potential health hazard and exposure should be as low as reasonably achievable.

5.2 Always wear safety goggles, gloves and protective clothing (lab coat) when working with theses chemicals and reagents.

6.0 SAMPLE COLLECTION, PRESERVATION AND STORAGE

6.1 Aqueous samples must be extracted within 7 days from date of collection. Soil samples must be extracted within 14 days from date of collection.

6.2 Sample extracts must be analyzed within 40 days from date of extraction.

6.3 Refrigerate samples and extracts at 4°C (± 2°C) upon receipt until and after analysis

7.0 REQUIRED EQUIPMENT

7.1 GC/MS system:

7.1.1 Gas chromatograph – Agilent Gas chromatogram (Model 6890/7890) which is an analytical system complete with a temperature programmable gas chromatograph and all required accessories including syringes, analytical column, and gases. The injection port is designed for split/splitless injections for capillary columns.

7.1.2 Columns
7.1.2.1 Agilent J&W DB-5MS UI, 30 meter, 0.25 mm ID and 0.25 um phase
7.1.2.2 Agilent DB-UI 8270D 30m, 0.25 mm ID and 0.25 um phase
7.1.2.3 Agilent J&W DB-5MS UI, 20m, 0.180 mm ID and 0.18 um film

7.1.3 Agilent Mass Spectrometer (Model 5973/5975 – Capable of scanning from 35 to 500 amu every 7 seconds or less utilizing a 70V(nominal) electron energy in the electron impact ionization mode, and producing a mass spectrum which meets all the criteria in Table 6 when 25 ng of Decafluorotriphenyl phosphine is injected through the injection port.

7.1.4 GC/MS interface – The interface gives an acceptable calibration points at 25 ng per injection for each of the parameters of interest and achieves all acceptable performance criteria.

7.1.5 Data System - A computer system with EnviroQuant ChemStation G1701ea Version E.02.00 software is interfaced to the mass spectrometer that allows the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program. The software allows searching any GC/MS data file for ions of a specified mass and plotting such abundance's versus time or scan number. This type of plot is defined as the Extracted Ion Current Profile (EICP). The software has the ability to integrate the abundance in any EICP between specified times or scan number limits.

7.1.6 Auto sampler –HP7673, 7683 and Agilent G4513A or equivalent; capable of injecting from 0.5 to 5 ul.

7.1.7 Analytical Balance, Mettler AE 200 Series

7.1.8 Stirrer, IKA. Model: Color SQUID, 1000rpm

7.1.9 Stirrer Bar, Fisher, Catalog# 1451393

8.0 STANDARDS AND REAGENTS

8.1 Store all intermediate standards at 4 degrees centigrade in a Teflon sealed glass container. Discard after 6 months or sooner if comparison with quality control checks standards indicates a problem or the manufacture states an earlier expiration date.

8.2 Stock standard solutions – Stock standard are purchased as certified stock standard solutions as neat and at various concentrations from Supelco and other vendors and are store at 4 degrees centigrade.

8.2.1 The following stock standards are used directly in the preparation of the calibration standards:

2000ppm TCL PAH Mix (Supelco 48905-U)
5000ppm Pest Mix
2000 ppm TCL Phenols/Benzidines Mix (Supelco 47992-U)
2000ppm TCL Haz. Subst. Mix (Supelco 47990-U)
2000ppm TCL BN Mix (Supelco47991-U)
1000ppm 8270 Mega Mix (Restek 31850)
2000ppm Benzoic Acid Mix (Restek 31879 or Supelco, CRM 47508)
2000ppm Benzidine & 3,3'-Dichlorobenzidene Mix (Restek 31030 or Supelco, 48906)

8.3 Prepare intermediate standards as follows:

8.3.1 Prepare a 10,000ppm 8270 EXTRA MIX#1 by weighing 0.1 gm of each of the following neat compounds into a clean 10ml volumetric half filled with Methylene chloride:

Diphenyl ether (Aldrich 240834)
1,2,4,5-Tetrachlorobenzene (Aldrich 131857-5G)
Acetophenone (Supelco 44-2438 or ChemService N-11020-1G)
Atrazine (Fluka, 45330-250mg-R)
Benzaldehyde (Aldrich B1334-5g)
Caprolactum (Aldrich C2204-5G or ChemService N11397-1G)
1,4-Dioxane (ChemService N-10220-1G)

Bring to volume with Methylene chloride, cap and invert mixture several times to mix.

8.3.2 Repeat the steps above to create a second source solution. Prepare a 10,000ppm 8270 EXTRA MIX#1 (Second Source) by weighing 0.1 gm of each of the following neat compounds into a clean 10ml volumetric half filled with Methylene chloride:

Diphenyl ether (Aldrich 240834)
1,2,4,5-Tetrachlorobenzene (Aldrich 131857-5G)
Acetophenone (Supelco 44-2438 or ChemService N-11020-1G)
Atrazine (Fluka, 45330-250mg-R)
Benzaldehyde (Aldrich B1334-5g)
Caprolactum (Aldrich C2204-5G or ChemService N11397-1G)
1,4-Dioxane (ChemService N-10220-1G)

Bring to volume with Methylene chloride, cap and invert mixture several times to mix.

8.3.3 Prepare a 10,000 ppm **Pyridine** standard by combining 10uL of neat (Fisher P368-500) and 990uL of Methylene chloride in a 2ml auto sampler vial.

8.3.4 Prepare a 5,000 ppm Pest Mix by Prepare by weighing 0.05gm of each of the following neat compounds into a clean 10ml volumetric flask.

4,4'-DDT (ChemService N-10876-100mg)
4,4'-DDD (ChemService N-10874-250mg)
4,4'-DDE (ChemService N-10875-100mg)

Bring to volume with Methylene chloride, cap and invert the mixture three times.

8.3.5 Prepare a 5000ppm BNA-7 Mix by weighing 0.05gm of the following neat compounds into a clean 10ml volumetric flask half filled with Methylene chloride:

Pentachloroethane (ChemService N-12829-1G)
n-Octadecane (ChemService N-12582-2G)
n-Decane (ChemService N-12526-1G)
Biphenyl (ChemService N-11207-1G)
1,4-Dimethylnaphthalene (Aldrich D170305-5G)
Coumarin (ChemService Cat# N-11508-1G)
3,4-Dichlorophenol (ChemService Cat# N-10766-1G)

Bring to volume with Methylene Chloride, cap and invert the mixture three times.

8.3.6 BNA-8-Mix: Repeat Section 8.3.4 a second time for the second source standard and add 0.05 gm of 2,3,4,6-Tetrachlorophenol (ChemService N-10599-50mg) to the mixture.

8.3.7 Surrogate standard spiking solution - Prepare a surrogate spiking solution:

Using1L volumetric flask half filled with Acetone and a clean stir bar, add the following neat compounds:

1gm **2-Fluourobiphenyl** (Aldrich 102741-10G)
1gm **Terphenyl-d14** (Sigma-Aldrich 364630-500mg)
2gm **Phenol-d5** (Sigma-Aldrich 425370-5G)
2gm **2,4,6-Tribromophenol** (Sigma-Aldrich 137715-5G)
800uL **Nitrobenzene-d5** (Aldrich 151955-5G)
1.6mL **2-Fluorophenol** (Aldrich F12804-10G)

Place mixture on a stirring plate until dissolved. Remove the stirring bar and bring up to volume with Methylene chloride. Cap and invert the mixture 2 to 3 times. Transfer the standard to 40ml vials and store in the refrigerator.

The final concentration for the BN surrogates is 1000ppm and the ACID surrogates are 2000ppm.

8.4 Internal Standard spiking solution (2000PPM) – Weigh 0.5 grams of the following neat compounds and transfer to a 250mL volumetric flask:

1,4-Dichlorobenzene-d4 (CIL DLM-268-5)
Naphthalene-d8 (CIL DLM-365)
Acenaphthene-d10 (CIL CLM-108-1)
Phenanthrene-d10 (CIL DLM-371-1)
Chrysene-d12 (CIL DLM-261-1)
Perylene-d12 (CIL DLM-366-1)
1,4-Dioxane-d8 (CIL DLM-28-5)

Bring to volume with Methylene chloride. Cap the flask and invert the mixture 2 to 3 times. Transfer the standard to 40ml vials and store in the refrigerator.

A 20 uL of this added to 1 mL of extract will create a concentration of 40 ug/ml.

8.5 Prepare a 10,000PPM 1-Methylnapthalene standard (Sigma Aldrich 245795-250mg) by weighning out 0.25g into a clean 25ml volumetric flask half filled with Methylene Chloride. Bring to volume with Methylene Chloride, cap it and invert the flask several times to mix.

8.6 DFTPP (Decafluorotriphenyl phosphine) standard(2000PPM). To a 10ml volumetric flask half filled with Methylene chloride, add 0.02 g of DFTPP neat, dissolved and bring up to the 10ml.

8.7 DFTPP (Decafluorotriphenyl phosphine) standard. Prepare a 50 ug/mL solution of DFTPP by adding the following to a 2ml vial: 50ul of DFTPP STD. (Sec. 8.6), 100ul TCL PHENOLS/BENZIDINE MIX, 400ul DDT/ENDRIN MIX, 1450ul Methylene chloride. Cap the vial and invert 2 to 3 times.

8.8 Intermediate/BNA Stock Std A (varied conc): To a 2ml vial add 300uL of 8270 Mega Mix, 60uL BNA Pest Mix (5000ppm), 150uL Benzoic acid Mix (2000ppm), 150uL Benzidine & 3,3'-

Dichlorobenzidine Mix (2000ppm), 60uL BNA-7-Mix (5000ppm), 150uL BNA Surrogate (1000/2000ppm), and 270uL of Methylene chloride.

8.8.1 Prepare BNA STOCK Std, a 200ppm (varied conc) by adding to a 1ml vial, 90uL of Methylene chloride, 10uL of 8270 EXTRA MIX#1 (Section 8.3.1), 400uL of 250ppm BNA STOCK Std A (Section 8.8). Mix by inverting three times.

8.8.2 Use this 200ppm standard to prepare 8 calibration levels using 300uL vials as follows:

	196ppm	**160ppm**	**120ppm**	**80ppm**	**50ppm**	**20ppm**	**10ppm**	**2ppm***	**0.5ppm**
200ppm interm Cal std	100uL	80uL	60uL	40uL	50uL	10uL	5uL		1uL (50ppm)
2000ppm ISTD	2uL	2uL	2uL	2uL	4uL	2uL	2uL		2uL (50ppm)
Methylene Chloride	-------	18uL	38uL	58uL	146uL	88uL	93uL		97uL
FV	102uL	100uL	100uL	100uL	200uL	100uL	100uL		100uL

***see Section 8.8.3.1**

8.8.3 Prepare another 50ppm BNA Std by combining 75uL of Methylene chloride and 25uL of the BNA Stock (200ppm) in a 300uL vial.

8.8.3.1 Prepare an 8th calibration standard at 2ppm by combining 94uL of Methylene chloride, 4uL of the 50ppm BNA Standard from Section 8.8.3 and 2uL of Internal Standard (2000ppm).

8.9 ICV (Initial Calibration Verification) Standard: The standard used for the ICV standard is from a second source or separate lot standard.

8.9.1 Prepare a 250ppm(varied conc) BNA Stock Std B in a 2ml vial by adding 150uL of 2000ppm TCL PAH Mix (Supelco CRM 48905-U), 60uL of 5000ppm BNA-8 Mix (Section 8.3.5), 30uL of 10,000ppm Pyridine Std (Section 8.3.2), 150uL BNA Surrogate (1000/2000ppm), 150uL of 2000ppm TCLP Phenols/Benzidines Mix (Supelco 47992-U), 150uL of 2000ppm TCL Base Neutrals Mix (Supelco 47991-U), 150uL of 2000ppm TCL Hazardous Substance Mix (Supelco 47990-U) and 360uL of Methylene chloride. Cap and invert the mixture three times.

8.9.2 Prepare a 50ppm second source standard by combining 40uL of BNA Stock Std B (Section 8.9.1), 4uL of BNA Internal Standard, 1ul of 8270 Extra Mix #1 (second source), 1uL of 1-Methylnaphthalene (section 8.5) and 154uL of Methylene chloride. Mix by inverting two to three times.

8.10 Separate calibration standards are prepared for the following compounds:

o-Toluidine
2-Ethylaniilne
2,4-Dimethylaniline
3,4-Dimethylaniline
2,3-Dimethylaniline
2,4,5-Trimethylaniline
4-Chloro-o-toluidine
2-Aminonaphthalene

8.10.1 Prepare a 200ppm working Custom Standard by combining 100uL of BNA surrogate (Section 8.3.6), 100uL of Custom SVOC Standard (Accustandard S-20990) and 800uL of Methylene chloride. Invert mixture three times to mix.

8.10.2 Prepare a 200ppm second source working ICV custom standard by combining 100uL of BNA surrogate (Section 8.3.6), 100uL of Custom second source SVOC standard (Accustandard S-20990, different lot from Section 8.10.1) and 800uL of Methylene chloride.

8.10.2.1 Prepare calibration standards using the working standard in Section 8.10.1:

8.10.3 Prepare another 50ppm BN standard by combining 75uL of Methylene chloride and 25uL of the 200ppm Custom Standard Mix (Section 8.10.1) in a 300uL vial.

8.10.4 Prepare an 8th calibration standard at 2ppm by combining 94uL of Methylene chloride, 4uL of the 50ppm BN standard mix from Section 8.10.3 and 2uL of Internal Standard (2000ppm).

	196ppm	**160ppm**	**120ppm**	**80ppm**	**50ppm**	**20ppm**	**10ppm**	**2ppm**
200ppm custom Cal std	98uL	80uL	60uL	40uL	100uL	10uL	5uL	*
2000ppm ISTD	2uL	2uL	2uL	2uL	8uL	2uL	2uL	*
Methylene Chloride	-	18uL	38uL	58uL	292uL	88uL	93uL	*
FINAL VOLUME	100uL	100uL	100uL	100uL	400uL	100uL	100uL	*

* - See Section 8.10.4

8.10.5Prepare a 50ppm second source standard by combining 50uL of the second source working standard (Section 8.10.6.2), 4uL of BNA Internal Standard (Section 8.4) and 146uL of Methylene chloride. Invert the mixture three times to mix.

NOTE: The initial calibration of these special compounds in Section 8.10 are analyzed only based on project specific basis.

8.11 The preparation of all standards must be documented immediately after preparation as follows: Locate a PC with the VeriProg icon. Double click on the VeriProg icon, select standards. You're your name then select create new standard (Internal standard prep log), Type in the name of each standard and the amount used. Print the label for the standard by clicking on print label. Exit out of the software. Place the label on the standard and store the standard in the refrigerator for daily use.

9.0 PROCEDURE FOR INITIAL CALIBRATION

9.1 Establish the GC/MS operating parameters for each instrument for the analysis of the tune standard (DFTPP), calibration and samples. Once the parameters are set, they must be saved. The same parameters must be used for tuning, calibration and sample. Operating parameters for each instrument vary slightly. Follow the manufacture manual to properly tune and save the tune method for each instrument.

9.2 Set up the GC operating parameters. The GC acquisition parameters are as follows and may vary from instrument to instrument:

Mass range: 35-500 amu
Scan time: 1sec/scan
Initial temp: 50°C
Initial hold: 3 minutes
Initial rate: 35°C/minute
Second temp: 180°C
Second rate: 20°C/minute
Third temp: 325°C
Final hold: 2.5 – 3.0 minutes

Column Flow: 1 mL/minute helium
Injection volume: 0.50ul for calibration/sample/ DFTPP
Injector: split
Injection port: 250 °C
Transfer line: 280 °C
Source Temp: 250 °C

9.3 Set up the MS operating parameters as follows: From the instrument control, select MS and choose the tune file. Select on the MS again and click on Edit MS SIM/SCAN, on the Acq Mode, select SCAN. Save the run method together with the operating parameters.

9.4 Daily GC/MS Performance - At the beginning of each day when analysis will be performed, inject a 50 ng of DFTPP standard solution.

9.4.1 Load the DFTPP and calibration standard vials on the auto sampler tray and place on the instrument. Use the PC that is connected to the instrument and ChemStation software (see SOP 6012) to initiate analysis.

9.4.2 Once the run analysis is completed for the DFTPP, using the ChemStation software evaluate the DFTPP to screen. Confirm that all ions meet the acceptance criteria in Table 6. If criteria are not met the following approaches are acceptable to evaluate the DFTPP:

- Evaluate one scan immediately preceding or following the apex.
- Evaluate the average scans of the apex, the scan immediately before and after the apex.
- Evaluate the average of 3 or more scans within the DFTPP peak.

Background subtraction of a scan prior to the elution of DFTPP is acceptable.

9.4.2.1 If the criteria in Table 6 cannot be met using one of the above approaches, the analyst may reinject another DFTPP or retune the mass spectrometer and repeat until all criteria are met in Table 6.

9.4.3 Once the criteria in Table 3 are achieved, The DDT breakdown must be evaluated. The DDT breakdown must not exceed 20%. If the breakdown exceeds 20%, maintenance of the injection port may be needed.

9.4.4 The Benzidine and Pentachlorophenol tailing factors must be calculated. The DFTPP injection contains 100 ng of Benzidine and 100 ng of Pentachlorophenol. Identify and integrate the Benzidine and the Pentachlorophenol peaks. Verify all tailing criteria have been met. The Benzidine and Pentachlorophenol tailing factor must be less than 2.

9.4.5 If either of the tailing factor criteria cannot be met then the following should be performed: Try replacing the injector port liner and cutting 20 cm of column first. If this fails to solve the problem, then cut off a meter of column. If that fails to work, then replace the entire column.

9.4.6 The performance criteria in Sections 9.4 - 9.5 must be met before any samples, blanks or standards can be analyzed. All samples blanks and standards must be injected within 12 hours of the injection time of a DFTPP standard that meets the criteria in Table 6.

9.5 After all criteria are met, inject 0.5uL of each of the eight calibration standards prepared in Section 8.0. Once the analysis of the eight-point calibration standard is complete, process and edit each file and make sure each compound is properly identified then update the curve by using the EnviroQuant Software.

9.5.1 Once the initial calibration is updated, print the initial calibration standard form6 and the run log and make sure all criteria are met as follows:

9.5.1.1 Verify the areas of each internal standard within the calibration curve must be 50-100% of the mid level standard.

9.5.1.2 Verify the minimum response factor for each compound (at each calibration level) listed in Table 2 is met.

9.5.1.3 If the RSD of any target analyte is 20% or less, then the relative response factor is assumed to be constant over the calibration range, and the average relative response factor may be used for quantitation. If the RSD of any target analyte is greater than 20%, than a non-linear calibration technique is employed .

9.5.1.3.1 Creation/Curve Fitting of the Calibration Curve - The statistical considerations in developing a non-linear calibration model require more data than the more traditional linear approaches described above. Whereas the linear calibration method employs five standards for a linear (first order) calibration model, a quadratic (second order) model requires six standards, and a third order polynomial requires seven standards.

9.5.1.3.2 Most curve fitting programs will use some form of least squares minimization to adjust the coefficients of the polynomial to obtain the polynomial that best fits the data. The "goodness of fit" of the polynomial equation is evaluated by calculating the weighted coefficient of the determination (COD).

$$\frac{\sum_{i=1}^{n} (y_{obs} - \bar{y})^2 - \frac{(n-1)}{(n-p)} \sum_{i=1}^{n} (y_{obs} - Y_i)^2}{\sum_{i=1}^{n} (y_{obs} - \bar{y})^2} = COD$$

where,

$\bar{y}$ = Mean observed response from the initial calibration
y_{obs} = Observed response (area) for each concentration from each initial calibration standard
Y_i = Calculated (or predicted) response at each concentration from the initial calibration(s)

n = Total number of calibration points (i.e., 6 for a quadratic model; 7 for a third order model)

p = Number of adjustable parameters in the polynomial equation (i.e., 3 for a third order; 2 for a second order polynomial)

9.5.1.3.3 Under ideal conditions, with a "perfect" fit of the model to the data, the coefficient of the determination will equal 1.0. In order to be an acceptable non-linear calibration, the COD must be greater than or equal to 0.99.

NOTE: For those compounds that do not meet the 20% RSD or the minimum RF requirements, the calibration curve may still be acceptable but the sample results must be reported as estimated. The average RF should not be used for compounds that have an RSD greater than 20% unless the concentration is reported as an estimated.

In addition, if more than 10% of the compounds exceed the 20% RSD limit and do not meet the minimum correlation coefficent (0.99) for alternate curve fits, then corrective action is warrnted and a new initial calibration must be performed

9.5.1.3.4 When calculating the calibration curve using linear regression, a minimum quantitation check on the viability of the lowest calibration standard must be performed by re-fitting the response from the low calibratin standard back into the curve achieved by having the software requantitate the concentrations as if it were a sample. The recalculated concentration must be within + or – 30% of the standards true concentration. Compounds that do not meet these criteria warrant corrective action such as changing the concentration of the low standard or reporting those compounds as estimated when the concentration is at or near the lowest calibration point.

9.6 Initial Calibration Verification

9.6.1 Once an acceptable DFTPP and initial calibration has been acquired, analyze a 50ppm second source calibration standard as prepared in Section 8.9. The recovery of each compound must fall within 70-130% recovery (50-150% for Pyridine, Benzaldehyde, Aniline, 4-Chloroaniline, Benzidine and 3,3'-Dichlorobenzidine). Up to 10% of the compounds may fall outside the 70-130% limits, but must fall within 60-140%. A single reanalysis of the ICV is allowed. If the reanalysis of the ICV still fails, corrective action must be taken and a new initial calibration analyzed.

NOTE: The ICV must be analyzed and meet criteria before the analysis of any samples.

9.7 Continuing Calibration - The working calibration curve must be verified every 12 hours by the analysis of the mid concentration standard. On a daily basis, follow the procedure outlined in Sec 9.4, followed by the analysis of the 50ppm standard. The 50ppm standard must be analyzed and verified before any sample can be analyzed.

9.7.1 Verify that the minimum response factor for each compound listed in Table 2 is met. If the minimum RFs are not met, the system must be evaluated and corrective action taken before any samples may be analyzed.

9.7.2 If the percent difference or drift for each compound is less than or equal to 20%, the initial calibration is assumed to be valid. In cases where compounds fail, they may still be reported as non-detects if it can be demonstrated that there was adequate sensitivity to detect the compound. For situations where the failed compound was present, the concentrations must be reported as estimated values.

9.7.3 If greater than 20% of the compounds fail the 20% difference or drift criteria, corrective action must be taken prior to analyzing samples.

9.7.4 Percent difference and percent drift formulae:

$$\% \text{ Difference} = \frac{RF - RF_v}{\overline{RF}} \times 100$$

$$\% \text{ Drift} = \frac{\text{Calculated concentration - Theoretical concentration}}{\text{Theoretical concentration}} \times 100$$

9.7.5 The area of the internal standards must be within 50-100% of the mid level standard from the initial calibration.

9.7.6 If these criteria (9.7.1 through 9.7.5) are not met then the std can be repeated once using fresh
calibration standard. If the problem still persists then a new calibration curve must be analyzed using the initial calibration criteria procedure.

9.8 When all criteria have been met follow sample procedure to continue with the analysis of blank, samples and QC for up to 12 hours from the DFTPP injection.

10.0 PROCEDURE FOR SAMPLE ANALYSIS

10.1 After all the criteria have been met for the initial calibration or the continuing calibration, inject 20 uL of the 2000 ppm internal standard mix into the 1ml or 10 uL of the internal standard to 0.5ml of each sample extract vial, method blank (MB), method blank spike (MBS), matrix spike (MS) and matrix spike duplicate (MSD). The final concentration of the internal standard in the vial is therefore 40

mg/L. In order to ensure proper mixing of the internal standard in the extract vial, invert the vial several times after injecting the internal standard mix. The extracts are now ready for analysis. Injection volume and instrument operating conditions must be the same conditions that were used during initial calibration.

10.2 Load sample extracts, including blanks, MS, MSD and MBS on the instrument. Inject sample extracts into the GC/MS system using the same conditions that were used for the initial calibration. If the concentration in the sample exceeds the calibration range, the sample extract must be diluted and reanalyzed.

10.3 Internal area responses must be monitored for all blanks, samples, MS, MSD and MBS. If the area of any Internal Standard falls outside the –50% to +100% window from the areas determined in the continuing calibration standard for that day, the sample must be re-analyzed.

10.3 Qualitative analysis

10.3.1 Identification is based on retention time and comparison of the sample mass spectrum with characteristic ions in the reference mass spectrum. EICPs for the primary ion (m/z) and the two other masses (listed in Table 1) are used. The following criteria must be met:

10.3.1.1 The relative retention time must fall within +/- 0.06 RRT of the RT of the suspected compound.

10.3.1.2 The relative peak heights of the characteristic masses in the EICP should fall within +/- 20% of the relative intensities of these masses in a reference mass spectrum.

10.3.1.3 All characteristic masses greater than 10 % of the primary characteristic ion of the reference spectrum should be present in the sample chromatogram.

10.3.2 If the criteria for section 10.3.1.2 and 10.3.1.3 do not pass but in the opinion of the mass spectral analyst the compound is correct, then the analyst should give a positive identification for the peak. The mass spectral analyst should favor false positives if uncertain.

10.4 Quantitative analysis

10.4.1 When a target compound has been identified, the quantitation of that compound will be based on the integrated abundance from the EICP of the primary characteristic ion (m/z). If the sample produces interference for the primary ion, a secondary characteristic ion may be used to quantitate. The concentration in the sample is calculated using the equation in Section 11.3.

10.4.2 If the response for any ion (m/z) exceeds the working range of the GC/MS system, dilute the extract, reinject the appropriate amount of internal standard so that the final concentration in the vial is 40mg/L, and reanalyze.

11.0 CALCULATIONS

11.1 Percent Breakdown

$$\text{breakdown of DDT} = \frac{\text{sum of degradation peak areas (DDD + DDE)}}{\text{sum of all peak areas (DDT + DDD + DDE)}} \times 100\ \%$$

11.2 Response factor:

$$\text{Equation 1: } RF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$$

where:

A_s = Area of the characteristic ion(m/z) for the parameter to be measured.
A_{is} = Area of the characteristic ion for the internal standard.
C_{is} = Concentration of the internal standard (ug/L)
C_s = Concentration of the parameter to be measured (ug/L)

11.3 Concentration:

$$\text{Equation 2: Concentration (ug/L or ug/Kg)} = \frac{(A_s)(I_s)}{(A_{is})(RF)(V_s)}$$

where:

A_s = Area of the characteristic ion(m/z) for the parameter to be measured.
A_{is} = Area of the characteristic ion for the internal standard.
I_s = Amount of internal standard added to each extract (ug)
RF = Response Factor (Equation 1, Section 11.1)
V_s = Volume of water extracted (L) or weight of sample extracted (Kg)

11.4 Percent Recovery (%R)

$$\text{Equation 3: } p = \frac{100(A-B)}{T}$$

where:

p = Percent recovery of analyte

A = Concentration of analyte after spiking
B = Concentration of unspiked sample.
T = Actual spike concentration

11.5 Relative Percent Difference

Equation 4: $R = RPD = (|A-B|)/((A+B)/2)*100$

where:

A = Sample concentration in ug/L
B = Duplicate sample concentration in ug/L

11.6 Relative Retention Times:

Equation 5: $RRT = (RT_c/RT_i)$

where:

RT_c = Retention time of target analyte in minutes
RT_i = Retention time of internal standard in minutes

12.0 QUALITY CONTROL

12.1 All internal standard responses and retention times must be monitored for the initial and continuing calibrations. All internal standard retention times from the continuing calibration must fall within 30 seconds of the internal standard in the initial mid-point calibration curve. All internal standard area counts must not change by more than a factor of two (+100 %, -50 %) from the mid-point of the last initial calibration. If any internal standard fails the criteria, the initial calibration must be rerun.

12.2 Method Blank: A method blank must be analyzed in order to demonstrate that interferences from the analytical system and glassware are under control. Each day a set of samples is extracted or reagents are changed, a method blank must be extracted and analyzed. If more than 20 samples are to be extracted in that work shift then another blank must be extracted. If any target analyte is found to be present in the reagent water blank above the EQL all samples associated with that method blank must be re extracted.

12.3 Surrogate recoveries must be fall within the quality control limits as listed in Table 4. If any surrogate is outside these limits, then reextract (volume permitting) the sample and reanalyze.

12.3.1 If the surrogate fails the criteria in the second extraction, submit original sample Results and report both sets of surrogate recoveries on form 2.

12.3.2 If surrogate recoveries are outside QC limits but the sample was analyzed at a dilution, remake the dilution and reanalyze the sample. If the surrogate recoveries are still outside QC

limits, re-extract and reanalyze the sample. If the surrogate fails the criteria in the second extraction, submit original sample results and report both sets of surrogate recoveries on form 2. Samples that are diluted such that the concentration of the surrogates falls below the Reporting Limit, no re-analysis or re-extraction is necessary.

12.3.3 All surrogate recoveries that fail QC criteria must be documented on the non-conformance summary.

12.4 A Matrix Spike and Matrix Spike Duplicate (MS/MSD) must be extracted and analyzed with each prep batch up to 20 samples of the same matrix. The concentration of the spike compounds is 100 ug/L in the sample for the Base Neutral compounds and 100 ug/L for the Acid compounds (1650 and 3300 ug/Kg for soils).

12.4.1 Calculate the percent recovery (p) and relative percent deviation (R) for each compound by using the equations in Section 11.4 and 11.5.

12.4.2 Compare the p and R for each analyte with the corresponding QC acceptance criteria found in Table 4.

12.4.3 Recoveries that fall outside the QC limits must be documented in a non-conformance memo. Reextraction or reanalysis is not necessary as long as the MBS meets all QC criteria.

12.5 Laboratory Control Sample: A Method Blank Spike (MBS) must be extracted and analyzed with each prep batch of the same matrix daily. The concentration of the spike compounds is 100 ug/L in the sample for the Base Neutral compounds and 100 ug/L for the Acid compounds (1650 and 3300 ug/Kg for soils).

12.5.1 Calculate the percent recovery (p) and relative percent deviation (R) for each compound by using the equations in Section 11.4 and 11.5.

12.5.2 Compare the p and R for each analyte with the corresponding QC acceptance criteria found in Table 4.

12.5.3 If any one analyte recovery falls outside the QC limits, it must be documented in a non-conformance memo. If more than one analyte falls outside QC limits, the MBS. Blank and all associated samples must be re-extracted and re-analyzed.

12.6 Method Detection Limits(MDLs) must be generated annually. Additionally, an MDL verification standard must also be analyzed on all instruments used for sample analysis. An MDL verification standard is a qualitative QC sample containing all the analytes of interest, spiked at a concentration 1 - 4 times the calculated MDL.

12.7 Demonstration of Capability (DOC): The analyst must make a yearly demonstration of ability to generate acceptable accuracy and precision data. The analyst must perform the following operations:

12.7.1 Four quality control (QC) check samples containing each analyte (obtained from an external or second source) must be prepared and analyzed.

12.7.2 Calculate the average recovery (X) and the standard deviation of the recovery (s) for each parameter using the four results.

12.7.3 For each analyte compare s and X with the corresponding acceptance criteria for precision and accuracy, respectively found in Table 4. If s and X for all analytes meet the acceptance criteria, the performance is acceptable and analysis of actual samples can begin. If any one of the analytes does not meet the acceptance criteria, the performance is unacceptable for that analyte.

12.7.4 If any analyte tested fails any of the criteria then the analyst must proceed with the following: Repeat the test beginning in Section 12.10.1 for only those analytes which failed If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest.

13.0 NONCONFORMANCE AND CORRECTIVE ACTION

13.1 Any unplanned deviation from this procedure must be documented on a nonconformance memo.

14.0 RECORD MAINTENANCE

14.1 All raw data files are backed up on the system then transferred to DVD

14.3 All run logbooks, standard prep log books, refrigerator logs, extraction logs should be saved for a minimum of 5 years.

15.0 POLLUTION PREVENTION

15.1 The chemicals and standards needed for these analyses are purchased as needed, therefore eliminating the disposal of unused expired standards.

15.2 The sample bottles provided are appropriate to obtain a representative sample, but limit the amount of sample required for disposal.

16.0 WASTE MANAGEMENT

16.1 Expired sample extract vials are placed in a designated 55-gallon drum for disposal. Vials are not disposed of until sample results are final.

16.2 Waste Methylene chloride, acetone and hexane are collected and evaporated under the hood, the remaining remnants are then lab-packed.

17.0 ESTIMATION OF UNCERTAINTY

17.1 Refer to SOP No. 1013 for calculation of estimation of uncertainty associated with an analytical result. The calculated estimation of for this method is listed below:

Aqueous:

Aver	SD	RSD	SD2	SD3	SD-2 % Rec	SD+2 % Rec	
39.955	17.9870701	0.45018321	**35.9741401**	53.9612102	3.98085987	75.92914013	**Pyridine**
72.6525	6.74456887	0.09283327	**13.4891377**	20.233706	59.163362	86.14163774	**N-Nitrosodimethylamie**
91.3785	23.3810876	0.25587077	**46.7621751**	70.143262	44.6163249	138.1406751	**Benzaldehyde**
84.1135	16.392518	0.19488577	**32.7850359**	49.177553	51.3284641	116.8985359	**Aniline**
98.6125	9.58952876	0.09724456	**19.1790575**	28.768586	79.4334425	117.7915575	**Pentachloroethane**
90.4815	4.20903324	0.04651816	**8.41806647**	12.627099	82.063433	98.89956647	**bis(2-chloroisopropyl)ether**
49.35	5.11963609	0.10374136	**10.2392722**	15.358908	39.1107278	59.58927218	**Phenol**
91.9815	4.76850884	0.05184204	**9.53701768**	14.305526	82.4444823	101.5185177	**2-Chlorophenol**
78.3515	8.51604385	0.10869025	**17.032087**	25.548131	61.3194123	95.3835877	**n-Decane**
85.3465	9.14428166	0.10714302	**18.2885633**	27.432845	67.0579367	103.6350633	**1,3-Dichlorobenzene**
85.3185	8.8782462	0.10406004	**17.756924**	26.634738	67.5620076	103.0749924	**1,4-Dichlorobenzene**
87.2625	8.10375279	0.09286638	**16.2075056**	24.311258	71.0549944	103.4700056	**1,2-Dichlorobenzene**
91.9485	5.35285096	0.05821575	**10.7057019**	16.058552	81.2427981	102.6542019	**Benzyl Alcohol**
91.522	6.21451747	0.0679019	**12.4290349**	18.643552	79.0929651	103.9510349	**bis(2-chloroisopropyl)ether**
86.4115	5.50650646	0.06372423	**11.0130129**	16.519519	75.398487	97.42451292	**2-Methylphenol**
85.042	4.05880797	0.0477271	**8.11761593**	12.176423	76.924384	93.15961593	**Acetophenone**
86.8285	9.87587879	0.11374006	**19.751757**	29.627636	67.0767424	106.5802576	**Hexachloroethane**
95.62	5.83294816	0.06100134	**11.6658963**	17.498844	83.9541037	107.2858963	**N-Nitroso-di-n-propylamine**
81.3373684	5.62612146	0.06917019	**11.2522429**	16.878364	70.085125	92.5896113	**3&4-Methylphenol**
97.4675	5.63708386	0.05783552	**11.2741677**	16.911251	86.1933323	108.7416677	**Nitrobenzene**
89.4535	4.48032691	0.05008554	**8.96065382**	13.440980	80.4928462	98.41415382	**Isophorone**

101.355	6.48870395	0.06401957	**12.9774079**	19.466111	88.3775921	114.3324079	**2-Nitrophenol**
95.143	5.64298549	0.05931057	**11.285971**	16.9289565	83.857029	106.4289712	**2,4-Dimethylphenol**
34.637	21.9931396	0.63496087	**43.986279**	2 65.9794189	-9.3492792	78.62327925	**Benzoic Acid**
97.271	4.29607642	0.04416606	**8.59215285**	12.888229	3 88.6788472	105.8631528	**bis(2-chloroethoxy)methane**
99.971	6.47610742	0.06477986	**12.9522148**	19.428323	87.0187852	112.9232148	**2,4,-Dichlorophenol**
92.2395	7.1359774	0.07736357	**14.2719548**	21.407932	2 77.9675452	106.5114548	**1,2,4-Trichlorobenzene**
92.6255	5.1712072	0.0558292	**10.3424144**	15.513621	6 82.2830856	102.9679144	**Naphthalene**
126.923	10.3312989	0.08139816	**20.6625979**	30.993896	8 106.260402	147.5855979	**4-Chloroaniline**
89.924	9.50940277	0.10574933	**19.018805**	5 28.528208	3 70.9051945	108.9428055	**Hexachlorobutadiene**
40.9705	5.53009896	0.13497758	**11.0601979**	16.590296	9 29.9103021	52.03069791	**Caprolactum**
101.7205	5.27755573	0.05188291	**10.5551115**	15.832667	2 91.1653885	112.2756115	**4-Chloro-3-methylphenol**
98.131	4.36763897	0.04450825	**8.73527794**	13.102916	9 89.3957221	106.8662779	**2-Methylnaphthalene**
98.131	5.01101093	0.0510645	**10.0220219**	15.033032	8 88.1089781	108.1530219	**Methylnaphthalenes(total)**
97.62	6.81333368	0.06979444	**13.6266674**	20.440001	83.9933326	111.2466674	**1,1'-Biphneyl**
89.2395	6.85763767	0.07684532	**13.7152753**	20.572913	75.5242247	102.9547753	**1,2,4,5-Tetrachlorobenzene**
96.8585	9.16320461	0.09460403	**18.326409**	2 27.489613	8 78.5320908	115.1849092	**Hexachlorocyclopentadiene**
106.616	5.66604513	0.05314442	**11.3320903**	16.998135	4 95.2839097	117.9480903	**2,4,6-Trichlorophenol**
105.49	5.70848215	0.05411396	**11.4169643**	17.125446	4 94.0730357	116.9069643	**2,4,5-Trichlorophenol**
99.625	4.81705687	0.04835189	**9.63411373**	14.451170	6 89.9908863	109.2591137	**2-Chloronaphthalene**
89.3655	5.42346993	0.06068863	**10.8469399**	16.270409	8 78.5185601	100.2124399	**1,4-Dimethylnaphthalene**
89.3655	5.42346993	0.06068863	**10.8469399**	16.270409	8 78.5185601	100.2124399	**Dimethylnaphthalenes(total)**
88.216	5.25747528	0.05959775	**10.5149506**	15.772425	8 77.7010494	98.73095056	**Diphenyl ether**
103.034	5.69879803	0.05530988	**11.3975961**	17.096394	1 91.6364039	114.4315961	**2-Nitroaniline**
98.488	4.10529004	0.04168315	**8.21058008**	12.315870	1 90.2774199	106.6985801	**Acenaphthylene**
101.915	5.43746506	0.05335294	**10.8749301**	16.312395	2 91.0400699	112.7899301	**Dimethylphthalate**
96.3175	21.5903767	0.224158	**43.180753**	64.771302	53.1367466	139.4982534	**2,6-Dinitrotoluene**
96.547	4.28139439	0.04434518	**8.56278877**	12.844183	2 87.9842112	105.1097888	**Acenaphthene**
118.063	7.84033908	0.0664081	**15.680678**	23.521017	2 102.382322	133.7436782	**3-Nitroaniline**
92.323	14.4142134	0.15612809	**28.828426**	8 43.242640	2 63.4945732	121.1514268	**2,4-Dinitrophenol**
99.7545	4.58573816	0.04597024	**9.17147632**	13.757214	5 90.5830237	108.9259763	**Dibenzofuran**
102.3215	6.38006705	0.06235314	**12.7601341**	19.140201	1 89.5613659	115.0816341	**2,4-Dinitotoluene**
51.364	6.82940808	0.13296099	**13.658816**	2 20.488224	2 37.7051838	65.02281616	**4-Nitrophenol**
93.76	5.95190018	0.06348016	**11.9038004**	17.855700	5 81.8561996	105.6638004	**2,3,4,6-Tetrachlorophenol**
97.1335	5.75232427	0.05922081	**11.5046485**	17.256972	8 85.6288515	108.6381485	**Fluorene**
100.29	6.293058	0.06274861	**12.586116**	18.879174	87.703884	112.8761164	**4-Chlorophenyl-phenylether**
99.106	5.90885544	0.05962157	**11.8177109**	17.726566	3 87.2882891	110.9237109	**Diethylphthalate**
109.7315	7.25688223	0.06613308	**14.513764**	5 21.770646	7 95.2177355	124.2452645	**4-Nitroaniline**
100.3505	7.82885451	0.0780151	**15.65770**	9 23.486563	5 84.692791	116.008209	**Atrazine**
106.9235	11.675787	0.10919758	**23.351574**	1 35.027361	1 83.5719259	130.2750741	**4,6-Dinitro-2-methylphenol**
84.503	3.66801266	0.04340689	**7.33602531**	11.004038	77.166974	91.83902531	**N-Nitrosodiphenylamine**
103.065	5.65005729	0.05482299	**11.3001146**	16.950171	9 91.7598854	114.3601146	**1,2-Diphenylhydrazine**
106.1655	7.33851303	0.06912333	**14.677026**	1 22.015539	1 91.4884739	120.8425261	**4-Bromophenyl-phenylether**
100.782	6.35941788	0.06310073	**12.7188358**	19.078253	6 88.0631642	113.5008358	**Hexachlorobenzene**
104.61	9.70961162	0.09281724	**19.419223**	2 29.128834	9 85.1907768	124.0292232	**n-Octadecane**
117.103	11.9605994	0.10213743	**23.921198**	8 35.881798	2 93.1818012	141.0241988	**Pentachlorophenol**
104.2821	05 3.45756591	0.03315589	**6.91513181**	10.372697	7 97.3669735	111.1972371	**Phananthrene**
101.1505	4.96811038	0.04911602	**9.93622077**	14.904331	2 91.2142792	111.0867208	**Anthracene**
100.937	5.00933455	0.04962833	**10.018669**	1 15.028003	6 90.9183309	110.9556691	**Carbazole**
106.2085	6.03358868	0.05680891	**12.0671774**	18.100766	94.1413226	118.2756774	**Di-n-butylphthalate**

106.419	7.08041918	0.06653341	**14.160384**	21.241257	92.258161	120.579838	**Fluoranthene**
95.615	5.24767467	0.05488338	**10.4953493**	15.74302	85.1196507	106.110349	**Pyrene**
43.2085	31.4502448	0.72787171	**62.9004896**	94.3507344	-19.69199	106.108986	**Benzidene**
107.0835	5.02400477	0.04691671	**10.0480095**	15.0720143	97.0354905	117.131509	**Butylbenzylphthalate**
138.9525	14.7031679	0.10581435	**29.4063358**	44.1095037	109.546164	168.358835	**3,3-Dichlorobenzidine**
98.4795	5.31715444	0.05399251	**10.6343089**	15.9514633	87.8451911	109.113809	**Benzo(a)anthracene**
97.016	6.84157953	0.07052448	**13.6831591**	20.5247386	83.3268409	110.693159	**Chrysene**
107.9635	5.08397821	0.04708979	**10.1679564**	15.2519346	97.7955436	118.131456	**bis(2-Ethylhexyl)phthalate**
103.131	7.19337536	0.06974988	**14.3867507**	21.5801261	88.7442493	117.517751	**Di-n-octylphthalate**
99.2655	6.39564364	0.06442967	**12.7912873**	19.1869309	86.4742127	112.056787	**Benzo(b)fluoranthene**
103.9605	8.48259776	0.08159443	**16.9651955**	25.4477933	86.9953045	120.925696	**Benzo(k)fluoranthene**
103.805	6.28150208	0.06051252	**12.5630042**	18.8445062	91.2419958	116.368004	**Benzo(a)pyrene**
106.246	6.886249	0.0648142	**13.772498**	20.658747	92.473502	120.018498	**Indeno(1,2,3-c,d)pyrene**
108.233	6.31782449	0.05837244	**12.635649**	18.9534735	95.597351	120.868649	**Dibenzo(a,h)anthracene**
105.117	8.03730323	0.07646055	**16.0746065**	24.1119097	89.0423935	121.191607	**Benzo(g,h,l)perylene**
56.9127755	5.45098104	0.09577781	**10.8196208**	16.352943	46.0931542	67.7323958	**1,4-Dioxane**
							1-Methylnaphthalene

Soils:

					SD-3	SD+3	SD-2	SD+2	
AverRec	SD	RSD	SD2	SD3	% Rec	% Rec	% Rec	% Rec	Compound
26.056	4.60431079	0.17670827	**9.20862159**	13.8129324	24.48614	79.73786	16.8473784	35.26462159	**Pyridine**
39.744	5.99921258	0.15094637	**11.9984252**	17.9976377	43.49272	115.4833	27.7455748	51.74242516	**N-Nitrosodimethylamie**
59.736	7.44951245	0.12470725	**14.8990249**	22.3485374	74.77493	164.1691	44.8369751	74.63502491	**Benzaldehyde**
34.6425	9.31980228	0.26902799	**18.6396046**	27.9594068	13.36619	125.2038	16.0028954	53.28210455	**Aniline**
48.024	3.88175001	0.08082938	**7.76350002**	11.64525	72.7575	119.3385	40.2605	55.78750002	**Pentachloroethane**
42.1555	3.38067025	0.08019524	**6.76134049**	10.1420107	64.02698	104.595	35.3941595	48.91684049	**bis(2-chloroisopropyl)ether**
85.5175	8.52158119	0.09964722	**17.0431624**	25.5647436	59.95276	111.0822	68.4743376	102.5606624	**Phenol**
89.4405	6.13096667	0.06854799	**12.2619333**	18.3929	71.0476	107.8334	77.1785667	101.7024333	**2-Chlorophenol**
34.871	5.2532906	0.15064927	**10.5065812**	15.7598718	38.22226	101.2617	24.3644188	45.3775812	**n-Decane**
41.4765	3.34584153	0.08066837	**6.69168305**	10.0375246	62.87795	103.028	34.7848169	48.16818305	**1,3-Dichlorobenzene**
42.3925	3.18389843	0.07510523	**6.36779686**	9.55169529	65.68161	103.8884	36.0247031	48.76029686	**1,4-Dichlorobenzene**
43.8055	3.13480038	0.0715618	**6.26960076**	9.40440114	68.8022	106.4198	37.5358992	50.07510076	**1,2-Dichlorobenzene**
47.0885	3.79883677	0.08067441	**7.59767354**	11.3965103	71.38398	116.97	39.4908265	54.68617354	**Benzyl Alcohol**
45	4.69419014	0.10431534	**9.38838028**	14.0825704	61.83486	118.1651	35.6116197	54.38838028	**bis(2-chloroisopropyl)ether**
89.9505	7.68125776	0.08539428	**15.3625155**	23.0437733	66.90673	112.9943	74.5879845	105.3130155	**2-Methylphenol**
47.598	3.70741306	0.0778901	**7.41482612**	11.1222392	72.95152	117.4405	40.1831739	55.01282612	**Acetophenone**
41.9675	4.1438488	0.09873947	**8.2876976**	12.4315464	59.07191	108.7981	33.6798024	50.2551976	**Hexachloroethane**
44.2215	4.42538405	0.10007313	**8.85076809**	13.2761521	61.8907	114.9953	35.3707319	53.07226809	**N-Nitroso-di-n-propylamine**
89.1615	8.55940681	0.09599891	**17.1188136**	25.6782204	63.48328	114.8397	72.0426864	106.2803136	**3&4-Methylphenol**
46.8265	2.91569307	0.06226588	**5.83138613**	8.7470792	76.15884	111.1472	40.9951139	52.65788613	**Nitrobenzene**

41.511	2.83719265	0.06834797	**5.67438529**	8.51157794	65.99884	100.0452	35.8366147	47.18538529	**Isophorone**
91.641	5.17850913	0.05650865	**10.3570183**	15.5355274	76.10547	107.1765	81.2839817	101.9980183	**2-Nitrophenol**
90.908	5.47922449	0.06027219	**10.958449**	16.4376735	74.47033	107.3457	79.949551	101.866449	**2,4-Dimethylphenol**
64.38	24.6472193	0.38283969	**49.2944387**	73.941658	-9.56166	138.3217	15.0855613	113.6744387	**Benzoic Acid**
45.779	3.00800143	0.06570701	**6.01600287**	9.0240043	73.50999	109.606	39.7629971	51.79500287	**bis(2-chloroethoxy)methane**
94.073	6.09896203	0.06483223	**12.1979241**	18.2968861	75.77611	112.3699	81.8750759	106.2709241	**2,4,-Dichlorophenol**
45.0175	2.85422471	0.06340256	**5.70844942**	8.56267412	72.90965	107.1603	39.3090506	50.72594942	**1,2,4-Trichlorobenzene**
44.8995	2.80825377	0.06254532	**5.61650753**	8.4247613	72.94948	106.6485	39.2829925	50.51600753	**Naphthalene**
31.5835	10.6552385	0.33736725	**21.3104771**	31.9657156	-0.76443	127.0984	10.2730229	52.89397706	**4-Chloroaniline**
43.1115	3.1161418	0.07228099	**6.23228361**	9.34842541	67.52615	104.9199	36.8792164	49.34378361	**Hexachlorobutadiene**
51.2625	4.61796136	0.09008459	**9.23592272**	13.8538841	74.81723	130.2328	42.0265773	60.49842272	**Caprolactum**
93.1745	7.81564253	0.08388178	**15.6312851**	23.4469276	69.72757	116.6214	77.5432149	108.8057851	**4-Chloro-3-methylphenol**
46.9805	2.96118141	0.06303001	**5.92236281**	8.88354422	76.19391	111.7281	41.0581372	52.90286281	**2-Methylnaphthalene**
46.9805	2.8957691	0.06163768	**5.7915382**	8.6873073	76.58639	111.3356	41.1889618	52.7720382	**Methylnaphthalenes(total)**
45.004	3.12560967	0.06945182	**6.25121933**	9.376829	71.25434	108.7617	38.7527807	51.25521933	**1,1'-Biphneyl**
50.942	3.77340918	0.07407265	**7.54681836**	11.3202275	79.24354	124.5245	43.3951816	58.48881836	**1,2,4,5-Tetrachlorobenzene**
35.8825	13.9084817	0.38761183	**27.8169633**	41.725445	-11.6859	155.2159	8.0655367	63.6994633	**Hexachlorocyclopentadiene**
95.796	5.48249213	0.05723091	**10.9649843**	16.4474764	79.34852	112.2435	84.8310157	106.7609843	**2,4,6-Trichlorophenol**
95.0235	5.79238727	0.06095742	**11.5847745**	17.3771618	77.64634	112.4007	83.4387255	106.6082745	**2,4,5-Trichlorophenol**
47.8915	2.67031493	0.0557576	**5.34062987**	8.0109448	79.76111	111.8049	42.5508701	53.23212987	**2-Chloronaphthalene**
43.3245	2.69580273	0.06222352	**5.39160546**	8.0874082	70.47418	102.8238	37.9328945	48.71610546	**1,4-Dimethylnaphthalene**
43.3245	2.69580273	0.06222352	**5.39160546**	8.0874082	70.47418	102.8238	37.9328945	48.71610546	**Dimethylnaphthalenes(total)**
50.856	3.291887	0.06472957	**6.58377399**	9.87566099	81.96068	121.4633	44.272226	57.43977399	**Diphenyl ether**
51.0915	3.56574976	0.06979145	**7.13149951**	10.6972493	80.7885	123.5775	43.9600005	58.22299951	**2-Nitroaniline**
47.5185	2.86011092	0.06018942	**5.72022184**	8.58033276	77.87633	112.1977	41.7982782	53.23872184	**Acenaphthylene**
47.5415	2.93407795	0.06171614	**5.8681559**	8.80223385	77.47853	112.6875	41.6733441	53.4096559	**Dimethylphthalate**
46.053	2.97325818	0.06456166	**5.94651636**	8.91977454	74.26645	109.9455	40.1064836	51.99951636	**2,6-Dinitrotoluene**
45.7735	2.72018048	0.05942697	**5.44036096**	8.16054144	75.22592	107.8681	40.333139	51.21386096	**Acenaphthene**
39.0415	8.80416604	0.22550788	**17.6083321**	26.4124981	25.258	130.908	21.4331679	56.64983209	**3-Nitroaniline**
47.124	24.2584515	0.51477912	**48.5169029**	72.7753544	-25.6514	119.8994	-1.3929029	95.64090293	**2,4-Dinitrophenol**
46.9765	2.86168937	0.06091747	**5.72337874**	8.58506811	76.78286	111.1231	41.2531213	52.69987874	**Dibenzofuran**
45.6615	3.77536792	0.08268164	**7.55073583**	11.3261037	68.67079	113.9752	38.1107642	53.21223583	**2,4-Dinitotoluene**
92.437	7.79481481	0.0843257	**15.5896296**	23.3844444	69.05256	115.8214	76.8473704	108.0266296	**4-Nitrophenol**
88.6505	5.51008881	0.06215519	**11.0201776**	16.5302664	72.12023	105.1808	77.6303224	99.67067762	**2,3,4,6-Tetrachlorophenol**
44.93	3.11335662	0.06929349	**6.22671325**	9.34006987	71.17986	108.5401	38.7032868	51.15671325	**Fluorene**
46.0435	3.28193665	0.07127904	**6.56387329**	9.84580994	72.39538	111.7786	39.4796267	52.60737329	**4-Chlorophenyl-phenylether**
45.6245	3.05545324	0.06696957	**6.11090647**	9.16635971	72.91628	109.5817	39.5135935	51.73540647	**Diethylphthalate**
42.9	10.3915137	0.24222643	**20.7830275**	31.1745412	23.45092	148.1491	22.1169725	63.68302749	**4-Nitroaniline**
50.989	4.30817937	0.08449233	**8.61635874**	12.9245381	76.12892	127.8271	42.3726413	59.60535874	**Atrazine**
66.074	22.4728546	0.34011645	**44.9457092**	67.4185638	-1.34456	133.4926	21.1282908	111.0197092	**4,6-Dinitro-2-methylphenol**
40.2325	9.7598306	0.24258574	**19.5196612**	29.2794918	21.90602	139.024	20.7128388	59.75216121	**N-Nitrosodiphenylamine**
50.987	3.51295962	0.06889912	**7.02591923**	10.5388788	80.89624	123.0518	43.9610808	58.01291923	**1,2-Diphenylhydrazine**
51.2925	3.25257934	0.06341238	**6.50515868**	9.75773802	83.06952	122.1005	44.7873413	57.79765868	**4-Bromophenyl-phenylether**
47.7285	3.14356699	0.06586352	**6.28713398**	9.43070097	76.5956	114.3184	41.441366	54.01563398	**Hexachlorobenzene**
50.386	4.77496035	0.0947676	**9.54992069**	14.324881	72.12224	129.4218	40.8360793	59.93592069	**n-Octadecane**
89.9265	9.81445887	0.10913867	**19.6289177**	29.4433766	60.48312	119.3699	70.2975823	109.5554177	**Pentachlorophenol**

48.8278947	3.10142902	0.06351757	**6.20285805**	9.30428707	79.04722	116.2644	42.6250367	55.03075278	**Phananthrene**
46.6775	3.07016522	0.06577399	**6.14033044**	9.21049566	74.93401	111.776	40.5371696	52.81783044	**Anthracene**
45.477	2.97692724	0.06546006	**5.95385448**	8.93078172	73.09244	108.8156	39.5231455	51.43085448	**Carbazole**
49.075	3.50436795	0.07140841	**7.0087359**	10.5131039	77.12379	119.1762	42.0662641	56.0837359	**Di-n-butylphthalate**
47.3965	4.21334506	0.0888957	**8.42669012**	12.6400352	69.51293	120.0731	38.9698099	55.82319012	**Fluoranthene**
47.9765	3.51037901	0.07316872	**7.02075802**	10.531137	74.89073	117.0153	40.955742	54.99725802	**Pyrene**
37.141	17.2716494	0.4650292	**34.5432988**	51.8149482	-29.3479	177.9119	2.59770122	71.68429878	**Benzidene**
51.3355	3.50999247	0.06837359	**7.01998493**	10.5299774	81.61105	123.731	44.3155151	58.35548493	**Butylbenzylphthalate**
37.263	11.8211795	0.31723639	**23.642359**	35.4635386	3.598923	145.4531	13.620641	60.90535904	**3,3-Dichlorobenzidine**
46.0575	2.45571701	0.0533185	**4.91143403**	7.36715104	77.3807	106.8493	41.146066	50.96893403	**Benzo(a)anthracene**
46.9005	2.95140729	0.06292912	**5.90281458**	8.85422187	76.09256	111.5094	40.9976854	52.80331458	**Chrysene**
51.3805	3.49288069	0.06798067	**6.98576138**	10.4786421	81.80372	123.7183	44.3947386	58.36626138	**bis(2-Ethylhexyl)phthalate**
51.0145	5.09122429	0.09979955	**10.1824486**	15.2736729	71.48165	132.5763	40.8320514	61.19694858	**Di-n-octylphthalate**
45.0885	3.56830975	0.07914013	**7.1366195**	10.7049293	68.76714	111.5869	37.9518805	52.2251195	**Benzo(b)fluoranthene**
47.9795	3.71959739	0.07752472	**7.43919478**	11.1587922	73.64142	118.2766	40.5403052	55.41869478	**Benzo(k)fluoranthene**
46.9715	2.90945152	0.06194078	**5.81890304**	8.72835457	76.48629	111.3997	41.152597	52.79040304	**Benzo(a)pyrene**
49.2915	4.31453879	0.08753109	**8.62907759**	12.9436164	72.69577	124.4702	40.6624224	57.92057759	**Indeno(1,2,3-c,d)pyrene**
49.4855	4.07760827	0.08240006	**8.15521654**	12.2328248	74.50535	123.4366	41.3302835	57.64071654	**Dibenzo(a,h)anthracene**
49.9765	5.09629822	0.10197389	**10.1925964**	15.2888947	69.37521	130.5308	39.7839036	60.16909644	**Benzo(g,h,i)perylene**
									1, 4-Dioxane (TBD)
									1-Methylnaphthalene(TBD)

TABLE 1 (TARGET ANALYTES)

	CAS #
1,1'-Biphenyl	92-52-4
1,2,4,5-Tetrachlorobenzene	95-94-3
1,2-Dichlorobenzene	95-50-1
1,2-Diphenylhydrazine	122-66-7
1,3-Dichlorobenzene	541-73-1
1,4-Dichlorobenzene	106-46-7
1,4-Dioxane	123-91-1
1-Methylnaphthalene	90-12-0
2,3,4,6-Tetrachlorophenol	58-90-2
2,4,5-Trichlorophenol	95-95-4
2,4,6-Tribromophenol	118-76-6
2,4,6-Trichlorophenol	88-06-2
2,4-Dichlorophenol	120-83-2
2,4-Dimethylphenol	105-67-9
2,4-Dinitrophenol	51-28-5
2,4-Dinitrotoluene	121-14-2
2,6-Dinitrotoluene	606-20-2
2-Chloronaphthalene	91-58-7
2-Chlorophenol	95-57-8

Table 1 – cont'd

2-Fluorobiphenyl	321-60-8
2-Fluorophenol	367-12-4
2-Methylnaphthalene	91-57-6
2-Methylphenol	95-48-7
2-Nitroaniline	88-74-4
2-Nitrophenol	88-75-5
2-Nitrotoluene	88-72-2
3&4-Methylphenol	106-44-5
3,3'-Dichlorobenzidine	91-94-1
3-Nitroaniline	99-09-2
3-Nitrotoluene	99-08-1
4,6-Dinitro-2-methylphenol	534-52-1
4-Bromophenyl-phenylether	101-55-3
4-Chloro-3-methylphenol	59-50-7
4-Chloroaniline	106-47-8
4-Chlorophenyl-phenylether	7005-72-3
4-Nitrophenol	100-02-7
4-Nitrotoluene	99-99-0
Acenaphthene	83-32-9
Acenaphthylene	208-96-8
Acetophenone	98-86-2
Aniline	62-53-3
Anthracene	120-12-7
Atrazine	1912-24-9
Benzaldehyde	100-52-7
Benzidine	92-87-5
Terphenyl-d14	1718-51-0
1,2,4-Trichlorobenzene	120-82-1
Pyridine	110-86-1
Pentachloroethane	76-01-7
o-Toluidine	95-53-4
2-Ethylaniline	578-54-1
2-Amino-naphthalene	91-59-8
1,4-Dioxane	123-91-1
Benzo[a]anthracene	56-55-3
Benzo[a]pyrene	50-32-8
Benzo[b]fluoranthene	205-99-2
Benzo[g,h,i]perylene	191-24-2
Benzo[k]fluoranthene	207-08-9
Benzoic acid	65-85-0
Benzyl alcohol	100-51-6
Bis(2-Chloroethoxy)methane	111-91-1
Bis(2-Chloroethyl)ether	111-44-4
Bis(2-Chloroisopropyl)ether	108-60-1
Bis(2-Ethylhexyl)phthalate	117-81-7

Table 1 – cont'd

Butylbenzylphthalate	85-68-7
Caprolactam	105-60-2
Carbazole	86-74-8
Chrysene	218-01-9
Dibenzo[a,h]anthracene	53-70-3
Dibenzofuran	132-64-9
Diethylphthalate	84-66-2
Dimethylnaphthalenes (Total)	DIMETHYLS
Dimethylphthalate	131-11-3
Di-n-butylphthalate	84-74-2
Di-n-octylphthalate	117-84-0
Diphenyl Ether	101-84-8
Fluoranthene	206-44-0
Fluorene	86-73-7
Hexachlorobenzene	118-74-1
Hexachlorobutadiene	87-68-3
Hexachlorocyclopentadiene	77-47-4
Hexachloroethane	67-72-1
Indeno[1,2,3-cd]pyrene	193-39-5
Isophorone	78-59-1
Naphthalene	91-20-3
Nitrobenzene	98-95-3
Nitrobenzene-d5	4165-60-0
N-Nitrosodimethylamine	62-75-9
N-Nitroso-di-n-propylamine	621-64-7
N-Nitrosodiphenylamine	86-30-6
Pentachlorophenol	87-86-5
Phenanthrene	85-01-8
Phenol	108-95-2
Phenol-d5	13127-88-3
Pyrene	129-00-0
Pyridine	110-86-1
2,3-Dimethylanilin	87-59-2
2,4-Dimethylaniline	95-68-1
3,4-Dimethylaniline	95-64-7
2,4,5-Trimethylaniline	137-17-7
4-Chloro-o-toluidine	95-69-21
n-Decane	124-18-5
n-Octadecane	593-45-3

TABLE 2 – Minimum Response Factors for Initial and Continuing Calibration Verification

Semivolatile Compounds	Minimum Response Factor (RF)
Benzaldehyde	0.010
Phenol	0.800
Bis(2-chloroethyl)ether	0.700
2-Chlorophenol	0.800
2-Methylphenol	0.700
bis (2-chloroisopropyl)ether	0.010
Acetophenone	0.010
4-Methylphenol	0.600
N-Nitroso-di-n-propylamine	0.500
Hexachloroethane	0.300
Nitrobenzene	0.200
Isophorone	0.400
2-Nitrophenol	0.100
2,4-Dimethylphenol	0.200
Bis(2-chloroethoxy)methane	0.300
2,4-Dichlorophenol	0.200
Naphthalene	0.700
4-Chloroaniline	0.010
Hexachlorobutadiene	0.010
Caprolactam	0.010
4-Chloro-3-methylphenol	0.200
2-Methylnaphthalene	0.400
Hexachlorocyclopentadiene	0.050
2,4,6-Trichlorophenol	0.200
2,4,5-Trichlorophenol	0.200
1,1'-Biphenyl	0.010
2-Chloronaphthalene	0.800
2-Nitroaniline	0.010
Dimethyl phthalate	0.010
2,6-Dinitrotoluene	0.200
Acenaphthylene	0.900
3-Nitroaniline	0.010
Acenaphthene	0.900
2,4-Dinitrophenol	0.010
4-Nitrophenol	0.010
Dibenzofuran	0.800
2,4-Dinitrotoluene	0.200
Diethyl phthalate	0.010
1,2,4,5-Tetrachlorobenzene	0.010
4-Chlorophenyl-phenyl ether	0.400
Fluorene	0.900
4-Nitroaniline	0.010
4,6-Dinitro-2-methylphenol	0.010
4-Bromophenyl-phenyl ether	0.100
N-Nitrosodiphenylamine	0.010

TABLE 2 - continued

Semivolatile Compounds	Minimum Response Factor (RF)
Hexachlorobenzene	0.100
Atrazine	0.010
Pentachlorophenol	0.050
Phenanthrene	0.700
Anthracene	0.700
Carbazole	0.010
Di-n-butyl phthalate	0.010
Fluoranthene	0.600
Pyrene	0.600
Butyl benzyl phthalate	0.010
3,3'-Dichlorobenzidine	0.010
Benzo(a)anthracene	0.800
Chrysene	0.700
Bis-(2-ethylhexyl)phthalate	0.010
Di-n-octyl phthalate	0.010
Benzo(b)fluoranthene	0.700
Benzo(k)fluoranthene	0.700
Benzo(a)pyrene	0.700
Indeno(1,2,3-cd)pyrene	0.500
Dibenz(a,h)anthracene	0.400
Benzo(g,h,i)perylene	0.500
2,3,4,6-Tetrachlorophenol	0.010
Pentachloroethane	0.050
n-Decane	0.050
n-Octadecane	0.050
1,4-Dioxane	0.010
1-Methylnaphthalene	0.400

TABLE 3
(internal standards)

PARAMETER	Internal Standard Number	CHARACTERISTIC MASSES ELECTRON IMPACT		
		primary	secondary	secondary
1,4-Dioxane-d8	1	96	64	---
1,4-Dichlorobenzene-d4	2	150	152	115
Naphthalene-d8	3	136	68	---
Acenapthene-d10	4	164	162	160
Phenanthrene-d10	5	188	94	80
Chrysene-d12	6	240	120	236
Perylene-d12	7	264	260	265

TABLE 4
(surrogate standards)

PARAMETER	CHARACTERISTIC MASSES ELECTRON IMPACT			SURROGATE RECOVERY LIMITS	
	primary	secondary	secondary	WATER	SOIL
Nitrobenzene-d5	82	54	128	51-139	52-129
2-Fluorobiphenyl	172	171	---	53-129	58-125
Terphenyl-d14	244	122	245	55-146	58-148
Phenol-d5	99	42	71	27-115	49-129
2-Fluorophenol	112	64	---	29-113	43-128
2,4,6-Tribromophenol	330	332	141	54-149	54-145

TABLE 5
(quality control)

MBS/MS/MSD Recovery Limits

	SOIL		AQUEOUS	
	LOWER	UPPER	LOWER	UPPER
Pyridine	1	150	5	150
N-Nitrosodimethylamine	50	130	50	150
Benzaldehyde	20	150	20	150
Aniline	20	150	20	150
Pentachloroethane	50	130	50	130
bis(2-chloroethyl)ether	50	130	50	130
Phenol	20	150	20	150
2-Chlorophenol	50	130	70	130
N-Decane	20	130	40	130
1,3-Dichlorobenzene	60	130	50	130
1,4-Dichlorobenzene	60	130	50	130
1,2-Dichlorobenzene	50	130	50	130
Benzyl Alcohol	20	130	70	130
bis(2-chloroisopropyl)ether	40	130	40	130
2-Methylphenol	50	130	60	130
Acetophenone	50	130	50	130
Hexachloroethane	50	130	50	130
N-Nitroso-di-n-propylamine	40	130	50	130
3&4-Methylphenol	70	130	50	130
Nitrobenzene	70	130	70	130
Isophorone	60	130	70	130
2-Nitrophenol	70	130	70	130
2,4-Dimethylphenol	50	130	50	130
Benzoic Acid	20	130	20	130
bis(2-chloroethoxy)methane	60	130	70	130
2,4,-Dichlorophenol	70	130	70	130
1,2,4-Trichlorobenzene	50	130	50	130
Naphthalene	50	130	70	130
4-Chloroaniline	10	150	50	150
Hexachlorobutadiene	60	130	70	130
Caprolactum	50	130	20	130
4-Chloro-3-methylphenol	50	130	70	130
2-Methylnaphthalene	70	130	70	130
1- Methylnaphthalene	70	130	70	130
1,1'-Biphenyl	60	130	70	130
1,2,4,5-Tetrachlorobenzene	70	130	70	130
Hexachlorocyclopentadiene	20	160	20	130
2,4,6-Trichlorophenol	70	130	70	130
2,4,5-Trichlorophenol	70	130	70	130

2-Chloronaphthalene	70	130	70	130
1,4-Dimethylnaphthalene	70	130	70	130
Diphenyl ether	70	130	70	130
2-Nitroaniline	50	130	50	150
Coumarin	70	130	70	130
Acenaphthylene	70	130	70	130
Dimethylphthalate	70	130	70	130
2,6-Dinitrotoluene	70	130	70	130
Acenaphthene	50	130	70	130
3-Nitroaniline	10	130	50	150
2,4-Dinitrophenol	20	150	20	150
Dibenzofuran	70	130	70	130
2,4-Dinitotoluene	40	130	40	130
4-Nitrophenol	20	150	20	150
2,3,4,6-Tetrachlorophenol	50	130	70	130
Fluorene	50	130	70	130
4-Chlorophenyl-phenylether	70	130	70	130
Diethylphthalate	70	130	50	130
4-Nitroaniline	50	130	50	150
Atrazine	50	130	50	130
4,6-Dinitro-2-methylphenol	70	130	70	130
N-Nitrosodiphenylamine	50	130	50	130
1,2-Diphenylhydrazine	70	130	70	130
4-Bromophenyl-phenylether	70	130	70	130
Hexachlorobenzene	70	130	70	130
N-Octadecane	70	130	70	130
Pentachlorophenol	70	130	40	130
Phenanthrene	40	130	70	130
Anthracene	70	130	70	130
Carbazole	70	130	70	130
Di-n-butylphthalate	70	130	70	130
Fluoranthene	70	130	70	130
Pyrene	50	130	70	130
Benzidine	1	130	0	130
Butylbenzylphthalate	50	130	50	130
3,3-Dichlorobenzidine	10	130	1	150
Benzo(a)anthracene	70	130	70	130
Chrysene	60	130	50	130
bis(2-Ethylhexyl)phthalate	70	130	70	130
Di-n-octylphthalate	70	130	70	130
Benzo(b)fluoranthene	70	130	70	130
Benzo(k)fluoranthene	70	130	70	130
Benzo(a)pyrene	70	130	70	130
Indeno(1,2,3-c,d)pyrene	70	130	70	130
Dibenzo(a,h)anthracene	60	130	70	130
Benzo(g,h,I)perylene	70	130	70	130

TABLE 6

DFTPP KEY MASSES AND ABUNDANCE CRITERIA	
MASSES	M/Z ABUNDANCE CRITERIA
51	10-80 % of base peak
68	<2% of mass 69
70	<2% of mass 69
127	10 - 80 % of mass 198
197	<2% of mass 198
198	Base peak, or >50 % of mass 442
199	5 - 9 % of mass 198
275	10 - 60 % of mass 198
365	>1% of mass 198
441	Present but < 24% of mass 442
442	Base peak, or >50% of mass 198
443	15-24 percent of mass 442

TABLE 7

REPORTING LIMITS

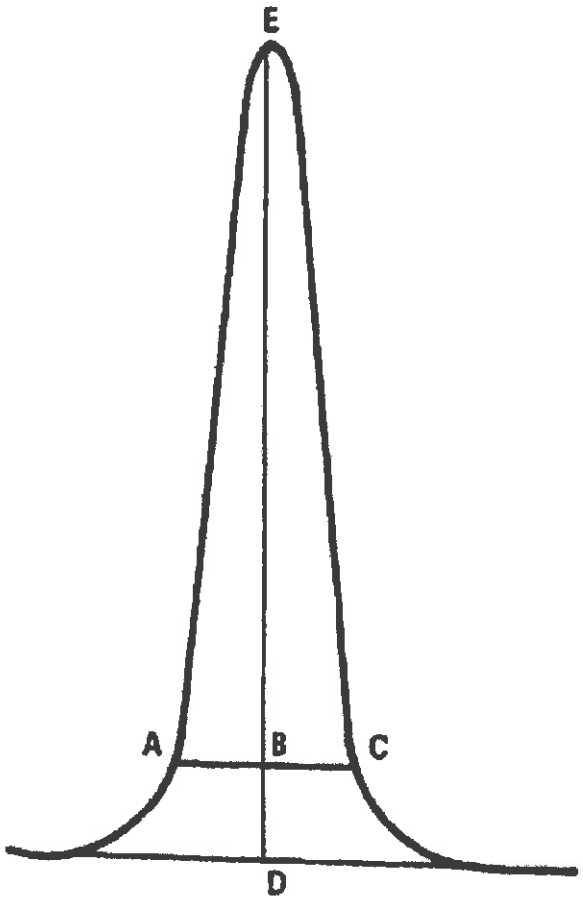
Analyte	CAS#	Matrix	RL	UNIT
1,1'-Biphenyl	92-52-4	Aqueous	2	ppb
1,2,4,5-Tetrachlorobenzene	95-94-3	Aqueous	2	ppb
1,2,4-Trichlorobenzene	120-82-1	Aqueous	2	ppb
1,2-Dichlorobenzene	95-50-1	Aqueous	2	ppb
1,2-Diphenylhydrazine	122-66-7	Aqueous	2	ppb
1,3-Dichlorobenzene	541-73-1	Aqueous	2	ppb
1,4-Dichlorobenzene	106-46-7	Aqueous	2	ppb
1,4-Dimethylnaphthalene	571-58-4	Aqueous	2	ppb
1,4-Dioxane	123-91-1	Aqueous	0.25	ppb
1-Methylnaphthalene	90-12-0	Aqueous	2	ppb
2,3,4,6-Tetrachlorophenol	58-90-2	Aqueous	2	ppb
2,4,5-Trichlorophenol	95-95-4	Aqueous	2	ppb
2,4,6-Trichlorophenol	88-06-2	Aqueous	2	ppb
2,4-Dichlorophenol	120-83-2	Aqueous	2	ppb
2,4-Dimethylphenol	105-67-9	Aqueous	2	ppb
2,4-Dinitrophenol	51-28-5	Aqueous	10	ppb
2,4-Dinitrotoluene	121-14-2	Aqueous	2	ppb
2,6-Dinitrotoluene	606-20-2	Aqueous	2	ppb
2-Chloronaphthalene	91-58-7	Aqueous	2	ppb
2-Chlorophenol	95-57-8	Aqueous	2	ppb
2-Methylnaphthalene	91-57-6	Aqueous	2	ppb

2-Methylphenol	95-48-7	Aqueous	0.5	ppb
2-Nitroaniline	88-74-4	Aqueous	2	ppb
2-Nitrophenol	88-75-5	Aqueous	2	ppb
3&4-Methylphenol	106-44-5	Aqueous	0.5	ppb
3,3'-Dichlorobenzidine	91-94-1	Aqueous	2	ppb
3-Nitroaniline	99-09-2	Aqueous	2	ppb
4,6-Dinitro-2-methylphenol	534-52-1	Aqueous	10	ppb
4-Bromophenyl-phenylether	101-55-3	Aqueous	2	ppb
4-Chloro-3-methylphenol	59-50-7	Aqueous	2	ppb
4-Chloroaniline	106-47-8	Aqueous	2	ppb
4-Chlorophenyl-phenylether	7005-72-3	Aqueous	2	ppb
4-Nitroaniline	100-01-6	Aqueous	2	ppb
4-Nitrophenol	100-02-7	Aqueous	2	ppb
Acenaphthene	83-32-9	Aqueous	2	ppb
Acenaphthylene	208-96-8	Aqueous	2	ppb
Acetophenone	98-86-2	Aqueous	2	ppb
Aniline	62-53-3	Aqueous	2	ppb
Anthracene	120-12-7	Aqueous	2	ppb
Atrazine	1912-24-9	Aqueous	2	ppb
Benzaldehyde	100-52-7	Aqueous	2	ppb
Benzidine	92-87-5	Aqueous	10	ppb
Benzo[a]anthracene	56-55-3	Aqueous	2	ppb
Benzo[a]Pyrene	50-32-8	Aqueous	2	ppb
Benzo[b]fluoranthene	205-99-2	Aqueous	2	ppb
Benzo[g,h,i]Perylene	191-24-2	Aqueous	2	ppb
Benzo[k]fluoranthene	207-08-9	Aqueous	2	ppb
Benzoic Acid	65-85-0	Aqueous	10	ppb
Benzyl alcohol	100-51-6	Aqueous	2	ppb
Bis(2-Chloroethoxy)Methane	111-91-1	Aqueous	2	ppb
bis(2-Chloroethyl)ether	111-44-4	Aqueous	0.5	ppb
bis(2-chloroisopropyl)ether	108-60-1	Aqueous	2	ppb
bis(2-Ethylhexyl)phthalate	117-81-7	Aqueous	2	ppb
Butylbenzylphthalate	85-68-7	Aqueous	2	ppb
Caprolactam	105-60-2	Aqueous	2	ppb
Carbazole	86-74-8	Aqueous	2	ppb
Chrysene	218-01-9	Aqueous	2	ppb
Coumarin	91-64-5	Aqueous	2	ppb
Dibenzo[a,h]anthracene	53-70-3	Aqueous	2	ppb
Dibenzofuran	132-64-9	Aqueous	0.5	ppb
Diethylphthalate	84-66-2	Aqueous	2	ppb
Dimethylnaphthalenes		Aqueous	2	ppb
Dimethylphthalate	131-11-3	Aqueous	2	ppb
Di-n-Butylphthalate	84-74-2	Aqueous	0.5	ppb
Di-n-octylphthalate	117-84-0	Aqueous	2	ppb
Diphenyl Ether	101-84-8	Aqueous	2	ppb
Fluoranthene	206-44-0	Aqueous	2	ppb
Fluorene	86-73-7	Aqueous	2	ppb
Hexachlorobenzene	118-74-1	Aqueous	2	ppb
Hexachlorobutadiene	87-68-3	Aqueous	2	ppb
Hexachlorocyclopentadiene	77-47-4	Aqueous	10	ppb
Hexachloroethane	67-72-1	Aqueous	2	ppb
Indeno[1,2,3-cd]pyrene	193-39-5	Aqueous	2	ppb
Isophorone	78-59-1	Aqueous	2	ppb
Methylnaphthalenes		Aqueous	2	ppb

Naphthalene	91-20-3	Aqueous	0.5	ppb
n-Decane	124-18-5	Aqueous	2	ppb
Nitrobenzene	98-95-3	Aqueous	2	ppb
N-Nitrosodimethylamine	62-75-9	Aqueous	2	ppb
N-Nitroso-Di-n-propylamine	621-64-7	Aqueous	0.5	ppb
n-Nitrosodiphenylamine	86-30-6	Aqueous	2	ppb
n-Octadecane	593-45-3	Aqueous	2	ppb
Pentachloroethane	76-01-7	Aqueous	2	ppb
Pentachlorophenol	87-86-5	Aqueous	10	ppb
Phenanthrene	85-01-8	Aqueous	2	ppb
Phenol	108-95-2	Aqueous	2	ppb
Pyrene	129-00-0	Aqueous	2	ppb
Pyridine	110-86-1	Aqueous	10	ppb

Analyte	CAS#	Matrix	RL	UNIT
1,1'-Biphenyl	92-52-4	Soil	0.033	ppm
1,2,4,5-Tetrachlorobenzene	95-94-3	Soil	0.033	ppm
1,2,4-Trichlorobenzene	120-82-1	Soil	0.033	ppm
1,2-Dichlorobenzene	95-50-1	Soil	0.033	ppm
1,2-Diphenylhydrazine	122-66-7	Soil	0.033	ppm
1,3-Dichlorobenzene	541-73-1	Soil	0.033	ppm
1,4-Dichlorobenzene	106-46-7	Soil	0.033	ppm
1,4-Dimethylnaphthalene	571-58-4	Soil	0.033	ppm
1,4-Dioxane	123-91-1	Soil	0.033	ppm
1-Methylnaphthalene	90-12-0	Soil	0.033	ppm
2,3,4,6-Tetrachlorophenol	58-90-2	Soil	0.033	ppm
2,4,5-Trichlorophenol	95-95-4	Soil	0.033	ppm
2,4,6-Trichlorophenol	88-06-2	Soil	0.033	ppm
2,4-Dichlorophenol	120-83-2	Soil	0.0083	ppm
2,4-Dimethylphenol	105-67-9	Soil	0.0083	ppm
2,4-Dinitrophenol	51-28-5	Soil	0.17	ppm
2,4-Dinitrotoluene	121-14-2	Soil	0.033	ppm
2,6-Dinitrotoluene	606-20-2	Soil	0.033	ppm
2-Chloronaphthalene	91-58-7	Soil	0.033	ppm
2-Chlorophenol	95-57-8	Soil	0.033	ppm
2-Methylnaphthalene	91-57-6	Soil	0.033	ppm
2-Methylphenol	95-48-7	Soil	0.0083	ppm
2-Nitroaniline	88-74-4	Soil	0.033	ppm
2-Nitrophenol	88-75-5	Soil	0.033	ppm
3&4-Methylphenol	106-44-5	Soil	0.0083	ppm
3,3'-Dichlorobenzidine	91-94-1	Soil	0.033	ppm
3-Nitroaniline	99-09-2	Soil	0.033	ppm
4,6-Dinitro-2-methylphenol	534-52-1	Soil	0.17	ppm
4-Bromophenyl-phenylether	101-55-3	Soil	0.033	ppm
4-Chloro-3-methylphenol	59-50-7	Soil	0.033	ppm
4-Chloroaniline	106-47-8	Soil	0.016	ppm
4-Chlorophenyl-phenylether	7005-72-3	Soil	0.033	ppm
4-Nitroaniline	100-01-6	Soil	0.033	ppm
4-Nitrophenol	100-02-7	Soil	0.033	ppm
Acenaphthene	83-32-9	Soil	0.033	ppm
Acenaphthylene	208-96-8	Soil	0.033	ppm

Acetophenone	98-86-2	Soil	0.033	ppm
Aniline	62-53-3	Soil	0.0083	ppm
Anthracene	120-12-7	Soil	0.033	ppm
Atrazine	1912-24-9	Soil	0.033	ppm
Benzaldehyde	100-52-7	Soil	0.033	ppm
Benzidine	92-87-5	Soil	0.17	ppm
Benzo[a]anthracene	56-55-3	Soil	0.033	ppm
Benzo[a]Pyrene	50-32-8	Soil	0.033	ppm
Benzo[b]fluoranthene	205-99-2	Soil	0.033	ppm
Benzo[g,h,i]Perylene	191-24-2	Soil	0.033	ppm
Benzo[k]fluoranthene	207-08-9	Soil	0.033	ppm
Benzoic Acid	65-85-0	Soil	0.17	ppm
Benzyl alcohol	100-51-6	Soil	0.033	ppm
Bis(2-Chloroethoxy)Methane	111-91-1	Soil	0.033	ppm
bis(2-Chloroethyl)ether	111-44-4	Soil	0.0083	ppm
bis(2-chloroisopropyl)ether	108-60-1	Soil	0.033	ppm
bis(2-Ethylhexyl)phthalate	117-81-7	Soil	0.033	ppm
Butylbenzylphthalate	85-68-7	Soil	0.033	ppm
Caprolactam	105-60-2	Soil	0.033	ppm
Carbazole	86-74-8	Soil	0.033	ppm
Chrysene	218-01-9	Soil	0.033	ppm
Coumarin	91-64-5	Soil	0.033	ppm
Dibenzo[a,h]anthracene	53-70-3	Soil	0.033	ppm
Dibenzofuran	132-64-9	Soil	0.0083	ppm
Diethylphthalate	84-66-2	Soil	0.033	ppm
Dimethylnaphthalenes		Soil	0.033	ppm
Dimethylphthalate	131-11-3	Soil	0.033	ppm
Di-n-Butylphthalate	84-74-2	Soil	0.017	ppm
Di-n-octylphthalate	117-84-0	Soil	0.033	ppm
Diphenyl Ether	101-84-8	Soil	0.033	ppm
Fluoranthene	206-44-0	Soil	0.033	ppm
Fluorene	86-73-7	Soil	0.033	ppm
Hexachlorobenzene	118-74-1	Soil	0.033	ppm
Hexachlorobutadiene	87-68-3	Soil	0.033	ppm
Hexachlorocyclopentadiene	77-47-4	Soil	0.17	ppm
Hexachloroethane	67-72-1	Soil	0.033	ppm
Indeno[1,2,3-cd]pyrene	193-39-5	Soil	0.033	ppm
Isophorone	78-59-1	Soil	0.033	ppm
Methylnaphthalenes		Soil	0.033	ppm
Naphthalene	91-20-3	Soil	0.0083	ppm
n-Decane	124-18-5	Soil	0.17	ppm
Nitrobenzene	98-95-3	Soil	0.033	ppm
N-Nitrosodimethylamine	62-75-9	Soil	0.033	ppm
N-Nitroso-Di-n-propylamine	621-64-7	Soil	0.0083	ppm
n-Nitrosodiphenylamine	86-30-6	Soil	0.033	ppm
n-Octadecane	593-45-3	Soil	0.033	ppm
Pentachloroethane	76-01-7	Soil	0.033	ppm
Pentachlorophenol	87-86-5	Soil	0.17	ppm
Phenanthrene	85-01-8	Soil	0.033	ppm
Phenol	108-95-2	Soil	0.033	ppm
Pyrene	129-00-0	Soil	0.033	ppm
Pyridine	110-86-1	Soil	0.17	ppm



$$\text{TAILING FACTOR} = \frac{BC}{AB}$$

Example calculation: Peak Height = DE = 100 mm
10% Peak Height = BD = 10 mm
Peak Width at 10% Peak Height = AC = 23 mm
AB = 11 mm
BC = 12 mm

$$\text{Therefore: Tailing Factor} = \frac{12}{11} = 1.1$$

Figure 1

SOP REVISIONS LOG

SOP NUMBER 5003B

DATE	REV. #	INITIALS	REVISION
7/5/12	1	RC	Section 17.1- updated listing
7/5/12	1	RC	Table 1 – updated compound list
7/5/12	1	RC	Table 4 – Updated compound list
11/13/14	2	EJ	Sec 7.1.2: adeed two columns
11/13/14	2	EJ	Sec 8.3.1:changed BNA CLP Comp to 8270 EXTRA MIX#1
11/13/14	2	EJ	Sec 8.3.4: changed Pest Mix concentration to 5,000ppm, added bulleted paragraph from Sec 8.2.1
11/13/14	2	EJ	Sec 8.3.5:changed BNA-5 Mix to BNA-7 Mix, added Coumarin and 3,4-Dichlorophenol
11/13/14	2	EJ	Sec 8.3.6:changed BNA-6 Mix to BNA-8 Mix
11/13/14	2	EJ	Sec 8.8:changed BNA-5 Mix to BNA-7 Mix
11/13/14	2	EJ	Sec 8.8.1: updated description of standards to current use
11/13/14	2	EJ	Sec 8.9.1: changed BNA-6 Mix to BNA-8 Mix
12/08/14	2	EJ	Sec 7.1.3 and 7.1.4: changed 50 ng to 25 ng
12/08/14	2	EJ	Sec 7.1.6: Added autosampler
12/08/14	2	EJ	Sec 9.2: changed amount of injected DFTPP
01/05/15	2	EJ	Sec 9.4.4: changed 50 ng to 100 ng
04/23/15	3	EJ	Added Table 7: Reporting Limits
3/29/16	4	RC/AH	Section 2.4: Added refernce to DOD QSM v5.0
3/29/16	4	RC/AH	Section 8.2.1:added additional standard vendors to the list
3/29/16	4	RC/AH	Section 8.3.1:added additional standard vendors to the list
3/29/16	4	RC/AH	Section 8.3.3 through 8.3.6: updated nomenclature
3/29/16	4	RC/AH	Section 8.4: Added 1,4-dioxane to the list
3/29/16	4	RC/AH	Section 8.10: Removed reference for alternative method to prepare ICV and update the preparation of the separate calibration standards.
3/29/16	4	RC/AH	Section 9.2: updated time on GC operating system
5/10/16	5	RC/AH	Section 7: Added balance, stir plate and stir bars to equipment
5/27/16	6	RC/AH	Section 8.3.2: Added preparation of Second Source Standard
5/27/16	6	RC/AH	Section 8.5: Added preparation of 1-Methylnaphthalene
5/27/16	6	RC/AH	Section 8.9.2: Added 1-Methylnaphthalene in preparation of 50ppm second source standard
5/27/16	6	RC/AH	Section 17.0: Added 1-Methylnaphthalene
5/27/16	6	RC/AH	Table 1: Added 1-Methylnaphthalene
5/27/16	6	RC/AH	Table 2: Added 1-Methylnaphthalene
5/27/16	6	RC/AH	Table 5: Added 1-Methylnaphthalene
6/20/16	7	AH/EJ	Table 7: Added 1-Methylnaphthalene
7/21/16	8	EJ	Table 4: Updated surrogates to in-house limits
7/21/16	8	EJ	Table 5:Updated to current laboratory limits

HAMPTON-CLARKE, INC.

STANDARD OPERATING PROCEDURE

VOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/ MASS SPECTROMETRY (GC/MS) METHOD 8260C

Prepared By: _____ Date: 12/11/17

Concurred By: _____ Date: 12/11/2017
Technical Specialist

Approved By: _____ Date: 12/11/2017
QA Director

Approved By: _____ Date: 12/11/2017
Laboratory Director

VOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/ MASS SPECTROMETRY (GC/MS) METHOD 8260C

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VOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/ MASS SPECTROMETRY (GC/MS) METHOD 8260C

1.0 PURPOSE AND APPLICATION

1.1 This SOP is used to determine volatile organic compounds in aqueous and solid matrices.

1.2 This method can be used to quantitate most volatile organic compounds that have boiling points below 200°C.

1.3 This method is restricted to use by, or under the supervision of, analysts experienced in the use of gas chromatograph/mass spectrometers, and skilled in the interpretation of mass spectra and their use as a quantitative tool.

1.4 The estimated quantitation limit (EQL) of this method for an individual compound is 0.5 mg/kg (wet weight) for soil/sediment samples, and 5 ug/L for ground water. EQLs will be proportionately higher for sample extracts and samples that require dilution or when a reduced sample size is used to avoid saturation of the detector.

2.0 REFERENCES

2.1 Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Method 8260B, Revision 3, August 2006.

2.2 Test Methods for Evaluating Solids Waste, SW-846, Third Edition, Revision 2, March 2003, Method 8000C.

2.3 Hampton-Clarke Quality Assurance Manual, Current Revision

2.4 DNREC HSCA SOP, Version 5.0, Rev1, 10.30.04.

3.0 METHOD SUMMARY

3.1 The volatile compounds are introduced into the gas chromatograph by the purge-and-trap SOP 5005 and 5006. The analytes are introduced directly to a narrow-bore capillary column. The column is temperature-programmed to separate the analytes, which are then detected with a mass spectrometer (MS) interfaced to the gas chromatograph (GC).

3.2 Analytes eluted from the capillary column are introduced into the mass spectrometer via a direct connection. Identification of target analytes is accomplished by comparing their mass spectra with the electron impact spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using an eight-point calibration curve.

3.3 Samples analyzed under the DENREC program will follow the current version of the HSCA SOP

4.0 SAMPLE COLLECTION, PRESERVATION AND STORAGE

4.1 Samples should be collected in the appropriate glass jars to insure a representative sample, but minimize waste disposal.

4.1.1 Aqueous samples – 40 ml vial
4.1.2 Soil sample – 40z jar, encore sampler
4.1.3 Methanol soil – 40ml VO vial with 10ml of Methanol.
4.1.3.1.For DNREC HSCA projects: Soil sample – pre-weighed 40 ml VOA vial with 10ml of the 1.5ppm Working SURR Mix - section 8.11. The methanol vials must be prepared by the laboratory prior to the sampling event including the addition of surrogates. The weight of each vial is recorded by the laboratory for future determination of analytical concentrations. The same balance must be used for both the "before" and "after" weight measurements of each bottle.

4.2 Aqueous samples are acidified to a pH <2 hydrochloric acid.

4.3 Holding time is 14 days from date of collection (7 days for water samples that are not preserved).

4.4 Refrigerate samples at 4°C (± 2°C) upon receipt until analysis, in refrigerator designated for volatile samples only.

5.0 SAFETY

5.1 Handle all chemicals appropriately.

5.2 Wear the appropriate protective clothing (Safety glasses, laboratory coat, and gloves)

6.0 INTERFERENCES

6.1 Major contaminant sources are volatile materials in the laboratory and impurities in the inert purging gas and in the sorbent trap. The use of non-polytetrafluoroethylene (PTFE) thread sealants, plastic tubing, or flow controllers with rubber components should be avoided, since such materials out-gas organic compounds which will be concentrated in the trap during the purge operation. Analyses of calibration and reagent blanks provide information about the presence of contaminants.

6.2 Contamination may occur when a sample containing low concentrations or no volatile organic compounds is analyzed immediately after a sample containing high concentrations of volatile organic compounds. A technique to prevent this problem is to rinse the purging apparatus and sample syringes with two portions of organic-free reagent water between samples. After the

analysis of a sample containing high concentrations of volatile organic compounds, one or more blanks should be analyzed to check for cross-contamination. Alternatively, if the sample immediately following the high concentration sample does not contain the volatile organic compounds present in the high level sample, freedom from contamination has been established.

6.3 For samples containing large amounts of water-soluble materials, suspended solids, high boiling compounds, or high concentrations of compounds being determined, it may be necessary to wash the purging device with a soap solution, rinse it with organic-free reagent water, and then dry the purging device in an oven at 105°C. In extreme situations, the entire purge-and-trap device may require dismantling and cleaning.

6.4 Special precautions must be taken to analyze for Methylene chloride. The analytical and sample storage area should be isolated from all atmospheric sources of Methylene chloride. Otherwise, random background levels will result. Since Methylene chloride will permeate through PTFE tubing, all gas chromatography carrier gas lines and purge gas plumbing should be constructed from stainless steel or copper tubing. Laboratory clothing worn by the analyst should be clean, since clothing previously exposed to Methylene chloride can contribute to sample contamination.

6.5 Samples can be contaminated by diffusion of volatile organics (particularly Methylene chloride and fluorocarbons) through the septum seal of the sample container into the sample during shipment and storage. A trip blank prepared from organic-free reagent water and carried through the sampling, handling, and storage protocols can serve as a check on such contamination.

7.0 REQUIRED EQUIPMENT

7.1 Micro syringes – 5uL and larger, gas-tight

7.2 Syringe – 5mL, gas tight

7.3 Balance – top loading capable of accurately weighing to 0.1 grams.

7.4 Glassware

7.4.1 Vials – 43mL, screw cap, with Teflon cap liner.

7.4.2 Volumetric flasks – Class A with ground-glass stoppers, 50mL & 100mL.

7.4.3 Vials – Amber 1-5 mL to store standards

7.5 STS Archon Purge and Trap Centurion Autosampler System (Model 12113)

7.5.1 The trap is Supelco Purge Trap K (Tekmar) or Evolution EST Analytical. The trap is packed with the absorbents: Carbopack B/ Carboxen1000 & 1001(VOCARB 3000).

7.5.2 The desorber is capable of rapidly heating the trap to 250°C. The trap should not be heated higher than 260°C during bake out mode. Alternatively, follow the manufacturer's directions.

7.6 GC/MS System

7.6.1 Agilent Gas chromatograph (Model 5890A/6890/9000) – An analytical system complete with a temperature programmable gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns and gases.

7.6.2 Column – J&W DB-624 25 meter, 0.20 ID, 1.12 film thickness.

7.6.3 Agilent Mass spectrometer (Model 5975C/5977B/9000) – Capable of scanning from 35 to 700 amu every 2 seconds or less, using 70 volts (nominal) electron energy in the electron impact ionization mode. The mass spectrometer is capable of producing a mass spectrum for 4-Bromofluorobenzene (BFB), which meets all of the criteria in table 1 when 50 ng of the GC/MS tuning standard (BFB) is injected through the gas chromatograph inlet.

7.6.4 Data System – Environmental ChemStation G1701EA Version E.01.01335 software is interfaced to the mass spectrometer that allows the continuous acquisition and storage on machine readable media of all mass spectra obtained throughout the duration of the chromatographic program. The software allows searching any GC/MS data file for ions of a specified mass and plotting such ion abundance's versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). The software has the ability to integrate the abundance in any EICP between specified times or scan number limits.

8.0 STANDARDS AND REAGENTS

8.1 Organic-free reagent/deionized water (DI water)

8.2 Methanol, CH_3OH - Pesticide quality or equivalent, demonstrated to be free of analytes. (Fisher A453-1) Store apart from other solvents.

8.3 Stock standard solutions – Stock standard solutions purchased from approved commercial vendors accompanied by certificates of analysis (Ex. Supelco, Accustandard). These stock solutions are used to prepare the calibration, verification, spiking, and system monitoring compounds.

8.3.1 For DNREC HSCA projects: Unless the Project Quality Assurance Plan (PQAP) specifies otherwise, the compounds to be analyzed by GC/MS are as specified in Sections 8.3.1.1

8.3.1.1 - Volatile organics to be analyzed by GC/MS are as follows:

Dichlorodifluoromethane
Chloromethane

Vinyl Chloride
Bromomethane
Chloroethane
Trichlorofluoromethane
1,1-Dichloroethene
1,1,2-Trichloro-1,2,2-trifluoroethane
Acetone
Carbon Disulfide
Methyl Acetate
Methylene Chloride
trans-1,2-Dichloroethene
Methyl tert-Butyl Ether
1,1-Dichloroethane
cis-1,2-Dichloroethene
2-Butanone
Chloroform
1,1,1-Trichloroethane
Cyclohexane
Carbon Tetrachloride
Benzene
1,2-Dichloroethane
Trichloroethene
Methylcyclohexane
1,2-Dichloropropane
Bromodichloromethane
cis-1,3-Dichloropropene
4-Methyl-2-pentanone
Toluene
trans-1,3-Dichloropropene
1,1,2-Trichloroethane
Tetrachloroethene
2-Hexanone
Dibromochloromethane
1,2-Dibromoethane
Chlorobenzene
Ethylbenzene
Xylenes (total)
Styrene
Bromoform
Isopropylbenzene
1,1,2,2-Tetrachloroethane
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,2-Dichlorobenzene
1,2-Dibromo-3-chloropropane
1,2,4-Trichlorobenzene
n-Hexane
ETBE (Ethyl tert butyl ether)

A new vial of stock solutions for the gases must be opened every two months or more frequently if any problems are indicated by comparison to the initial calibration curve.

8.4 Secondary Dilution Standards – Using stock standard solutions, prepare dilution standards in methanol that contain the compounds of interest.

8.5 Prepare a 200ppm Working Standard by combining:

220uL of Methanol
100uL of 2000ppm 502.2 Cal Mix#1 (Gases)
100uL of 2000ppm 202.2 CAL2000 Mega Mix
100uL of 2000ppm 8260 Cal Mix 2
100uL of (varied conc) Custom VOC std
100uL of 2000ppm tert-Amyl Methyl Ether
40uL of 5000ppm VOA ADD MIX
100uL of 2000-20000ppm Voa Extra Add Mix
40uL of 5000ppm Ethyl Ether/Futan Mix
100uL of 2000ppm Ethyl-tert-Butyl Ether

8.5.1 Prepare a 20ppm of Working Standard by diluting 100uL from the 200 ppm VOA Working Std (Section 8.5) and adding it to 900uL of Methanol.

8.5.2 Prepare a 20 ppm Chlorodifluoromethane (Freon#22) by diluting 100uL from the 200 ppm Chlorodifluoromethane (Freon#22) (Section 8.5) and adding it to 900uL of Methanol.

8.5.3 Alternate standard preparations are made based on specific client needs.

8.5.3.1Tert-Amylmethyl ether is purchased at 2000ppm from Supelco (506737) and added to the mixture prepared in Section 8.5 when needed.

8.5.3.2 Prepare a 10,000 ppm Cyclohexanone standard by weighing 50mg of neat Cyclohexanone (ChemService F2326) into a 5ml volumetric flask. Bring to volume with Methanol. Invert the mixture three times.

8.5.3.3 Prepare a 5000ppm VOA ADD Mix by weighing 25mg each of neat 1,2,4,5-Tetramethylbenzene (Acros 409390050), p-Diethylbenzene (ChemService O-2296) and p-Ethyltoluene (ChemService O-2413) into a 5ml volumetric flask. Bring to volume with Methanol. Invert the mixture three times.

8.5.3.4 Prepare a 5000ppm VOA ADD Mix 2 by weighing 25 mg each of neat methyl methacrylate (ChemService F982), ethyl methacrylate (ChemService F984), butyl methacrylate (ChemService O-1005), n-butyl acrylate (ChemService O-1004), n-amyl acetate (ChemService

O-2003), iso-propyl acetate (ChemService F2536) and ethyl acetate (ChemService O-412) into a 5 ml volumetric flask. Bring to volume with Methanol. Invert the mixture three times.

8.5.3.5 Prepare a 5000ppm Ethyl ether/Furan Mix by weighing 50 mg each of neat ethyl ether (ChemService O-569) and furan (ChemService O-2298) into a 10 ml volumetric flask. Bring to volume with Methanol. Invert the mixture three times.

8.5.3.6 The above standard solutions (Section 8.5.1.2 and 8.5.1.5) are added at the appropriate concentrations to the 200ppm VOA Working Std (Section 8.5) when needed.

8.6 Prepare a 500ppb calibration standard by weighing 40g of DI purge water, add 100uL of the working standards prepared in Section 8.5 and 100uL of Chlorodifluoromethane (Accustandard ALR-CFC-003).

8.7 Calibration standards – Prepare calibration standards as follows:

AQUEOUS

Concentration	uL of 200 ppm VOA Working Std	uL of 200 ppm Chlorodifluoromethane*	FV in DI Water
500 ppb	250	250	100
250 ppb	125	125	100
100 ppb	50	50	100
50 ppb	25	25	100
20 ppb	10	10	100

Concentration	uL of 20 ppm VOA Working Std	uL of 20 ppm Chlorodifluoromethane*	FV in DI Water
10 ppb	50	50	100
5 ppb	25	25	100
1 ppb	5	5	100
0.5 ppb	2.5	2.5	100

* - client specific

SOIL

Concentration	uL of 500ppb Cal.Std	uL DI Water
500 ppb	5000	0
250 ppb	2500	2500
100ppb	1000	4000

50ppb	500	4500
20ppb	200	4800
5ppb	50	4950
2ppb	20	4980
1ppb	10	4990
0.5ppb	5	4995

DNREC HSCA Projects – prepare calibration standards as follows:

Concentration	uL of 200 ppm Working Std	uL of 200ppm Chlorodifluoromethane*	FV in DI Water	mL Meoh
500 ppb	250	250	100	1.500
250 ppb	125	125	100	1.750
100 ppb	50	50	100	1.900
50 ppb	25	25	100	1.950
20 ppb	10	10	100	1.980
10 ppb	5	5	100	1.990
5 ppb	2.5	2.5	100	1.995

8.8 ISTD/SURR standards – Prepare stock ISTD/SURR standards as follows:

8.8.1 2500 ppm 8260 surrogates mix (Restek 30240) and 2500ppm Internal Standard mix (Restek 30241) are purchased as stock mix from Restek

8.9 Prepare a 150 ppm Working ISTD/SURR Mix by combining 6ml of Internal standard and 6 ml of 8260 surrogate mix into a 100 ml volumetric flask half filled with Methanol. Bring up to 100 ml with Methanol. Cap and invert 3 times.

8.10 Prepare a 150ppm Working ISTD Mix by combining 6 ml of the stock ISTD Mix prepared in Section 8.8.2 and bring to volume with Methanol in a 100 ml volumetric flask.

8.11 For DNREC HSCA projects: Prepare a 150ppm Working SURR Mix by combining 6 ml of the stock SURR Mix and bring to volume with Methanol in a 100 ml volumetric flask.

8.12 BFB standard: Prepare a 50ppm solution by adding 500uL of 150ppm working ISTD/SURR Mix to 1000uL of methanol mix in a 2mL vial.

8.13 Standard (LCS/MS/MSD):
610 uL of Methanol
50uL of 2000ppm Volatile Org Compounds Mix 6
50uL of 2000ppm 502/524 Volatile Org Cal Mix

50uL of 2000ppm 8260 Cal Mix 2 (2^{nd} source)
50uL of (varied conc) Custom VOC std
50uL of 2000ppm tert-Amyl Methyl Ether
20uL of 5000ppm VOA ADD MIX (2^{nd} Source)
50uL of 2000-20000ppm Voa Extra Add Mix
20uL of 5000ppm Ethyl Ether/Futan Mix
50uL of 2000ppm Ethyl-tert-Butyl Ether

8.14 ICV – Initial Calibration Verification Standard – Prepare an ICV standard by adding 20uL of the QC standard (prepared in Section 8.10) and 10ul of Chlorodifluoromethane and bring up to 100 mL in a volumetric flask.. Invert the mixture three times.

8.15 DNREC HSCA Projects – ICV - Initial Calibration Verification Standard - Prepare an ICV standard by adding 20uL of the QC standard (prepared in Section 8.10), 1.980 mL of Methanol and bring up to 100 mL in a volumetric flask. Invert the mixture three times.

9.0 PROCEDURE

Instrument Set-up

9.1 Everyday, prior to use, condition the trap for 5 minutes while back flushing at 250°C with the column at 225°C. When a new trap is installed, condition the trap for 1 hour at 270°C in the purge mode with an inert gas flow of at least 20mL/min

9.1.1 Connect the purge and trap device to a gas chromatograph. The gas chromatograph must be operated using temperature and flow rate parameters equivalent to those in 9.2.1.

9.1.2 The purge-and-trap of aqueous samples is performed at ambient temperature.

9.2 Recommended chromatographic conditions:

9.2.1

Carrier gas (He) flow rate:	1 mL/min
Column:	J&W DB-624, 25m x 0.20 mm
Initial temperature:	45°C, hold for 1.5 minutes
Temperature program:	12°C/min to 70°C then 50°C/min to 120°C then 25°C/min to 250°C, hold for 0.25 minutes

9.2.2 BFB (Direct Injection) GC method:

Carrier gas (He) flow rate:	1 mL/min
Column:	J&W DB-624, 25m x 0.20 mm
Initial temperature:	110°C, hold for 1 minute
Temperature program:	12°C/min to 170°C

9.2.3 Set up the GC operating parameters. For example, GCMS#1. Locate the PC that controls instrument #1. From the PC window, select the icon of GCMS#1. Once the ChemStation window of the instrument appears, select Method and then select Edit Method. Follow the HP ChemStation software and set and save the instrument method.

9.2.4 Set up the MS operating parameters as follows: From the instrument control, select MS and choose the tune file. Select on the MS again and click on Edit MS SIM/SCAN, on the Acq Mode, select SCAN. Save the run method together with the operating parameters.

9.2.5 Daily GC/MS performance - at the beginning of each day analysis is to be performed inject 1uL of the 50ppm BFB (Section 8.10) as follows: Locate the PC that controls the instrument. From the PC window, select the icon of the specific instrument (i.e. GCMS#1). Once the ChemStation window appears, select Sequence, edit sample Log Table. Type the name (BFB tune) and the names of the calibration levels, vial #, data file and method of analysis. Select OK, select Sequence. Save as the date of analysis run, run Sequence. Type data file directory (usually the date of the analysis) and select Run. Using a 5uL or 10uL syringe, inject 1uL of BFB directly into the injection port of the GC. Press the start button on the GC after approximately 5 seconds of injecting the BFB standard.

9.3 Once the run analysis is completed for the BFB, from the ENVIROQUANT software, select file and load data file, double click on the following files from the G: drive: GCMSDATA, calendar year (i.e. 2008), then directory date (i.e. 11-01-08). Double click on the BFB data file . Select Method and load method. Double click on the current quantitation method for the instrument. To load the current method, a previous midlevel calibration standard can also be loaded. After loading the BFB data file and method, locate the peak for the BFB and zoom in. Double right click on the apex of the peak, select Tuner and Evaluate BFB, then Evaluate BFB to Screen. Confirm that all ions meet the acceptance criteria in Table 1. If criteria are not met the following approach is acceptable to evaluate the BFB:

- Evaluate the average scans of the apex, the scan immediately before and after the apex.
- Background subtraction of a scan prior to the elution of BFB is acceptable.

The performance criteria must be achieved before any samples, blanks or standards are analyzed. All samples, blanks and standards must be injected within 12 hours of the injection time of passing the BFB criteria. The instrument must meet the requirements in Table 1 before any analysis may take place. If the requirements are not met, make necessary adjustments to the tune. Correct the sequence log table by retyping another BFB run using the next data file, and reanalyze the BFB standard.

NOTE: All subsequent standards, samples, MS/MSDs, LCSs, and blanks associated with a BFB analysis must use the same MS instrument conditions.

Initial Calibration

9.4 After the instrument has been tuned properly, the system must be calibrated for all compounds of interest. Additional compounds may be analyzed dependent on the target list required by the client.

9.4.1 Set up the sample introduction system as outlined in Sec. 9.1. The calibration must be performed using the same introduction technique that will be used for samples. Analyze each calibration standard by programming the Archon to introduce 5mL of each calibration standard and 1uL of internal/surrogate standard mix into the purge device. Purge for 5 minutes (instrument specific) at ambient temperature following the procedure outlined in SOP # 5005.

9.4.2 Prepare calibration standards as directed in section 8. The Archon is programmed to inject 1 uL of a 150 ppm internal standard/surrogate standard into each calibration standard. This will create a concentration of 30 ppb for the internal/surrogate in all the calibration standards.

9.5 Once the analysis of the calibration standards is complete, follow these steps: If a previous quant method has already existed, from the EnviroQuant software, select load Method and choose the desired method. Save the old quant method to the new method. If a new quant method needs to be created, set and save a method with all the compounds and the parameters related to each compound. The quantitation method is saved as the instrument's name and the date of analysis (eg: 1M_0710). If a quant method has not previously been created, load the mid level std. Select Tools, EasyID. Qedit each internal standard and update Relative Target Compound. Exit and save changes. Select Quant, Calculate/Generate Report, select Quant. Qedit and verify all compounds. Exit and save change. Select InitCal, update the retention time and save the method.

9.6 Thereafter, load each data file of the standards and quantitate with the new saved method. Edit each file and make sure each compound is properly identified then update the curve by using the EnviroQuant Software. To update the quant method with the responses of the each standard, from the EnviroQuant menu, select InitCal. Click on Quick Levels Update. Clear Old Response. No to requant files before update, Single data File/Level and add each data file as per their concentration levels to the new quant method.

Once the initial calibration is updated, save the method. Select InitCal, Response Factor to Screen or printer. Once an acceptable curve is verified as per the criteria of the method (see Section 9.8 and 9.9), elect InitCal, Response Factors to CSV(form6). From the PC window, locate and double click on the EnvForms. Select import data, click on Retrieve Data (GCMS). Double click on the directory and instrument where the data file is located and run the program. Once the program has been run, print the initial calibration standard form6 and the run log and make sure all criteria are met as follows:

9.7 The area of each internal standard within the calibration curve must be 50-100% of the mid-level standard. For DNREC HSCA projects the %RSD of the area of each internal standard within the calibration curve must be ≤30%.

9.8 The average response factor for each compound must have an average %RSD no greater than 20%. If the RSD of any target analyte is greater than 20%, then a non-linear calibration

technique is employed. If the method of linear regression is applied then the lowest standard of the calibration curve must be analyzed or requantitated and be within +/-30% of the standards true concentration.

9.8.1 Curve Fitting of the Calibration Curve - The statistical considerations in developing a non-linear calibration model require more data than the more traditional linear approaches described above. Whereas the linear calibration method employs five standards for a linear (first order) calibration model, a quadratic (second order) model requires six standards.

Most curve fitting programs will use some form of least squares minimization to adjust the coefficients of the polynomial to obtain the polynomial that best fits the data. The "goodness of fit" of the polynomial equation is evaluated by calculating the weighted coefficient of the determination (COD).

$$COD = \frac{\sum_{i=1}^{n} (y_{obs} - \bar{y})^2 - \frac{(n-1)}{(n-p)} \sum_{i=1}^{n} (y_{obs} - Y_i)^2}{\sum_{i=1}^{n} (y_{obs} - \bar{y})^2}$$

where,

$\bar{y}$	=	Mean observed response from the initial calibration
y_{obs}	=	Observed response (area) for each concentration from each initial calibration standard
Y_i	=	Calculated (or predicted) response at each concentration from the initial calibration(s)
n	=	Total number of calibration points (i.e., 6 for a quadratic model; 7 for a third order model)
p	=	Number of adjustable parameters in the polynomial equation (i.e., 3 for a third order; 2 for a second order polynomial)

Under ideal conditions, with a "perfect" fit of the model to the data, the coefficient of the determination will equal 1.0. In order to be an acceptable non-linear calibration, the COD must be greater than or equal to 0.990.

Weighting is selected in the Enviroquant software. Weighting is only used during linear regression. Weight is determined by best fit. Either equal weighting or inverse concentration is used. The software performs all calculations.

9.9 Upon completion of calibration range that meets the criteria in Section 9.8, immediately analyze a second-source ICV. The recovery of each compound of interest must fall within 70-130% recovery (50-150% for Acrolein, Acrylonitrile, Dichlorodifluoromethane, TBA and Acetone). Up to 10% of the analytes may fall outside the 70-130% limits but must fall within 60-140%. A single reanalysis of the ICV is allowed. If the reanalysis of the ICV still fails, corrective action must be taken and the initial calibration reanalyzed. If the recovery of any compound falls outside of the acceptance limits, the problem must be identified and corrected and analysis may continue. Any compound that failed the ICV criteria cannot be reported using that initial calibration. Corrective action can include, but is not limited to, remaking and reanalyzing another curve or ICV.

NOTE: The ICV must be analyzed and meet criteria before the analysis of any samples.

9.10 For DNREC HSCA projects: If samples are analyzed during the same 12-hour period in which an IC is run, sample quantitations are performed using the RRF's from the mid-level IC standard.

9.11 Calibration verification – A daily calibration verification (20ppb for aqueous, 50ppb for soils) standard must be analyzed. For DNREC HSCA projects: the RFs from the calibration verification standard are used for calculating sample concentrations. If the % Diff is greater than 20% another calibration check standard may be analyzed. If the calibration still does not pass, a new initial calibration curve must be analyzed.

9.11.1 Internal standard retention time - The retention times of the internal standards in the calibration verification standard must be evaluated immediately after or during data acquisition. If the retention time for any internal standard changes by more than 10 seconds from the initial calibration, then the chromatographic system must be inspected for malfunctions and corrections must be made, as required. The verification must be re-analyzed once the problem has been corrected.

9.11.2 Internal standard response - If the EICP area for any of the internal standards in the calibration verification standard changes by a factor of two (-50% to + 100%) from that in the mid-point standard level of the most recent initial calibration sequence, the mass spectrometer must be inspected for malfunctions and corrections must be made, as appropriate. The verification must be re-analyzed once the problem has been corrected.

9.12 For DNREC HSCA projects: Ending Calibration- a second mid-range calibration standard must be analyzed at the end of each 12-hour analysis shift to confirm that the instrument response has remained sufficiently stable over the analysis period to produce reliable qualitative and quantitative results for all of the samples analyzed. All sample analyses must be "bracketed" by a successful calibration standard run at the beginning of the analysis period and another successful calibration standard run at the end of the analysis period. Unless otherwise specified in the PQAP or in the method specified in the PQAP, the following requirements shall apply:

- Immediately after the last sample has been injected, another mid-level calibration standard shall be run. "Immediately" shall be interpreted to mean that injection of the shift-

ending standard must take place within one (1) hour of the completion of the last sample analysis.

- A successful shift-ending calibration standard may be used to start a new 12-hour analysis shift only if a new tuning compound run is performed prior to its injection; the one hour time limit specified above must still be met.
- If sample analysis is terminated sooner than 12 hours after injection of the tuning compound, a shift-ending calibration standard must be run immediately after the last sample run is completed.
- Four compounds are permitted to be outside ≤25%D quality control limit provided the results are ≤50%D.
- Any variations from the above requirements must be approved by DNREC.

Analysis of samples

9.13 All the QC requirements listed for the Tune, Initial Calibration or Calibration Verification, must be met prior to commencing sample analysis.

9.13.1 All samples and standard solutions must be allowed to warm to ambient temperature before analysis.

9.13.2 Program the Archon to introduce 5 mL of sample and 1 uL of internal/surrogate standard mix for aqueous samples and 1 uL of internal standard mix for aqueous dilutions of methanol soil extracts into the purge device. The addition of 1 uL of the spiking solution to 5 mL of aqueous sample will yield a concentration of 30 ug/L of each compound.

9.13.3 If aqueous sample concentrations are expected to exceed the calibration range, program the Archon to perform the necessary dilution (from 2x to 100x). Any dilution higher than 100x must be prepared manually using a 100 ml volumetric flask.

9.13.4 For aqueous samples chosen as QC (MS, MSD), add 8 uL of the matrix spike solution (Sec. 8.11) to the 40-mL vial. Disregarding any dilutions, this is equivalent to a concentration of 20 ug/L of each matrix spike standard. The MBS (Method Blank Spike) is prepared using the same spike solution added to 40ml of reagent water. Program each method of the Archon based on the number of samples and dilution. Link one method to the other.

9.13.5 For soil samples chosen as QC (MS, MSD) add 250 uL of the matrix spike solution (Section 8.13) to each of the 2 40ml vials containing 5g of soil and 10 ml of working SURR mix (section 8.11). This is equivalent to a concentration of 50ppb of each MS compound. The MBS is prepared using the same standard added to a 40ml vial containing 5g of analyte-free solid matrix and 10 ml of methanol/surrogate mix.

9.13.6 Analyze the sample using the same condition as those used during calibration. Locate the PC that controls the instrument. From the ChemStation software, select Sequence. Edit Sample Log Table. Type the name of the blank and each sample and QC sample to be analyzed. Select OK and save the sequence. Select Position and run, select the specific line (the desired position), select OK then select Run Sequence. Start the Archon based on the method previously typed. Once the analysis of the samples is completed, from the EnviroQuant Software, load the data file

of the check standard in order to have the correct quantitation method loaded up. Load the data file to be quantitated, select Quant, Calculate/Generate Report, OK. To quantitate multiple data files. Select Jobs, Report Destination, Start Report Manager, OK, RPT1, OK. Select Jobs again, Queue Quant List of Files, Quant No Report, select the data files to be quantitated, Process. Once the files have been processed, return to report manager and select start. When all files have been quantitated, from the PC window, locate and double click on the EnvForms. Select import data and click on Retrieve Data(GCMS), double click on the directory and instrument where the data files are located and run the program. Once the program has been run, associate the appropriate MBS with their proper MS and MSD and the sample that was spiked, select send to Lims, print Run Log, surrogates form2, spike form3, ISTD Areas form8.

9.13.7 If the initial analysis of the sample or a dilution of the sample has a concentration of any analyte that exceeds the initial calibration range, the sample must be reanalyzed at a higher dilution. Secondary ion quantitation is allowed only when there are sample interferences with the primary ion.

9.13.7.1 When ions from a compound in the sample saturate the detector follow the analysis with an organic-free reagent water blank. If the blank analysis is not free of interferences, then the system must be decontaminated. Sample analysis is not to be resumed until the blank analysis is demonstrated to be free of interferences. If a blank was not run after analyzing a sample which saturated the detector and the sample that followed the high concentration run does not contain the target compound/s which saturated the detector then the system is considered free of interferences.

9.13.7.2 Perform dilutions at levels that keep the response of the major constituents (previously saturated peaks) within the linear range of the curve.

Qualitative analysis

9.14 Identification is based on retention time and comparison of the sample mass spectrum with characteristic ions in the reference mass spectrum. EICPs for the primary ion (m/z) and the two other masses (listed in Table 2) are used. The following criteria must be met:

9.14.1 The relative retention time must fall within $\pm$ 0.06 RRT of the RT of the suspected compound.

9.14.2 The relative peak heights of the characteristic masses in the EICP should fall within $\pm$ 20% of the relative intensities of these masses in a reference mass spectrum.

9.14.3 All characteristic masses greater than 10 % of the primary characteristic ion of the reference spectrum should be present in the sample chromatogram.

9.14.4 If the criteria for section 9.14.1 to 9.14.3 is not met but in the opinion of the mass spectral analyst the compound is correct, then the analyst should give a positive identification for the peak. False positives must be included in full deliverable data packages and clearly labeled "false positive."

9.15 Quantitative analysis

9.15.1 When a target compound has been identified, the quantitation of that compound will be based on the integrated abundance from the EICP of the primary characteristic ion (m/z) in Table 2. If the sample produces an interference for the primary ion, a secondary characteristic ion may be used to quantitate. The concentration in the sample is calculated using the equation:

Concentration:

Equation 2: Concentration (ug/L or ug/Kg) = $$\frac{(A_s)(I_s)(DF)}{(A_{is})(RF)(V_s)}$$

where:

A_s = Area of the characteristic ion(m/z) for the parameter to be measured.
A_{is} = Area of the characteristic ion for the internal standard.
DF = Dilution Factor
I_s = Amount of internal standard added to each extract (ug)
RF = Response Factor (from most recent continuing calibration)
V_s = Volume of water extracted (L) or weight of sample extracted (Kg)

9.15.2 If the response for any ion (m/z) exceeds the working range of the GC/MS system, dilute the extract, re-inject the appropriate amount of internal standard so that the final concentration in the vial is 40mg/L, and reanalyze.

10.0 QUALITY CONTROL

10.1 The following is a summary of the required criteria that must be met prior to analyzing samples.

10.1.1 The GC/MS system must be tuned to meet the BFB specifications in Table 1.

10.1.2 There must be an initial calibration, followed by an initial calibration verification (second source std) of the GC/MS system as described in Sec. 9.4 – 9.9.

10.1.3 The criteria for linearity of the initial calibration curve is an RSD of ≤ 20% for each compound. (See Section 9.8).

10.1.4 For non-linear calibration curves, the correlation coefficient must be greater than or equal to 0.990.

10.2 All blanks (both field and laboratory initiated blanks) associated with the samples from a

particular site will be prepared from the same source of contaminant-free ("pure") water or soil. The method blank must be analyzed immediately after the initial calibration verification std or continuing calibration standard, to ensure that the analytical system is free of contamination.

For DNREC HSCA projects: The method blank must contain less than or equal to five times (5x) the method-specified detection limit of methylene chloride, acetone, toluene, and 2-butanone or less than the level of acceptable blank contamination specified in the approved PQAP prior to analyzing any samples.

10.2.1 If the method blank results do not meet the acceptance criteria, then corrective action should be taken to locate and reduce the source of the contamination prior to analyzing samples. If the samples were run and reanalysis is not practical, then the data user should be provided with the sample results, the method blank results, and a discussion of the corrective actions taken to prevent this from reoccurring. Subtraction of the method blank results is not acceptable.

10.2.2 After the analysis of high concentration samples, subsequent samples must be reviewed for carry over. If analytes in the high-concentration sample are not present in the subsequent samples, then the lack of carryover has been demonstrated. If there is evidence that carryover may have occurred, then the samples should be reanalyzed.

10.3 For DNREC HSCA projects: Internal Standard (IS) retention times and areas must be evaluated during or immediately after data acquisition of each analysis run to determine acceptability of the results. The %RSD of the area of each IS within the calibration curve must be ≤30%. All IS retention times from the CC must fall within 30 seconds of the IS in the initial mid-point calibration curve. IS areas in the successful CC standard at the start of a 24-hour shift must vary by no more than a factor of 2 in either direction (-50% to +100%) from the average of the IS areas in the initial calibration standard runs. IS retention times in each method blank, sample, QC sample or shift-ending CC standard must vary by no more than 30 seconds from the IS retention times in the successful CC standard. IS areas in each method blank, sample, QC sample or shift-ending CC standard must vary by no more than a factor of 2 in either direction (-50% to +100%) from the IS areas in the successful CC standard. Samples that do not meet this criteria must be re-analyzed.

10.4 Surrogates are added to all samples. The four compounds that are present in the surrogate mix, elute at different retention times, allowing for a review of sample matrix and instrument response throughout the samples analysis.

10.4.1 Surrogate recovery is calculated as:

$$\text{Recovery (\%)} = \frac{\text{Concentration (or amount) found}}{\text{Concentration (or amount) added}} \times 100$$

10.4.2 Surrogates must fall within the following limits (Updated annually):

	Aqueous:	Soil:-
1,2-Dichloroethane-d4	78% - 128%	63%-143%
Bromofluorobenzene	82% - 112%	64%-129%
Dibromofluoromethane	73% - 131%	63%-140%
Toluene-d8	79% - 111%	68%-122%

If recovery is not within surrogate recovery limits, the following procedures are necessary.

10.4.2.1 Check to be sure that there are no errors in the calculations, surrogate solutions or internal standards. If errors are found, recalculate the data accordingly. Examine chromatograms for interfering peaks and integrated peak areas.

10.4.2.2 Check instrument performance. If an instrument performance problem is identified, correct the problem and re-analyze the sample.

10.4.2.3 Some samples may require dilution in order to bring one or more target analytes within the calibration range or to overcome significant interferences with some analytes.

10.4.2.4 If no instrument problem is found, and the sample was analyzed straight, the sample must be reanalyzed to confirm matrix interference.

10.4.2.5 If reanalysis confirms matrix interference, report the data from the initial run and provide the second analysis on the Form 2 for conformational purposes. If the recovery is within the limits in the re-analysis, report the second analysis with the acceptable surrogate recovery. If the holding time for the method has expired prior to the re-analysis, provide both the original and re-analysis results to the data user, and note the holding time problem.

10.5 Matrix Spike (MS), Matrix Spike Duplicates (MSD), Method Blank Spikes (MBS) - Samples are grouped into analytical batches according to the method and matrix. **All compounds are included in the spike mixture (see table 5, for a list of all compounds),**

The batch cannot exceed 20 samples. For DNREC HSCA projects all QC and samples will be analyzed concurrently. At a minimum, each batch contains the following QC samples: method blank, method blank spike, matrix spike and a matrix spike duplicate.

10.5.1 The MBS recoveries must fall within the limits specified in Table 4.

10.5.1.1 If the MBS, MS and MSD have all acceptable recoveries, the batch passes, and no problems are noted on the non-conformance summary.

10.5.1.2 If the MS or MSD have compounds that fail to meet the QC criteria (Table 4), but the MBS is recovered within acceptable limits, the batch is passed based on the

acceptable recovery of the MBS, indicating matrix effects. The problem is noted on the non-conformance summary.

10.5.1.3 If the MBS has compounds that fail to meet the QC criteria (Table 4), the MBS and all associated samples must be reanalyzed.

10.6 Demonstration of Capability (DOC) - The analyst must make a yearly demonstration of ability to generate acceptable accuracy and precision data. **All compounds that are analyzed must be reported for the DOC.** The analyst must perform the following operations:

10.6.1 Four quality control (QC) check samples containing each analyte (obtained from an external or second source) must be prepared and analyzed.

10.6.2 Calculate the average recovery (X) and the standard deviation of the recovery (s) for each parameter using the four results

10.6.3 For each analyte compare s and X with the corresponding acceptance criteria for precision and accuracy, respectively found in Table 4. If s and X for all analytes meet the acceptance criteria, the performance is acceptable and analysis of actual samples can begin. If any one of the analytes does not meet the acceptance criteria, the performance is unacceptable for that analyte.

10.6.4 If any analyte tested fails any of the criteria then the analyst must proceed with the following: Repeat the test beginning in Section 10.6.1 for only those analytes which failed. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest.

10.6.5 Analyze a MS/MSD pair and report out all of the compounds. Include this documentation with the DOC to ensure all compound spike recoveries are being reported annually.

10.7 Method Detection Limits (MDLs) must be generated annually. Additionally, an MDL verification standard must also be analyzed on all instruments used for sample analysis. An MDL verification standard is a qualitative QC sample containing all the analytes of interest, spiked at a concentration 1 - 4 times the calculated MDL.

11.0 NONCONFORMANCE AND CORRECTIVE ACTION

11.1 Any unplanned deviation from this procedure must be documented on a nonconformance memo.

11.2 The Organics Director should outline and document a corrective action that will prevent a reoccurrence of a similar concern.

12.0 RECORD MAINTENANCE

12.1 All raw data files are backed up on the system then transferred to DVD

12.2 All hard copy packages are filed and saved for a minimum of 5 years.

12.3 All run logbooks, standard prep logbooks, refrigerator logs, extraction logs are saved for a minimum of 5 years.

13.0 POLLUTION PREVENTION

13.1 The chemicals needed for these analyses are purchased as needed, therefore eliminating the disposal of unused expired standards.

13.2 The sample bottles provided are appropriate to obtain a representative sample, but limit the amount of sample required for disposal.

14.0 WASTE MANAGEMENT

14.1 Samples and chemicals are disposed of following the procedures outlined in SOP 7003 (Sample Storage and Disposal).

15.0 DEFINITIONS

15.1 Please refer to SOP 1010.

16.0 ESTIMATION OF UNCERTAINTY

16.1 Refer to SOP No. 1013 for calculation of estimation of uncertainty associated with an analytical result. The calculated estimation of uncertainty for this method is listed below:

Soil

Mean X	Mean Rec	S	RSD	STD2	STD3	
52.78184	106	**8.33368821**	**0.15788931**	16.6673764	25.0010646	**Chlorodifluoromethane**
37.699625	75	**11.9411938**	**0.31674569**	23.8823876	35.8235815	**Dichlorodifluoromethane**
44.29945	89	**6.58108457**	**0.14855906**	13.1621691	19.7432537	**Chloromethane**
2987.30745	93	**5.62766706**	**0.12102197**	11.2553341	16.8830012	**Bromomethane**
45.581285	91	**6.55576402**	**0.14382578**	13.111528	19.6672921	**Vinyl Chloride**

47.43443	95	**4.3948285**	**0.0926506**	8.78965701	13.1844855	**Chloroethane**
46.093995	92	**6.07409325**	**0.13177624**	12.1481865	18.2222798	**Trichlorofluoromethane**
83.74809	167	**21.3640933**	**0.25509947**	42.7281867	64.09228	**Ethyl ether**
102.936025	206	**32.2280365**	**0.31308802**	64.4560729	96.6841094	**Furan**
45.975245	92	**5.78893723**	**0.12591422**	11.5778745	17.3668117	**1,1,2-Trichloro-1,2,2-Trifluromethane**
48.93536	98	**6.27694398**	**0.12827011**	12.553888	18.8308319	**Methylene Chloride**
229.38502	115	**30.65681**	**0.13364783**	61.3136201	91.9704301	**Acrolein**
54.398305	109	**15.13897**	**0.27829856**	30.27794	45.4169099	**Acrylonitrile**
45.732795	91	**6.21347981**	**0.13586486**	12.4269596	18.6404394	**Idomethane**
235.54204	118	**45.4132703**	**0.19280325**	90.8265406	136.239811	**Acetone**
48.06214	96	**4.47447452**	**0.0930977**	8.94894903	13.4234235	**Carbon Disulfide**
256.069765	128	**47.5154526**	**0.18555667**	95.0309053	142.546358	**t-Butyl Alcohol**
51.72045	103	**6.28580399**	**0.12153421**	12.571608	18.857412	**n-Hexane**
50.638745	101	**7.10476926**	**0.14030303**	14.2095385	21.3143078	**Di-isopropyl-ether**
51.441765	103	**5.705041**	**0.1109029**	11.410082	17.115123	**1,1-Dichloroethene**
48.7335105	97	**6.1719187**	**0.1266463**	12.3438374	18.5157561	**Methyl Acetate**
42.24823	84	**6.58427229**	**0.15584729**	13.1685446	19.7528169	**Metyl-t-butyl ether**
51.29646	103	**6.62999981**	**0.12924868**	13.2599996	19.8899994	**1,1-Dichloroethane**
49.136305	98	**6.03754224**	**0.12287335**	12.0750845	18.1126267	**trans-1,2-Dichloroethene**
45.44369	91	**7.12993358**	**0.15689601**	14.2598672	21.3898007	**Ethyl-t-butyl ether**
51.344325	103	**6.56567377**	**0.12787535**	13.1313475	19.6970213	**cis-1,2-Dichloroethene**
49.89272	100	**6.34448357**	**0.12716251**	12.6889671	19.0334507	**Bromochloromethane**
49.254865	99	**6.74480132**	**0.13693675**	13.4896026	20.234404	**2,2-Dichloropropane**
176.109485	352	**597.860154**	**3.39482086**	1195.72031	1793.58046	**Ethyl acetate**
2628.96239	105	**981.324642**	**0.37327451**	1962.64928	2943.97393	**1,4-Dioxane**
52.06535	104	**6.88524223**	**0.13224231**	13.7704845	20.6557267	**1,1-Dichloropropene**
48.282375	97	**7.14070519**	**0.14789465**	14.2814104	21.4221156	**Chloroform**
53.123595	106	**7.26090482**	**0.13667947**	14.5218096	21.7827144	**Cyclohexane**
45.09346	90	**6.6164949**	**0.14672848**	13.2329898	19.8494847	**1,2-Dichloroethane**
62.134805	124	**10.9854822**	**0.17680078**	21.9709645	32.9564467	**2-Butanone**
45.793095	92	**6.4691694**	**0.14126954**	12.9383388	19.4075082	**1,1,1-Trichloroethane**
45.776045	92	**6.6183507**	**0.14458109**	13.2367014	19.8550521	**Carbon Tetrachloride**
48.12676	96	**6.98462582**	**0.14512977**	13.96925164	20.9538775	**Vinyl Acetate**
49.347995	99	**7.35491972**	**0.14904192**	14.70983944	22.0647592	**Bromodichloromethane**
53.51843	107	**8.01791396**	**0.14981594**	16.03582791	24.0537419	**Methylcyclohexane**
46.87087	94	**7.65169234**	**0.16325049**	15.30338468	22.955077	**Dibromomethane**
53.05617	106	**7.33915559**	**0.13832803**	14.67831118	22.0174668	**1,2-Dichloropropane**
45.92062	92	**7.26493743**	**0.15820643**	14.52987486	21.7948123	**Trichloroethene**
46.347715	93	**6.56633062**	**0.14167539**	13.13266123	19.6989918	**Benzene**
45.84067	92	**7.65508095**	**0.16699322**	15.31016191	22.9652429	**Tert-Amyl methyl ether**
46.495655	93	**6.18236333**	**0.13296647**	12.36472666	18.54709	**Iso-propylacetate**
43.06992	86	**5.23731803**	**0.12160037**	10.47463607	15.7119541	**Methyl Methacrylate**
43.359895	87	**5.94788605**	**0.13717483**	11.8957721	17.8436581	**Dibromochloromethane**
39.43453	79	**4.8106371**	**0.12199048**	9.621274196	14.4319113	**2-Chloroethylvinylether**
47.22704	94	**5.51423696**	**0.11676016**	11.02847391	16.5427109	**cis-1,3-Dichloropropane**
47.851445	96	**6.36506278**	**0.13301715**	12.73012556	19.0951883	**trans-1,3-Dichloropropane**
41.129275	82	**4.86998612**	**0.11840681**	9.739972249	14.6099584	**Ethyl methacrylate**

46.183395	92	**5.18825651**	**0.1123403**	10.37651302	15.5647695	**1,1,2-Trichloroethane**
45.11146	90	**4.88010498**	**0.10817883**	9.760209957	14.6403149	**1,2-Dibromoethane**
48.614875	97	**5.47001872**	**0.11251739**	10.94003745	16.4100562	**1,3-Dichloropropane**
42.1239	84	**5.98109068**	**0.14198806**	11.96218136	17.943272	**4-Methyl-2-Pentanone**
35.73157	71	**6.53126786**	**0.18278704**	13.06253572	19.5938036	**2-Hexanone**
42.951765	86	**5.02055015**	**0.1168881**	10.04110031	15.0616505	**Tetrachloroethane**
45.407755	91	**4.9109542**	**0.10815232**	9.821908401	14.7328626	**Toluene**
42.03975	84	**4.77384874**	**0.11355559**	9.547697475	14.3215462	**1,1,1,2-Tetrachloroethane**
44.379135	89	**5.02798394**	**0.11329612**	10.05596788	15.0839518	**Chlorobenzene**
36.276075	73	**5.07288479**	**0.13984106**	10.14576958	15.2186544	**n-Butyl acrylate**
36.37656	73	**5.33857237**	**0.14675858**	10.67714473	16.0157171	**n-Amyl acetate**
41.601845	83	**4.11947149**	**0.09902137**	8.238942972	12.3584145	**Bromoform**
48.208135	96	**6.7337863**	**0.13968154**	13.4675726	20.2013589	**Ethylbenzene**
50.647695	101	**4.80665771**	**0.09490378**	9.613315411	14.4199731	**1,1,2,2-Tetrachloroethane**
49.659465	99	**6.2408052**	**0.12567202**	12.4816104	18.7224156	**Styrene**
86.48077	86	**13.6407735**	**0.15773187**	27.28154695	40.9223204	**m&p-Xylene**
45.76528	92	**5.66065511**	**0.12368886**	11.32131022	16.9819653	**o-Xylene**
51.4643	103	**6.53761894**	**0.12703212**	13.07523788	19.6128568	**Trans-1,4-Dichloro-2-butanone**
45.375555	91	**5.34231481**	**0.11773553**	10.68462963	16.0269444	**1,3-Dichlorobenzene**
42.79706	86	**5.20554002**	**0.12163312**	10.41108003	15.61662	**1,4-Dichlorobenzene**
44.1112	88	**5.28977561**	**0.1199191**	10.57955122	15.8693268	**1,2-Dichlorobenzene**
48.062695	96	**6.65157727**	**0.13839376**	13.30315454	19.9547318	**Isopropylbenzene**
215.04674	86	**35.9879159**	**0.16734927**	71.97583181	107.963748	**Cyclohexanone**
47.781975	96	**7.14297643**	**0.14949103**	14.28595285	21.4289293	**Camphene**
45.62638	91	**4.42742985**	**0.09703662**	8.8548597	13.2822895	**1,2,3-Trichloropropane**
50.7294235	101	**7.24729341**	**0.14286173**	14.49458682	21.7418802	**2-Chlorotoluene**
47.13317	94	**6.87803305**	**0.14592766**	13.7560661	20.6340992	**p-Ethyltoluene**
50.34857	101	**6.81598191**	**0.13537588**	13.63196383	20.4479457	**4-Chlorotoluene**
49.401915	99	**6.29745536**	**0.12747391**	12.59491072	18.8923661	**n-Propylbenzene**
45.633145	91	**5.31027527**	**0.11636882**	10.62055053	15.9308258	**Bromobenzene**
43.35223	87	**5.82058695**	**0.13426269**	11.64117391	17.4617609	**1,3,5-Trimethylbenzene**
39.192645	78	**5.19386721**	**0.13252148**	10.38773442	15.5816016	**Butyl methacrylate**
45.920535	92	**5.99075311**	**0.13045913**	11.98150622	17.9722593	**t-butylbenzene**
44.33527	89	**5.67675548**	**0.12804152**	11.35351096	17.0302664	**1,2,4-trimethylbenzene**
50.29462	101	**6.5330163**	**0.12989493**	13.0660326	19.5990489	**sec-butylbenzene**
26783.5884	96	**6.26305078**	**0.13044711**	12.52610155	18.7891523	**4-Isopropyltoluene**
50.955905	102	**7.01079916**	**0.13758561**	14.02159833	21.0323975	**n-butylbenzene**
45.777615	92	**7.3866302**	**0.161359**	14.77326041	22.1598906	**p-Diethylbenzene**
38.716295	77	**7.43804954**	**0.19211677**	14.87609907	22.3141486	**1,2,4,5-Tetramethylbenzene**
41.91954	84	**6.08935129**	**0.14526284**	12.17870259	18.2680539	**1,2-Dibromo-3-Chloropropane**
327.37716	65	**47.5414614**	**0.14521924**	95.08292272	142.624384	**Camphor**
45.052325	90	**6.14719069**	**0.13644558**	12.29438138	18.4415721	**Hexachlorobutadiene**
42.959545	86	**6.8032522**	**0.15836416**	13.60650441	20.4097566	**1,2,4-Trichlorobenzene**
45.46289	91	**7.36893095**	**0.16208673**	14.73786191	22.1067929	**1,2,3-Trichlrobenzene**
37.912915	76	**6.57542717**	**0.17343502**	13.15085435	19.7262815	**Naphthalene**

Aqueous

Mean X	Mean Rec	STD	RSD	STD2	STD3	
21.75263	109	**4.24965654**	**0.19536288**	8.499313081	12.7489696	**Chlorodifluoromethane**
18.08577	90	**6.1305269**	**0.33896964**	12.2610538	18.3915807	**Dichlorodifluoromethane**
18.6664	93	**2.31975814**	**0.12427453**	4.639516289	6.95927443	**Chloromethane**
16.41288	82	**3.80305447**	**0.23171159**	7.606108931	11.4091634	**Bromomethane**
20.851625	104	**3.60752179**	**0.17300914**	7.215043573	10.8225654	**Vinyl Chloride**
18.239365	91	**3.7864974**	**0.20760029**	7.572994809	11.3594922	**Chloroethane**
19.746565	99	**4.67314329**	**0.23665601**	9.34628658	14.0194299	**Trichlorofluoromethane**
30.19377	151	**7.71446945**	**0.25549872**	15.4289389	23.1434083	**Ethyl ether**
36.39434	182	**12.232968**	**0.33612281**	24.46593599	36.698904	**Furan**
19.97298	100	**3.85698181**	**0.19310998**	7.713963615	11.5709454	**1,1,2-Trichloro-1,2,2-Trifluromethane**
20.637355	103	**3.21964728**	**0.15601066**	6.439294558	9.65894184	**Methylene Chloride**
80.79506	81	**10.0439155**	**0.12431348**	20.08783092	30.1317464	**Acrolein**
18.797025	94	**2.20527588**	**0.11732047**	4.410551766	6.61582765	**Acrylonitrile**
20.570175	103	**3.27039114**	**0.15898704**	6.540782283	9.81117343	**Idomethane**
92.011805	92	**16.6600665**	**0.18106445**	33.32013295	49.9801994	**Acetone**
18.28134	91	**3.71775999**	**0.20336365**	7.435519989	11.15328	**Carbon Disulfide**
80.61869	81	**18.7031595**	**0.23199533**	37.40631902	56.1094785	**t-Butyl Alcohol**
18.122325	91	**3.60614245**	**0.19898895**	7.212284893	10.8184273	**n-Hexane**
19.441575	97	**2.82736423**	**0.14542876**	5.654728451	8.48209268	**Di-isopropyl-ether**
20.696305	103	**2.88964417**	**0.13962126**	5.779288331	8.6689325	**1,1-Dichloroethene**
19.203745	96	**2.22585466**	**0.11590732**	4.451709323	6.67756398	**Methyl Acetate**
18.49944	92	**2.65195913**	**0.14335348**	5.303918254	7.95587738	**Metyl-t-butyl ether**
19.870735	99	**2.77820911**	**0.13981411**	5.556418213	8.33462732	**1,1-Dichloroethane**
21.43784	107	**3.51965391**	**0.1641795**	7.03930782	10.5589617	**trans-1,2-Dichloroethene**
18.990295	95	**2.67312641**	**0.14076276**	5.346252821	8.01937923	**Ethyl-t-butyl ether**
19.82429	99	**3.07009791**	**0.15486547**	6.140195826	9.21029374	**cis-1,2-Dichloroethene**
19.08351	95	**2.20569348**	**0.11558112**	4.41138697	6.61708045	**Bromochloromethane**
19.36299	97	**3.41009183**	**0.17611391**	6.820183668	10.2302755	**2,2-Dichloropropane**
16.915715	85	**2.46073783**	**0.14547052**	4.921475662	7.38221349	**Ethyl acetate**
914.24785	91	**128.718424**	**0.14079161**	257.4368484	386.155273	**1,4-Dioxane**
21.217275	106	**2.91269582**	**0.13727945**	5.825391632	8.73808745	**1,1-Dichloropropene**
19.79201	99	**2.98968478**	**0.15105514**	5.979369551	8.96905433	**Chloroform**
19.350515	97	**2.36263023**	**0.1220965**	4.725260467	7.0878907	**Cyclohexane**
18.84203	94	**2.98106424**	**0.15821354**	5.96212848	8.94319272	**1,2-Dichloroethane**
17.568245	88	**3.3927007**	**0.19311552**	6.785401404	10.1781021	**2-Butanone**
20.077915	100	**2.1740138**	**0.10827886**	4.348027598	6.5220414	**1,1,1-Trichloroethane**
19.624505	98	**4.038592**	**0.20579332**	8.077183995	12.115776	**Carbon Tetrachloride**
17.289905	86	**2.86026938**	**0.16543002**	5.720538765	8.58080815	**Vinyl Acetate**
19.183535	96	**3.21330344**	**0.1675032**	6.42660688	9.63991032	**Bromodichloromethane**
18.599765	93	**3.62288781**	**0.19478138**	7.245775613	10.8686634	**Methylcyclohexane**
19.95909	100	**3.19233878**	**0.1599441**	6.384677551	9.57701633	**Dibromomethane**
19.930905	100	**3.27687285**	**0.16441164**	6.553745696	9.83061854	**1,2-Dichloropropane**
20.444115	102	**3.02290776**	**0.147862**	6.045815513	9.06872327	**Trichloroethene**
20.881325	104	**2.61969105**	**0.12545617**	5.239382103	7.85907315	**Benzene**
19.108895	96	**2.63336159**	**0.13780816**	5.266723182	7.90008477	**Tert-Amyl methyl ether**

15.977565	80	**2.04450426**	**0.12796094**	4.089008515	6.13351277	**Iso-propylacetate**
16.095545	80	**1.89399618**	**0.11767208**	3.787992364	5.68198855	**Methyl Methacrylate**
16.864405	84	**2.13609318**	**0.12666282**	4.272186356	6.40827953	**Dibromochloromethane**
16.13157	81	**1.51998157**	**0.09422403**	3.039963138	4.55994471	**2-Chloroethylvinylether**
16.969135	85	**1.857162**	**0.10944353**	3.714324001	5.571486	**cis-1,3-Dichloropropane**
15.934885	80	**2.09539723**	**0.13149748**	4.190794465	6.2861917	**trans-1,3-Dichloropropane**
15.509825	78	**2.81227296**	**0.18132203**	5.624545913	8.43681887	**Ethyl methacrylate**
17.483365	87	**1.8534178**	**0.10601036**	3.706835595	5.56025339	**1,1,2-Trichloroethane**
17.22125	86	**1.57335857**	**0.09136146**	3.146717137	4.72007571	**1,2-Dibromoethane**
17.73132	89	**2.0486808**	**0.11554023**	4.097361596	6.14604239	**1,3-Dichloropropane**
15.982275	80	**2.43874003**	**0.15259029**	4.877480068	7.31622014	**4-Methyl-2-Pentanone**
13.37116	67	**3.32680606**	**0.2488046**	6.653612129	9.98041819	**2-Hexanone**
19	95	**2.15838661**	**0.1135993**	4.316773229	6.47515984	**Tetrachloroethane**
18.293265	91	**1.8421472**	**0.10070084**	3.684294397	5.5264416	**Toluene**
18.5938	93	**1.95070728**	**0.10491171**	3.901414552	5.85212183	**1,1,1,2-Tetrachloroethane**
19.24988	96	**1.88528056**	**0.09793726**	3.770561115	5.65584167	**Chlorobenzene**
14.761105	74	**2.97438386**	**0.20150144**	5.948767715	8.92315157	**n-Butyl acrylate**
14.643785	73	**2.92985626**	**0.20007507**	5.859712518	8.78956878	**n-Amyl acetate**
14.91253	75	**1.82979189**	**0.12270164**	3.659583773	5.48937566	**Bromoform**
19.35818	97	**2.49146882**	**0.12870367**	4.982937639	7.47440646	**Ethylbenzene**
17.442905	87	**2.35277636**	**0.13488443**	4.705552712	7.05832907	**1,1,2,2-Tetrachloroethane**
19.519185	98	**1.64802125**	**0.08443084**	3.296042507	4.94406376	**Styrene**
39.1572	78	**3.33046538**	**0.08505372**	6.660930763	9.99139614	**m&p-Xylene**
19.17005	96	**2.02595341**	**0.10568326**	4.051906816	6.07786022	**o-Xylene**
15.473095	77	**2.74173737**	**0.17719386**	5.483474736	8.2252121	**Trans-1,4-Dichloro-2-butanone**
18.89085	94	**1.94631322**	**0.10302941**	3.892626435	5.83893965	**1,3-Dichlorobenzene**
18.50334	93	**1.75262595**	**0.09471944**	3.505251897	5.25787785	**1,4-Dichlorobenzene**
18.882685	94	**2.14199929**	**0.11343722**	4.283998575	6.42599786	**1,2-Dichlorobenzene**
18.670905	93	**1.9473998**	**0.10430131**	3.894799593	5.84219939	**Isopropylbenzene**
103.63701	104	**33.4668991**	**0.32292421**	66.93379825	100.400697	**Cyclohexanone**
14.84314	74	**1.89834939**	**0.12789406**	3.796698778	5.69504817	**Camphene**
15.770105	79	**1.97494114**	**0.12523323**	3.949882279	5.92482342	**1,2,3-Trichloropropane**
18.893725	94	**2.4132508**	**0.12772763**	4.826501595	7.23975239	**2-Chlorotoluene**
19.21698	96	**1.97665458**	**0.10285979**	3.953309164	5.92996375	**p-Ethyltoluene**
18.81708	94	**2.4711969**	**0.13132733**	4.942393798	7.4135907	**4-Chlorotoluene**
18.421035	92	**2.00942694**	**0.10908328**	4.018853873	6.02828081	**n-Propylbenzene**
17.266015	86	**1.60802974**	**0.09313265**	3.216059476	4.82408921	**Bromobenzene**
18.628345	93	**2.29749331**	**0.1233332**	4.594986617	6.89247992	**1,3,5-Trimethylbenzene**
16.5374	83	**2.14201862**	**0.12952572**	4.284037233	6.42605585	**Butyl methacrylate**
18.94482	95	**2.08206915**	**0.10990176**	4.1641383	6.24620745	**t-butylbenzene**
19.170005	96	**2.44003189**	**0.12728384**	4.880063775	7.32009566	**1,2,4-trimethylbenzene**
18.523085	93	**2.32465539**	**0.12550044**	4.649310775	6.97396616	**sec-butylbenzene**
18.74098	94	**2.1253339**	**0.1134057**	4.250667793	6.37600169	**4-Isopropyltoluene**
17.618345	88	**2.25767171**	**0.12814323**	4.515343427	6.77301514	**n-butylbenzene**
15.986515	80	**2.41136378**	**0.15083736**	4.822727568	7.23409135	**p-Diethylbenzene**
15.09361	75	**2.48355238**	**0.1645433**	4.967104767	7.45065715	**1,2,4,5-Tetramethylbenzene**
15.4975	77	**2.95170664**	**0.19046341**	5.903413284	8.85511993	**1,2-Dibromo-3-Chloropropane**

144.677755	72	**27.0002995**	**0.18662371**	54.00059909	81.0008986	**Camphor**
13.291305	66	**2.69902372**	**0.20306687**	5.398047443	8.09707116	**Hexachlorobutadiene**
17.33448	87	**2.21581871**	**0.12782724**	4.431637426	6.64745614	**1,2,4-Trichlorobenzene**
13.66333	68	**2.32517072**	**0.17017599**	4.650341439	6.97551216	**1,2,3-Trichlrobenzene**
14.350445	72	**4.44063544**	**0.30944235**	8.881270875	13.3219063	**Naphthalene**

TABLE 1

BFB (4-BROMOFLUOROBENZENE) MASS INTENSITY CRITERIA[a]

m/z	Required Intensity (relative abundance)
50	15 to 40% of m/z 95
75	30 to 60% of m/z 95
95	Base peak, 100% relative abundance
96	5 to 9% of m/z 95
173	Less than 2% of m/z 174
174	Greater than 50% of m/z 95
175	5 to 9% of m/z 174
176	Greater than 95% but less than 101% of m/z 174
177	5 to 9% of m/z 176

[a] Alternate tuning criteria may be used, (e.g. CLP, Method 524.2, or manufacturers" instructions), provided that method performance is not adversely affected.

TABLE 2

CHARACTERISTIC MASSES (m/z) FOR ORGANIC COMPOUNDS OF INTEREST

Compound	Primary Characteristic Ion	Secondary Characteristic Ion(s)
Acetone	58	43
Acrolein	56	55, 58
Acrylonitrile	53	52, 51
Benzene	78	-
Bromobenzene	156	77, 158
Bromochloromethane	128	49, 130
Bromodichloromethane	83	85, 127
Bromoform	173	175, 254
Bromomethane	94	96
2-Butanone	72	43
n-Butylbenzene	91	92, 134
sec-Butylbenzene	105	134
tert-Butylbenzene	119	91, 134
tert-Butyl Alcohol	59	43
Carbon disulfide	76	78
Carbon tetrachloride	117	119
Chlorobenzene	112	77, 114
Chlorodibromomethane	129	208, 206
Chloroethane	64 (49*)	66 (51*)
2-Chloroethyl vinyl ether	63	65, 106
Chloroform	83	85
Chloromethane	50 (49*)	52 (51*)
2-Chlorotoluene	91	126
4-Chlorotoluene	91	126
Cyclohexanone	55	42,98
1,2-Dibromo-3-chloropropane	75	155, 157
1,2-Dibromoethane	107	109, 188
Dibromomethane	93	95, 174
1,2-Dichlorobenzene	146	111, 148
1,3-Dichlorobenzene	146	111, 148
1,4-Dichlorobenzene	146	111, 148
Dichlorodifluoromethane	85	87
1,1-Dichloroethane	63	65, 83
1,2-Dichloroethane	62	98
1,1-Dichloroethene	96	61, 63

TABLE 2 (cont.)

Compound	Primary Characteristic Ion	Secondary Characteristic Ion(s)
cis-1,2-Dichloroethene	96	61, 98
trans-1,2-Dichloroethene	96	61, 98
1,2-Dichloropropane	63	112
1,3-Dichloropropane	76	78
2,2-Dichloropropane	77	97
1,1-Dichloropropene	75	110, 77
cis-1,3-Dichloropropene	75	77, 39
trans-1,3-Dichloropropene	75	77, 39
Di-isopropyl ether	45	87
1,4-Dioxane	88	58, 43, 57
Ethylbenzene	91	106
Hexachlorobutadiene	225	223, 227
2-Hexanone	43	58, 57, 100
Iodomethane	142	127, 141
Isopropylbenzene	105	120
p-Isopropyltoluene	119	134, 91
Methyl acetate	43	74
Methyl-t-butyl ether	73	57
Methylene chloride	84	86, 49
Methyl-t-butyl ether	73	57
Methylcyclohexane	83	55,98
Methylene chloride	84	86, 49
4-Methyl-2-pentanone	100	43, 58, 85
Naphthalene	128	-
n-Propylbenzene	91	120
Styrene	104	78
1,2,3-Trichlorobenzene	180	182, 145
1,2,4-Trichlorobenzene	180	182, 145
1,1,1,2-Tetrachloroethane	131	133, 119
1,1,2,2-Tetrachloroethane	83	131, 85
Tetrachloroethene	164	129, 131, 166
Toluene	92	91
1,1,1-Trichloroethane	97	99, 61
1,1,2-Trichloroethane	83	97, 85
Trichloroethene	95	97, 130, 132
Trichlorofluoromethane	151	101, 153
1,2,3-Trichloropropane	75	77
1,2,4-Trimethylbenzene	105	120
1,3,5-Trimethylbenzene	105	120
Vinyl acetate	43	86
Vinyl chloride	62	64
n-Hexane	57	41, 43

TABLE 2 (cont.)

Compound	Primary Characteristic Ion	Secondary Characteristic Ion(s)
o-Xylene	106	91
m-Xylene	106	91
p-Xylene	106	91
Chlorodifluoromethane	51	85
p-Ethyltoluene	105	120
p-Diethylbenzene	119	105,134
1,2,4,5-Tetramethylbenzene	119	134
tert-Amylmethyl ether	73	87,55
Ethyl Acetate	43	45,88
Isopropyl Acetate	43	61,87
n-Amyl Acetate	43	70,42
Butyl methacrylate	41	69,87
Methyl methacrylate	41	69,100
Ethyl methacrylate	41	69,99
n-Butyl acrylate	55	56,73
Ethyl tert butyl ether	59	87, 57
Internal Standards/Surrogates:		
Chlorobenzene-d_5	117	
1,4-Dichlorobenzene-d_4	152	115, 150
4-Bromofluorobenzene	95	174, 176
1,2-Dichloroethane-d_4	102	
Dibromofluoromethane	113	
Toluene-d_8	98	
Fluorobenzene	96	77

Characteristic ion for an ion trap mass spectrometer (to be used when ion-molecule reactions are observed).

Table 3 (extended parameter list)

ANALYTE	CAS #	ANALYTE	CAS #
1,1,1,2-Tetrachloroethane	630-20-6	Chlorobenzene	108-90-7
1,1,1-Trichloroethane	71-55-6	Chlorodifluoromethane	75-45-6
1,1,2,2-Tetrachloroethane	79-34-5	Chloroethane	75-00-3
1,1,2-Trichloroethane	79-00-5	Chloroform	67-66-3
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	Chloromethane	74-87-3
1,1-Dichloroethane	75-34-3	cis-1,2-Dichloroethene	156-59-2
1,1-Dichloroethene	75-35-4	cis-1,3-Dichloropropene	10061-01-5
1,1-Dichloropropene	563-58-6	Cyclohexane	110-82-7
1,2,3-Trichloropropane	96-18-4	Cyclohexanone	108-94-1
1,2,3-Trichlorobenzene	87-61-6	Dibromochloromethane	124-48-1
1,2,4-Trichlorobenzene	120-82-1	Dibromoethane	540-49-8
1,2,4-Trimethylbenzene	95-63-6	Dibromomethane	74-95-3
1,2,4,5-Tetramethylbenzene	95-93-2	Dichlorodifluoromethane	75-71-8
1,2-Dibromo-3-chloropropane	96-12-8	Di-isopropyl-ether	108-20-3
1,2-Dibromoethane	106-93-4	Ethylbenzene	100-41-4
1,2-Dichloroethane	107-06-2	Hexachlorobutadiene	87-68-3
1,2-Dichlorobenzene	95-50-1	n-hexane	110-54-3
1,2-Dichloropropane	78-87-5	m-Xylene	108-38-3
1,2-Dinitrobenzene	528-29-0	Methylcyclohexane	108-87-2
1,3,5-Trimethylbenzene	108-67-8	Methylene chloride	75-09-2
1,3-Dichloropropane	142-28-9	m&p-Xylenes	1330-20-7
1,3-Dichlorobenzene	541-73-1	Methyl-t-butyl ether	1634-04-4
1,4-Dichlorobenzene	106-46-7	N-Butylbenzene	104-51-8
1,4-Dioxane	123-91-1	N-Propylbenzene	103-65-1
1-Chlorobutane	109-69-3	Naphthalene	91-20-3
2,2-Dichloropropane	594-20-7	o-Xylene	95-47-6
2-Butanone	78-93-3	p-Ethyltoluene	622-96-8
2-Chloroethylvinylether	110-75-8	p-Diethylbenzene	105-05-5
2-Hexanone	591-78-6	p-Xylene	106-42-3
2-Methyl-2-propanol	75-65-0	Styrene	100-42-5
4-Methyl-2-pentanone	108-10-1	t-Butyl Alcohol	75-65-0
Acetone	67-64-1	t-Butylbenzene	98-06-6
Acrolein	107-02-8	tert-Amylmethyl ether	994-05-8
Acrylonitrile	107-13-1	Tetrachloroethene	127-18-4
Benzene	71-43-2	Tetrahydrofuran	109-99-9
Bromofluorobenzene	460-00-4	Toluene	108-88-3
Bromobenzene	108-86-1	trans-1,2-Dichloroethene	156-60-5
Bromochloromethane	74-97-5	trans-1,3-dichloropropene	10061-02-6
Bromodichloromethane	75-27-4	trans-1,4-Dichloro-2-butene	110-57-6
Bromoform	75-25-2	Trichloroethene	79-01-6
Bromomethane	74-83-9	Trichlorofluoromethane	75-69-4

Table 3 (extended parameter list cont.)

Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Methyl acetate	79-20-9
n-Amyl acetate	628-63-7
Methyl methacrylate	80-62-6
n-Butyl acrylate	141-32-2
Ethyl tert butyl ether	637-92-3
Vinyl acetate	108-05-4
Vinyl chloride	75-01-4
Ethyl acetate	141-78-6
Isopropyl acetate	108-21-4
Butyl methacrylate	97-88-1
Ethyl methacrylate	97-63-2

Table 4 Recommended Minimum Relative Response Factor Criteria for Initial and Continuing Calibration Verification

Volatile Compound	Minimum Response Factor (RF)[a]
Dichlorodifluoromethane	0.100
Chloromethane	0.100
Vinyl chloride	0.100
Bromomethane	0.100
Chloroethane	0.100
Trichlorofluoromethane	0.100
1,1-Dichloroethene	0.100
1,1,2-Trichloro- 1,2,2-trifluoroethane	0.100
Acetone	0.100
Carbon Disulfide	0.100
Methyl Acetate	0.100
Methylene chloride	0.100
Trans- 1,2-Dichloroethene	0.100
Cis- 1,2-Dichloroethene	0.100
Methyl tert-Butyl ether	0.100
1,1-Dichloroethane	0.200
2-Butanone	0.100
Chloroform	0.200
1,1,1-Trichloroethane	0.100
Cyclohexane	0.100
Carbon Tetrachloride	0.100
Benzene	0.500
1,2-Dichloroethane	0.100
Trichloroethene	0.200
Methylcyclohexane	0.100
1,2-Dichloropropane	0.100
Bromodichloromethane	0.200
Cis-1,3,Dichloropropene	0.200
Trans-1,3,Dichloropropene	0.100
4-Methyl-2-pentanone	0.100
Toluene	0.400
1,1,2-Trichloroethane	0.100
Tetrachloroethane	0.200
2-Hexanone	0.100
Dibromochloromethane	0.100
1,2-Dibromoethane	0.100
Chlorobenzene	0.500
Ethylbenzene	0.100
M+p-Xylene	0.100
o-Xylene	0.300
Styrene	0.300
Bromoform	0.100

Table 4 Recommended Minimum Relative Response Factor Criteria for Initial and Continuing Calibration Verification (cont).

Volatile Compound	Minimum Response Factor (RF)[a]
Isopropylbenzene	0.100
1,1,2,2-Tetrachloroethane	0.300
1,3-Dichlorobenzene	0.600
1,4-Dichlorobenzene	0.500
1,2-Dichlorobenzene	0.400
1,2-Dibromo-3-chloropane	0.050
1,2,4-Trichlorobenzene	0.200
Ethyl Acetate	0.100
Isopropyl acetate	0.100
n-Amyl Acetate	0.100
Butyl methacrylate	0.100
Ethyl methacrylate	0.100
n-Butyl acrylate	0.100
n-Hexane	0.100

[a] The project-specific response factors obtained may be affected by the quantitation ion selected and when using possible alternate ions the actual response factors may be lower than those listed. In addition, lower than the recommended minimum response factors may be accepted for those compounds that are not considered critical target analytes and associated data may be used for screening purposes.

TABLE 5
MBS/MS/MSD Recovery limits

	SOIL		AQUEOUS	
	Lower	Upper	Lower	Upper
1,1,1,2-Tetrachloroethane	50	130	70	130
1,1,1-Trichloroethane	50	130	70	130
1,1,2,2-Tetrachloroethane	50	130	70	130
1,1,2-Trichloro-1,2,2-trifluoroethane	50	130	50	150
1,1,2-Trichloroethane	50	130	70	130
1,1-Dichloroethane	50	130	70	130
1,1-Dichloroethene	50	130	70	130
1,1-Dichloropropene	50	130	70	130
1,2,3-Trichlorobenzene	50	130	70	130
1,2,3-Trichloropropane	50	130	70	130
1,2,4-Trichlorobenzene	50	130	70	130
1,2,4-Trimethylbenzene	50	130	70	130
1,2-Dibromo-3-chloropropane	50	130	50	150
1,2-Dibromoethane	50	130	70	130
1,2-Dichlorobenzene	50	130	70	130
1,2-Dichloroethane	50	130	70	130
1,2-Dichloropropane	50	130	70	130
1,3,5-Trimethylbenzene	50	130	70	130
1,3-Dichlorobenzene	50	130	70	130
1,3-Dichloropropane	50	130	70	130
1,4-Dichlorobenzene	50	130	70	130
1,4-Dioxane	50	130	50	150
2,2-Dichloropropane	50	130	70	130
2-Butanone	20	130	50	150
2-Chloroethylvinyl ether	50	130	70	130
2-Chlorotoluene	50	130	70	130
2-Hexanone	20	130	50	150
4-Chlorotoluene	50	130	70	130
4-Isopropyltoluene	50	130	70	130
4-Methyl-2-pentanone	20	130	50	150
Acetone	20	130	50	150
Acrolein	20	130	50	150
Acrylonitrile	20	130	50	150
Benzene	50	130	70	130
Bromobenzene	50	130	70	130
Bromochloromethane	50	130	70	130
Bromodichloromethane	50	130	70	130
Bromoform	20	130	70	130
Bromomethane	20	130	50	150
Carbon disulfide	50	130	50	150
Carbon tetrachloride	50	130	50	150
Chlorobenzene	50	130	70	130
Chloroethane	20	130	50	150

	SOIL		AQUEOUS	
	Lower	Upper	Lower	Upper
Chloroform	50	130	70	130
Chloromethane	20	130	50	150
cis-1,2-Dichloroethene	50	130	70	130
cis-1,3-Dichloropropene	50	130	70	130
Cyclohexane	50	130	70	130
Dibromochloromethane	50	130	70	130
Dibromomethane	50	130	70	130
Dichlorodifluoromethane	20	130	50	150
Diisopropyl ether	50	130	70	130
Ethylbenzene	50	130	70	130
Hexachlorobutadine	50	130	50	150
Iodomethane	50	130	50	150
Isopropylbenzene	50	130	70	130
m&p-Xylenes	50	130	70	130
Methyl acetate	50	130	50	150
Methylcyclohexane	50	130	70	130
Methylene chloride	50	130	70	130
Methyl-t-butyl ether	50	130	70	130
Naphthalene	50	130	50	150
n-Butylbenzene	50	130	70	130
n-Hexane	50	130	70	130
n-Propylbenzene	50	130	70	130
o-Xylene	50	130	70	130
sec-Butylbenzene	50	130	70	130
Styrene	50	130	70	130
t-butyl alcohol	20	130	50	150
t-Butylbenzene	50	130	70	130
Tetrachloroethene	50	130	50	150
Toluene	50	130	70	130
trans-1,2-Dichloroethene	50	130	70	130
trans,-1,3-Dichloropropene	50	130	70	130
Trichloroethene	50	130	70	130
Trichlorofluoromethane	20	130	50	150
Vinyl Acetate	50	130	50	150
Vinyl Chloride	20	130	50	150
n-Amyl acetate	50	130	70	130
Methyl methacrylate	50	130	70	130
n-Butyl acrylate	50	130	70	130
Isopropyl acetate	50	130	70	130
Butyl methacrylate	50	130	70	130
Ethyl methacrylate	50	130	70	130
Ethyl tert butyl ether	50	130	70	130

NOTE: In-house limits

TABLE 6

REPORTING LIMITS

Analyte	CAS#	Matrix	RL	Unit
1,1,1,2-Tetrachloroethane	630-20-6	Aqueous	1	ppb
1,1,1-Trichloroethane	71-55-6	Aqueous	1	ppb
1,1,2,2-Tetrachloroethane	79-34-5	Aqueous	1	ppb
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	Aqueous	1	ppb
1,1,2-Trichloroethane	79-00-5	Aqueous	1	ppb
1,1-Dichloroethane	75-34-3	Aqueous	1	ppb
1,1-Dichloroethene	75-35-4	Aqueous	1	ppb
1,1-Dichloropropene	563-58-6	Aqueous	1	ppb
1,2,3-Trichlorobenzene	87-61-6	Aqueous	1	ppb
1,2,3-Trichloropropane	96-18-4	Aqueous	1	ppb
1,2,4-Trichlorobenzene	120-82-1	Aqueous	1	ppb
1,2,4-Trimethylbenzene	95-63-6	Aqueous	1	ppb
1,2-Dibromo-3-Chloropropane	96-12-8	Aqueous	1	ppb
1,2-Dibromoethane	106-93-4	Aqueous	1	ppb
1,2-Dichlorobenzene	95-50-1	Aqueous	1	ppb
1,2-Dichloroethane	107-06-2	Aqueous	0.5	ppb
1,2-Dichloropropane	78-87-5	Aqueous	1	ppb
1,3,5-Trimethylbenzene	108-67-8	Aqueous	1	ppb
1,3-Dichlorobenzene	541-73-1	Aqueous	1	ppb
1,3-Dichloropropane	142-28-9	Aqueous	1	ppb
1,4-Dichlorobenzene	106-46-7	Aqueous	1	ppb
1,4-Dioxane	123-91-1	Aqueous	50	ppb
2,2-Dichloropropane	594-20-7	Aqueous	1	ppb
2-Butanone	78-93-3	Aqueous	1	ppb
2-Chloroethylvinylether	110-75-8	Aqueous	1	ppb
2-Chlorotoluene	95-49-8	Aqueous	1	ppb
2-Hexanone	591-78-6	Aqueous	1	ppb
4-Chlorotoluene	108-41-8	Aqueous	1	ppb
4-Isopropyltoluene	99-87-6	Aqueous	1	ppb
4-Methyl-2-Pentanone	108-10-1	Aqueous	1	ppb
Acetone	67-64-1	Aqueous	5	ppb
Acrolein	107-02-8	Aqueous	5	ppb
Acrylonitrile	107-13-1	Aqueous	1	ppb
Benzene	71-43-2	Aqueous	0.5	ppb
Bromobenzene	108-86-1	Aqueous	1	ppb
Bromochloromethane	74-97=5	Aqueous	1	ppb
Bromodichloromethane	75-27-4	Aqueous	1	ppb
Bromoform	75-25-2	Aqueous	1	ppb
Bromomethane	74-83-9	Aqueous	1	ppb
Carbon Disulfide	75-15-0	Aqueous	1	ppb
Carbon Tetrachloride	56-23-5	Aqueous	1	ppb
Chlorobenzene	108-90-7	Aqueous	1	ppb
Chlorodifluoromethane	75-45-6	Aqueous	1	ppb

Chloroethane	75-00-3	Aqueous	1	ppb
Chloroform	67-66-3	Aqueous	1	ppb
Chloromethane	74-87-3	Aqueous	1	ppb
cis-1,2-Dichloroethene	156-59-2	Aqueous	1	ppb
cis-1,3-Dichloropropene	10061-01-5	Aqueous	1	ppb
Cyclohexane	110-82-7	Aqueous	1	ppb
Cyclohexanone	108-94-1	Aqueous	5	ppb
Dibromochloromethane	124-48-1	Aqueous	1	ppb
Dibromomethane	74-95-3	Aqueous	1	ppb
Di-isopropyl-ether	108-20-3	Aqueous	1	ppb
Dichlorodifluoromethane	75-71-8	Aqueous	1	ppb
Ethylbenzene	100-41-4	Aqueous	1	ppb
Hexachlorobutadiene	87-68-3	Aqueous	1	ppb
Iodomethane	74-88-4	Aqueous	1	ppb
Isopropylbenzene	98-82-8	Aqueous	1	ppb
m&p-Xylenes	108-38-3 106-42-3	Aqueous	1	ppb
Methyl Acetate	79-20-9	Aqueous	1	ppb
Methylcyclohexane	108-87-2	Aqueous	1	ppb
Methylene Chloride	75-09-2	Aqueous	1	ppb
Methyl-t-butyl ether	1634-04-4	Aqueous	0.5	ppb
Naphthalene	91-20-3	Aqueous	1	ppb
n-amyl acetate	628-63-7	Aqueous	1	ppb
n-Butylbenzene	104-51-8	Aqueous	1	ppb
n-Hexane	110-54-3	Aqueous	1	ppb
n-Propylbenzene	103-65-1	Aqueous	1	ppb
o-Xylene	95-47-6	Aqueous	1	ppb
sec-Butylbenzene	135-98-8	Aqueous	1	ppb
Styrene	100-42-5	Aqueous	1	ppb
Tert-Amyl methyl ether	994-05-8	Aqueous	1	ppb
t-Butyl Alcohol	75-65-0	Aqueous	5	ppb
t-Butylbenzene	98-06-6	Aqueous	1	ppb
Tetrachloroethene	127-18-4	Aqueous	1	ppb
Toluene	108-88-3	Aqueous	1	ppb
trans-1,2-Dichloroethene	156-60-5	Aqueous	1	ppb
trans-1,3-Dichloropropene	10061-02-6	Aqueous	1	ppb
trans-1,4-Dichloro-2-butene	110-57-6	Aqueous	1	ppb
Trichloroethene	79-01-6	Aqueous	1	ppb
Trichlorofluoromethane	75-69-4	Aqueous	1	ppb
Vinyl Acetate	108-05-04	Aqueous	1	ppb
Vinyl Chloride	75-01-4	Aqueous	1	ppb

Analyte	CAS#	Matrix	RL	UNIT
1,1,1,2-Tetrachloroethane	630-20-6	Soil	0.002	ppm
1,1,1-Trichloroethane	71-55-6	Soil	0.002	ppm
1,1,2,2-Tetrachloroethane	79-34-5	Soil	0.002	ppm
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	Soil	0.002	ppm
1,1,2-Trichloroethane	79-00-5	Soil	0.002	ppm
1,1-Dichloroethane	75-34-3	Soil	0.002	ppm
1,1-Dichloroethene	75-35-4	Soil	0.002	ppm
1,1-Dichloropropene	563-58-6	Soil	0.002	ppm
1,2,3-Trichlorobenzene	87-61-6	Soil	0.002	ppm
1,2,3-Trichloropropane	96-18-4	Soil	0.002	ppm
1,2,4,5-Tetramethylbenzene	95-93-2	Soil	0.002	ppm
1,2,4-Trichlorobenzene	120-82-1	Soil	0.002	ppm
1,2,4-Trimethylbenzene	95-63-6	Soil	0.001	ppm
1,2-Dibromo-3-Chloropropane	96-12-8	Soil	0.002	ppm
1,2-Dibromoethane	106-93-4	Soil	0.001	ppm
1,2-Dichlorobenzene	95-50-1	Soil	0.002	ppm
1,2-Dichloroethane	107-06-2	Soil	0.002	ppm
1,2-Dichloropropane	78-87-5	Soil	0.002	ppm
1,3,5-Trimethylbenzene	108-67-8	Soil	0.001	ppm
1,3-Dichlorobenzene	541-73-1	Soil	0.002	ppm
1,3-Dichloropropane	142-28-9	Soil	0.002	ppm
1,4-Dichlorobenzene	106-46-7	Soil	0.002	ppm
1,4-Dioxane	123-91-1	Soil	0.1	ppm
2,2-Dichloropropane	594-20-7	Soil	0.002	ppm
2-Butanone	78-93-3	Soil	0.002	ppm
2-Chloroethylvinylether	110-75-8	Soil	0.002	ppm
2-Chlorotoluene	95-49-8	Soil	0.002	ppm
2-Hexanone	591-78-6	Soil	0.002	ppm
4-Chlorotoluene	108-41-8	Soil	0.002	ppm
4-Isopropyltoluene	99-87-6	Soil	0.001	ppm
4-Methyl-2-Pentanone	108-10-1	Soil	0.002	ppm
Acetone	67-64-1	Soil	0.01	ppm
Acrolein	107-02-8	Soil	0.01	ppm
Acrylonitrile	107-13-1	Soil	0.005	ppm
Benzene	71-43-2	Soil	0.001	ppm
Bromobenzene	108-86-1	Soil	0.002	ppm
Bromochloromethane	74-97=5	Soil	0.002	ppm
Bromodichloromethane	75-27-4	Soil	0.002	ppm
Bromoform	75-25-2	Soil	0.002	ppm
Bromomethane	74-83-9	Soil	0.002	ppm
Carbon Disulfide	75-15-0	Soil	0.002	ppm
Carbon Tetrachloride	56-23-5	Soil	0.002	ppm
Chlorobenzene	108-90-7	Soil	0.002	ppm
Chlorodifluoromethane	75-45-6	Soil	0.002	ppm

Chloroethane	75-00-3	Soil	0.002	ppm
Chloroform	67-66-3	Soil	0.002	ppm
Chloromethane	74-87-3	Soil	0.002	ppm
cis-1,2-Dichloroethene	156-59-2	Soil	0.002	ppm
cis-1,3-Dichloropropene	10061-01-5	Soil	0.002	ppm
Cyclohexane	110-82-7	Soil	0.002	ppm
Cyclohexanone	108-94-1	Soil	0.01	ppm
Dibromochloromethane	108-94-1	Soil	0.002	ppm
Dibromomethane	124-48-1	Soil	0.002	ppm
Dichlorodifluoromethane	75-71-8	Soil	0.002	ppm
Di-isopropyl-ether	108-20-3	Soil	0.002	ppm
Ethyl Acetate	141-78-6	Soil	0.002	ppm
Ethyl Ether	60-29-7	Soil	0.002	ppm
Ethylbenzene	100-41-4	Soil	0.001	ppm
Hexachlorobutadiene	87-68-3	Soil	0.002	ppm
Iodomethane	74-88-4	Soil	0.002	ppm
Isopropylbenzene	98-82-8	Soil	0.001	ppm
m&p-Xylenes	108-38-3 106-42-3	Soil	0.001	ppm
Methyl Acetate	79-20-9	Soil	0.002	ppm
Methylcyclohexane	108-87-2	Soil	0.002	ppm
Methylene Chloride	75-09-2	Soil	0.002	ppm
Methyl-t-butyl ether	1634-04-4	Soil	0.001	ppm
Naphthalene	91-20-3	Soil	0.001	ppm
n-amyl acetate	628-63-7	Soil	0.002	ppm
n-Butylbenzene	104-51-8	Soil	0.001	ppm
n-Hexane	110-54-3	Soil	0.002	ppm
n-Propylbenzene	103-65-1	Soil	0.001	ppm
o-Xylene	95-47-6	Soil	0.001	ppm
p-Diethylbenzene	105-05-5	Soil	0.002	ppm
p-Ethyltoluene	622-96-8	Soil	0.002	ppm
sec-Butylbenzene	135-98-8	Soil	0.001	ppm
Styrene	100-42-5	Soil	0.002	ppm
t-Butyl Alcohol	75-65-0	Soil	0.01	ppm
t-Butylbenzene	98-06-6	Soil	0.001	ppm
tert-Amyl methyl ether	994-05-8	Soil	0.002	ppm
Tetrachloroethene	127-18-4	Soil	0.002	ppm
Toluene	108-88-3	Soil	0.001	ppm
trans-1,2-Dichloroethene	156-60-5	Soil	0.002	ppm
trans-1,3-Dichloropropene	10061-02-6	Soil	0.002	ppm
trans-1,4-Dichloro-2-butene	110-57-6	Soil	0.002	ppm
Trichloroethene	79-01-6	Soil	0.002	ppm
Trichlorofluoromethane	75-69-4	Soil	0.002	ppm
Vinyl Acetate	108-05-04	Soil	0.002	ppm
Vinyl Chloride	75-01-4	Soil	0.002	ppm

TABLE 7

Manual Dilutions

20uL →	**100mL**	**=**	**5000X**
50ul →	**100mL**	**=**	**2000X**
100ul →	**100mL**	**=**	**1000X**
200ul →	**100mL**	**=**	**500X**
500ul →	**100mL**	**=**	**200X**
1mL →	**100mL**	**=**	**100X**
2mL →	**100mL**	**=**	**50X**
5mL →	**100mL**	**=**	**20X**

SOP REVISIONS LOG

SOP NUMBER 5004A

DATE	Rev #	Initials	REVISION
9/5/13	1	RC	Section 10.5 - Added all compounds included in the spike mixture. Clarified what compounds are typically reported in a spike report, however all or specified compounds may be reported per client request.
			10.6 Added that all compounds spiked must be reported.
			10.6.5 – Added a MS/MSD pair must be included witht eh DOC documentation to ensure all compounds are reported annually.
	2	RC	16.1 undated Estimates of Uncertianty
			Table 5- updated limits to match the DKQP limits
	3	RC	Table 2 removed Aqueous only reference
			Table 4 add additional compounds to list
04/23/15	4	EJ	Added Table 6:Reporting Limits
08/19/15	5	EJ/RC	Table 4: added n-Hexane
08/19/15	5	EJ/RC	Section 9.8.1: clarified weighting of linear regression
04/04/16	6	RC	Table 5 updated to in-house limits
04/04/16	6	RC	Table 6 updated- n-amyl acetate added to table
04/14/16	7	EJ	Added Table 7 Manual Dilutions
07/20/16	8	EJ	10.4.2: updated surrogates to in-house limits
07/20/16	8	EJ	10.5 removed the comment that only specific compounds are reported in the MS/MSD
12/11/17	9	JR/EJ	Sections 7.6.1, 7.6.3: added new instruments
12/11/17	9	JR/EJ	Sections 8.5, 8.6,8.7: updated to current lab practices
12/11/17	9	JR/EJ	Sections 8.5.1: Added 20 ppm Working Standard
12/11/17	9	JR/EJ	Sections 8.5.2: Added 20 ppm Chlorodifluoromethane
12/11/17	9	JR/EJ	Section 8.14: Added Chlorodifluoromethane

HAMPTON-CLARKE, INC.

STANDARD OPERATING PROCEDURE

GC/FID ANALYSIS OF TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS METHOD NJDEP EPH 10/08 Rev3

Prepared By:	Prepared By	Date:	8/25/2017
Concurred By:	Technical Specialist	Date:	8/25/2017
Approved By:	QA Director	Date:	8/25/2017
Approved By:	Laboratory Director	Date:	8/25/2017

GC/FID ANALYSIS OF TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS METHOD NJDEP EPH 10/08 Rev3

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GC/FID ANALYSIS OF TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS METHOD NJDEP EPH 10/08 Rev3

1.0 PURPOSE AND APPLICATION

1.1 This SOP is used to determine the collective concentrations of extractable aliphatic and aromatic petroleum hydrocarbons in water, soil, sediment and sludge samples. This method is applicable to the analysis of Extractable Petroleum Hydrocarbons (EPH).

1.2 This method is restricted for use by, or under the supervision of, analysts experienced in the use of gas chromatographs and skilled in the interpretation of gas chromatograms.

1.3 Reporting Limits for this method are: for soils 60 mg/kg, for waters 300 ug/L.

2.0 REFERENCES

2.1 Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 1, March 2003, Method 8000C.

2.2 Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 2, December 1996, Method 8015B

2.3 Hampton-Clarke Quality Assurance Manual, Current Revision.

2.4 Analysis of Extractable Petroleum Hydrocarbon Compounds (EPH) in aqueous, Soil, Sediment and Sludge", NJ DEP EPH 10/08 Rev 3.

3.0 METHOD SUMMARY

3.1 A measured volume or weight of sample is extracted using the appropriate matrix-specific extraction technique (see SOPs 3212 and 3213). The extracts are then analyzed by GC/FID. For non-aqueous samples that have not been known to be contaminated with #2 diesel fuel and have greater than 1700 mg/kg total EPH, the extracts are then solvent exchanged into hexane and separated into aliphatic and aromatic fraction using fractionation silica cartridge technique (see SOP3214). The extracts are re-concentrated and subsequently analyzed separately by GC/FID. Each of the resultant chromatograms of the aliphatic and aromatic fractions is used to quantitate four distinct carbon number ranges. Each carbon number range is defined using equivalent carbon (EC) numbers. The EC is related to a compound's boiling point and retention time on a gas chromatography column normalized to the actual carbon numbers of n-alkanes. For example, the EC of Acenaphthylene is 15.06 because its boiling point and GC retention time are halfway

between those of n-Tetradecane (a straight 14-carbon chain compound) and n-hexadecane (a straight 16-carbon chain compound). The EC numbers are used because they are more closely related to environmental mobility. The four EC number ranges for the aliphatic fractions are: EC9 to EC12, EC12 to EC16, EC16 to EC21 and EC21 to EC40. Similarly, the resultant chromatograms of the aromatic fractions are used to quantitate four distinct carbon number ranges: EC10 to EC12, EC12 to EC16, EC16 to EC21 and EC21 to EC36.

3.2 The EPH concentration is determined by integration of the FID chromatogram. Average calibration factors or response factors using the aliphatic standard mixture are used to calculate the concentration of each carbon range and total EPH. Average calibration factors or response factors using the aromatic standard mixture are used to calculate the concentration of each carbon range. Concentrations of each carbon range from both fractions are summed for a total EPH concentration.

3.3 The quantitation limit for each carbon range in soil is approximately 10 mg/kg and in water 100 ug/L.

3.4 Approximate Dynamic Range

3.4.1 EPH

Soil 80 - 16000 mg/kg
Aqueous 0.8 - 160 mg/L

Individual Carbon Ranges

Soil 10 - 2,000 mg/kg
Aqueous 0.10-20 mg/L

3.5 Compounds

3.5.1 Aliphatic Hydrocarbon Standard

Aliphatic Hydrocarbon (EC #)
n-Nonane (C9)
n-Decane (C10)
n-Dodecane (C12)
n-Tetradecane (C14)
n-Hexadecane (C16)
n-Octadecane (C18)
n-Eicosane (C20)
n-Heneicosane (C21)

n-Docosane (C22)
n-Tetracosane (C24)
n-Hexacosane (C26)
n-Octacosane (C28)
n-Triacontane (C30)
n-Dotriacontane (C32)
n-Tetratriacontane (C34)
n-Hexatriacontane (C36)
n-Octatriacontane (C38)
n-Tetracontane (C40)

3.5.2 Aromatic Hydrocarbon Standard

Aromatic Hydrocarbon (EC #)
Acenaphthene (C15.5)
Acenaphthylene (C15.06)
Anthracene (C19.43)
Benzo[a]anthracene (C26.37)
Benzo[a]pyrene (C31.34)
Benzo[b]fluoranthene (C30.14)
Benzo[g,h,i]perylene (C34.01)
Benzo[k]fluoranthene (C30.14)
Chrysene (C27.41)
Dibenz[a,h]anthracene (C30.36)
Fluoranthene (C21.85)
Fluorene (C16.55)
Indeno[1,2,3-cd]pyrene (C35.01)
2-Methylnaphthalene (C12.89)
Naphthalene (C11.7)
Phenanthrene (C19.36)
Pyrene (C20.8)
1,2,3-Trimethylbenzene (C10.1)

4.0 INTERFERENCES

4.1 Contamination by carryover can occur whenever high-concentration and low-concentration samples are analyzed in sequence. To reduce the potential for carryover, the sample syringe must be thoroughly rinsed between samples with an appropriate solvent.

4.2 Before processing any sample, the analyst shall demonstrate daily, through the analysis of a method blank, that the entire system is interference-free.

4.3 High purity solvents must be used to minimize interference problems.

4.4 Auto sampler vial septum should be replaced after each injection to minimize possibility of alkane contamination that can occur with re-analyzed extracts.

4.5 Naturally occurring alkanes may be detected by this method and may interfere with product identification. Naturally occurring plant waxes include odd carbon number alkanes from n-C25 through n-C35, and exhibit a dominant odd/even chain length distribution.

5.0 REQUIRED EQUIPMENT

5.1 Gas chromatograph - Agilent Gas chromatograph (Model 6890). An analytical system complete with a temperature programmable gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns and gases.

5.1.1 Chromatographic conditions (base operating conditions)

Oven:

Initial Temperature: 50°C
Initial Time: 1.00 min
Ramps:

#	Rate	Final temp	Final time
1	15.00	170	1.00
2	10.00	200	0.00
3	23.0	340	4.00

Run time: 22.09

Front Inlet:
Mode: Split, splitless
Initial temp: 260°C (on)
Pressure: 13.95 psi (on)
Split ratio: 3:1 / various

Split flow: 8.0 mL/min/ various
Total flow: 8.0 mL/min
Gas saver: On
Saver flow: 20.0 mL/min
Saver time: 2.00 min
Gas type: Hydrogen

Column 1:
Initial flow: 2.7 mL/min
Nominal init pressure: 13.96 psi
Average velocity: 65 cm/sec
Inlet: Front Inlet
Outlet: Front detector

Front Detector (FID):
Temperature: 320 °C (on)
Hydrogen flow: 40.0 mL/min (on)
Air flow: 350.0 mL/min (on)
Mode: Constant makeup flow
Makeup flow: 10.0 mL/min (on)
Makeup Gas Type: Hydrogen

Front Injector:
Injection Volume: 0.5uL

5.2 Hewlett Packard HP 7683/7673 auto sampler.

5.3 GC column - J&W DB-5MS, 30 meter, 0.25 mm ID and 0.25 um phase`

5.4 Autosampler vials – 2mL.

5.5 Micro syringes – 5uL and larger.

5.6 Data System – A computer system with EnviroQuant ChemStation G1701aa Version a.03.00 software is interfaced to the gas chromatograph that allows the continuous acquisition and storage on machine-readable media of all detector signals obtained throughout the duration of the chromatographic program. The software has the ability to integrate the abundance of any signal between specified time limits

5.7 Vials – 1-4 mL or 1-7 mL to store samples

5.8 Detector - Flame ionization (FID)

5.9 Analytical balance capable of accurately weighing 0.0001 g.

6.0 STANDARDS AND REAGENTS

6.1 **NOTE:** Store the standard solutions (stock, composite, calibration, and surrogate standards) at 4°C in polytetrafluoroethylene (PTFE)-sealed containers in the dark. All Aliphatic standards need to be stored at room temperature. All stock standard solutions prepared in house are replaced after one year or sooner if routine QC (Sec. 9.0) indicates a problem. All intermediate and working calibration standard solutions are replaced after six months or sooner if routine QC indicates a problem.

6.2 o-Terphenyl (OTP) surrogate standard – Prepare a 4000 ppm surrogate standard as follows:

6.2.1 Weigh 40 mg of neat o-Terphenyl (T2800-25G) into a 10ml volumetric flask. Bring to volume with Methylene chloride. Stopper and invert the mixture 2 to 3 times.

6.3 1-Chlorooctadecane (COD) surrogate standard – Prepare a 1000 ppm surrogate standard as follows:

6.3.1 weigh 10 mg of neat 1-Chlorooctadecane (N-10042-1G) into a 10ml volumetric flask. Bring to volume with Methylene chloride. Stopper and invert the mixture 2 to 3 times.

6.4 Surrogates Solution Mix – Prepare a 1000ppm surrogate mix by weighing out separately each, 50 mg of neat 1-Chlorooctadecane (ChemService O-629) and 50 mg of neat o-Terphenyl (Aldrich T280-0) into a 50ml volumetric flask. Bring to volume with Methylene chloride. Stopper and invert the mixture 2 to 3 times.

6.5 Fractionation Surrogate Mix (4000PPM) – Purchase as solution from Restek, p/n: 31469 containing Bromonaphthalene (Chem Service N10293-500ug) and 2-Fluorobiphenyl (Sigma-Aldrich 102741-10g).

6.6 Aliphatic Calibration Standards – Calibration standards are purchased from Restek-30540. This standard contains 1000ppm of individual alkane (C9, C10, C12, C14, C16, C18, C20, C21, C22, C24, C26, C28, C30, C38, C34, C36, C38, C40), Naphthalene and 2-Methylnaphthalene.

6.6.1 500ppm secondary standard Mix A: Initial calibration standards are prepared at six different concentration from a secondary dilution standard that is prepared by combining 1000uL of the Surrogates Solution Mix (as prepared in Section 6.4) with 1000uL of the 1000ppm Calibration Std (Accustandard, p/n S-18448-R2) in a 4 ml vial. Mix by inverting 2 to 3 times.

6.6.2 500ppm secondary standard Mix B: Initial calibration standards are prepared at six different concentration from a secondary dilution standard that is prepared by combining 1000uL of COD surrogate std (as prepared in Section 6.3) with 1000uL of the 1000ppm Calibration Std (Restek-30540) in a 4 ml vial. Mix by inverting 2 to 3 times

6.6.3 Prepare independently the 6 working aliphatic calibration concentration standards for Mix A and for Mix B as follows:

Cal Conc	µL of 500 ppm (Sect. 6.5.1)	µL of Hexanes	For samples not requiring fractionation µL of $MeCl_2$
10 ppm	20	980	980
50 ppm	100	900	900
100 ppm	200	800	800
200 ppm	400	600	600
300 ppm	600	400	400
500 ppm	*	-	-

* - Use 500ppm stock prepared in Section 6.6.1 and 6.6.2

6.7 Aliphatic ICV Standard – 50ul of 2000ppm ICV Cal Std (restek-30540) with 100 ul of surrogate std (Sec. 6.4) with 850 ul of Hexane.

6.8 Aromatic Calibration Standards – Calibration standards are purchased from Restek 31469. This standard contains 1000ppm of individual aromatic compound (Acenaphthene, Acenaphthylene, Anthracene, Benzo[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[g,h,i]perylene, Benzo[k]fluoranthene, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, 2-Methylnaphthalene, Naphthalene, Phenanthrene, Pyrene, 1,2,3-Trimethylbenzene).

6.8.1 500ppm secondary standard: Initial calibration standards are prepared at six different concentration from a secondary dilution standard that is prepared by combining 250uL of the OTP surrogate std (as prepared in Section 6.2), 250 uL of the fractionation surrogate mix (section 6.5), 1000uL of the 1000ppm Calibration Std (Restek 31469) and 500uL of Methylene Chloride in a 4 ml vial. Mix by inverting 2 to 3 times.

6.8.2 Prepare working aromatic calibration standards as follows:

Calibration Concentration	µL of 500 ppm (Sect. 6.9.1)	µL of $MeCl_2$
10 ppm	20	980
50 ppm	100	900
100 ppm	200	800
120 ppm	240	760
150 ppm	300	700
200 ppm	400	600

* - Use 500ppm stock prepared in Section 6.9.1

6.9 Aromatic ICV Standard – Prepare a 100 ppm second source Initial Calibration Verification (ICV) standard as follows: Combine 100uL of a 1000ppm ICV cal std (Restek 31469), 25uL of the surrogate std (as prepared in Section 6.2), 25 uL of the fractionation surrogate mix (section 6.5) and 850uL of Methylene chloride.

7.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

7.1 Extracts must be stored under refrigeration and analyzed within 40 days of extraction.

8.0 PROCEDURE

8.1 Initial Aliphatic calibration for samples requiring fractionation

8.1.1 Set up the sample introduction system as outlined in Sec. 5.1.1. Prepare calibration standards using the procedures described above (Sec. 6.6 and 6.8).

8.1.2 External standard calibration procedure for the aliphatic standard calibration Mix B:

8.1.2.1 The calibration procedure begins with determining the area attributable to column bleed by injecting 1uL of a Hexane blank for the aliphatic fraction analysis. When processing results, the integration area of each of the four carbon ranges is determined and subtracted out from all samples when calculating sample concentrations). Add 1mL of Hexane to an auto sampler vial.

8.1.2.2 Load the Hexane vial, calibration standard vials for mix B (prepared in Sec. 6.6) and the ICV (prepared in Sec. 6.8) on the auto sampler tray. Using the Chemstation software, select the instrument (i.e. GC #8). Select the correct method, then edit. Follow the HP Chemstation software to set and save the instrument method by following the acquisition parameters defined in Section 8.1.

8.1.2.3 Select sequence. Edit sequence log table, entering sample information (name, vial position, data file). Save sequence and select run sequence.

8.1.2.4 Once the analysis of the Hexane blank and the calibration standards are complete, calculate the calibration factor (CF) and the percent relative standard deviation (%RSD) of the CF for each individual compound and surrogate, and in addition to separate CF for each carbon range of interest. Calculate the CFs for the C9-C12, C12-C16, C16-C21 and C21-C40 Aliphatic Hydrocarbon carbon ranges from the appropriate aliphatic analysis chromatogram using Chemstation software.

For the aliphatic fraction, use the following compounds as carbon range markers:

Range	Compound	EC
C9-C12	n-Nonane	9.0
	n-Dodecane	12.0
C12-C16	n-Dodecane + 0.1 min	
	n-Hexadecane	16.0
C16-C21	n-Hexadecane + 0.1 min	
	n-Heneicosane	21.0
C21-C40	n-Heneicosane + 0.1min	
	n-Tetracontane	40.0

(Please note: The "+ 0.1 minutes" noted above in the aliphatic fractions are maximums. Less than the "compound + 0.1 minute" as the carbon range marker can be use if peak shape and chromatographic resolution are favorable.)

8.1.2.5 Choose and save the desired method, based on the instrument date. Load the mid level calibration standard data file. Select Quant, calculate/generate report. Select Quant, Qedit quant results. Verify or integrate all compounds based on RT. Exit and save. Update retention times and save the method. Thereafter, load each data file of the standards and quantitate with the new saved method. Edit each file and make sure each compound is properly identified then update the curve using the EnviroQuant Software. To update the quant method with the responses of each standard, from the EnviroQuant menu, select InitCal, click on Quick Levels Update, Clear Old Response, No to requant files before update, Single data File/Level and add each data file as per their concentration levels to the new quant method.

Note: For the carbon ranges, the quant method responses are updated by tabulating the summation of the peak areas of all the compounds in each carbon range. The areas for the surrogates must be subtracted out from the area summation of the range in which they elute. Also, any areas associated with naphthalene and 2-methylnaphthalene in the aliphatic fraction must be subtracted out from the appropriate carbon range.

8.1.2.6 Once the initial calibration is updated, save the method. Select InitCal, Response Factor to Screen or printer. Once an acceptable curve is verified as per the criteria of the method (below), select InitCal, Response Factors to CSV(form6). From the PC window, locate and double click on the EnvForms. Select import data, click on Retrieve Data. Double click on the directory and instrument where data file is

located and run the program. Once the program has been run, print the initial calibration standard form6 and the run log and make sure all criteria are met as follows:

8.1.2.7 If the RSD is ≤ 25% for each compound, surrogates and the carbon range, then the response of the instrument is considered linear and the mean calibration factor can be used to quantitate sample results. If the RSD is greater than 25% for any compound, then the source of the problem must be identified and corrected and a new curve need to be reanalyzed.

8.2 Initial Aliphatic calibration for samples not requiring fractionation (EPH NJDEP CAT 1 and CAT 2)

8.2.1 Set up the sample introduction system as outlined in Sec. 5.1.1. Prepare calibration standards using the procedures described above (Sec. 6.6 and 6.7).

8.2.2 External standard calibration procedure for the aliphatic standard calibration Mix A:

8.2.2.1 The calibration procedure begins with determining the area attributable to column bleed by injecting 1uL of a Methylene chloride blank for the aliphatic fraction analysis. When processing results, the integration area of each of the total carbon ranges is determined and subtracted out from all samples when calculating sample concentrations). Add 1mL of Methylene chloride to an auto sampler vial.

8.2.1.2 Load the Methylene chloride vial, calibration standard vials for mix A (prepared in Sec. 6.6) and the ICV (prepared in Sec. 6.7) on the auto sampler tray. Using the Chemstation software, select the instrument (i.e. GC #8). Select the correct method, then edit. Follow the HP Chemstation software to set and save the instrument method by following the acquisition parameters defined in Section 8.1.

8.2.1.3 Select sequence. Edit sequence log table, entering sample information (name, vial position, data file). Save sequence and select run sequence.

8.2.1.4 Once the analysis of the Methylene chloride blank and the calibration standards are complete, calculate the calibration factor (CF) and the percent relative standard deviation (%RSD) of the CF for each individual compound and surrogate, and in addition to separate CF for each carbon range of interest. Calculate the CFs for the C9-C28, >C28-C40, C9-C40 Aliphatic Hydrocarbon carbon ranges from the appropriate aliphatic analysis chromatogram using Chemstation software.

For the aliphatic fraction, use the following compounds as carbon range markers:

Range	Compound	EC
C9-C28	n-Nonane	9.0
	n-Octacosane	28.0
>C28-C40	n-Octacosane + 0.1 min	
	n-Tetracontane	40.0
C9-C40	n-Nonane	
	n-Tetracontane	40.0

(Please note: The "+ 0.1 minutes" noted above in the aliphatic fractions are maximums. Less than the "compound + 0.1 minute" as the carbon range marker can be use if peak shape and chromatographic resolution are favorable.)

8.2.1.5 Choose and save the desired method, based on the instrument date. Load the mid level calibration standard data file. Select Quant, calculate/generate report. Select Quant, Qedit quant results. Verify or integrate all compounds based on RT. Exit and save. Update retention times and save the method. Thereafter, load each data file of the standards and quantitate with the new saved method. Edit each file and make sure each compound is properly identified then update the curve using the EnviroQuant Software. To update the quant method with the responses of each standard, from the EnviroQuant menu, select InitCal, click on Quick Levels Update, Clear Old Response, No to requant files before update, Single data File/Level and add each data file as per their concentration levels to the new quant method.

Note: For the carbon ranges, the quant method responses are updated by tabulating the summation of the peak areas of all the compounds in each carbon range. The areas for the surrogates must be subtracted out from the area summation of the range in which they elute. Also, any areas associated with naphthalene and 2-methylnaphthalene in the aliphatic fraction must be subtracted out from the appropriate carbon range.

8.2.1.6 Once the initial calibration is updated, save the method. Select InitCal, Response Factor to Screen or printer. Once an acceptable curve is verified as per the criteria of the method (below), select InitCal, Response Factors to CSV(form6). From the PC window, locate and double click on the EnvForms. Select import data, click on Retrieve Data. Double click on the directory and instrument where data file is located and run the program. Once the program has been run, print the initial calibration standard form6 and the run log and make sure all criteria are met as follows:

If the RSD is ≤ 25% for each compound, surrogates and each carbon range, then the response of the instrument is considered linear and the mean calibration factor can be used to quantitate sample results. If the RSD is greater than 25% for any compound, then the source of the problem must be identified and corrected and a new curve need to be reanalyzed.

8.3 Initial aromatic calibration for samples requiring fractionation.

8.3.1 The calibration procedure begins with determining the area attributable to column bleed by injecting 1 uL of a Methylene Chloride blank for the aromatic fraction analysis. When processing results, the integration area of each of the four carbon ranges is determined and subtracted out from all samples when calculating sample concentrations). Add 1mL of Methylene Chloride to an auto sampler vial.

8.3.2 Load the Methylene Chloride vial, calibration standard vials (prepared in Sec. 6.7) and the ICV (prepared in Sec. 6.8) on the auto sampler tray. Using the Chemstation software, select the instrument (i.e. GC #8). Select the correct method, then edit. Follow the HP Chemstation software to set and save the instrument method by following the acquisition parameters defined in Section 8.1.

8.3.3 Select sequence. Edit sequence log table, entering sample information (name, vial position, data file). Save sequence and select run sequence.

8.3.4 Once the analysis of the Methylene Chloride blank and the calibration standards are complete, calculate the calibration factor (CF) and the percent relative standard deviation (%RSD) of the CF for each individual compound and surrogate, and in addition to separate CF for each carbon range of interest. Calculate the CFs for the C10-C12, C12-C16, C16-C21 and C21-C36 Aromatic Hydrocarbon carbon ranges from the appropriate aromatic analysis chromatogram using Chemstation software.

For the aromatic fraction, use the following compounds as carbon range markers:

Range	Compound	EC
C10-C12	1,2,3-Trimethylbenzene	10.1
	Naphthalene	11.7
C12-C16	Naphthalene + 0.1 min	
	Acenaphthene	15.5
C16-C21	Acenaphthene + 0.1 min	
	Pyrene	20.8
C21-C36	Pyrene + 0.1min	
	Benzo(g,h,i)perylene +1.0 min	34.01

(Please note: The "+ 0.1 minutes" noted above in the aromatic fractions are maximums. Less than the "compound + 0.1 minute" as the carbon range marker can be use if peak shape and chromatographic resolution are favorable.)

8.3.5 Choose and save the desired method, based on the instrument date. Load the mid level calibration standard data file. Select Quant, calculate/generate report. Select Quant, Qedit quant results. Verify or integrate all compounds based on RT. Exit and save. Update retention times and save the method. Thereafter, load each data file of the standards and quantitate with the new saved method. Edit each file and make sure each compound is properly identified then update the curve using the EnviroQuant Software. To update the quant method with the responses of each standard, from the EnviroQuant menu, select InitCal, click on Quick Levels Update, Clear Old Response, No to requant files before update, Single data File/Level and add each data file as per their concentration levels to the new quant method.

Note: For the carbon ranges, the quant method responses are updated by tabulating the summation of the peak areas of all the compounds in each carbon range. The areas for the surrogates must be subtracted out from the area summation of the range in which they elute.

8.3.6 Once the initial calibration is updated, save the method. Select InitCal, Response Factor to Screen or printer. Once an acceptable curve is verified as per the criteria of the method (below), select InitCal, Response Factors to CSV (form6). From the PC window, locate and double click on the EnvForms. Select import data, click on Retrieve Data. Double click on the directory and instrument where data file is located and run the program. Once the program has been run, print the initial calibration standard form6 and the run log and make sure all criteria are met as follows:

8.3.7 If the RSD is $\leq$ 25% for each compound, surrogates and the carbon range, then the response of the instrument is considered linear and the mean calibration factor can be used to quantitate sample results. If the RSD is greater than 25% for any compound, then the source of the problem must be identified and corrected and a new curve need to be reanalyzed.

8.4 RT windows: Retention time windows are established for each aliphatic compound, each aromatic compound and each surrogate on each GC. This procedure is repeated whenever a new column is installed. The average and SD of the RT is calculated. Absolute RT windows are established for the individual compounds (+ or – 0.05 minutes).

8.5 Initial Calibration Verification (ICV): Once the criteria in Section 8.1- 8.3 have been met, the ICV must be analyzed immediately following initial calibration, before any samples are analyzed. When done acquiring, process the data file of the ICV from Enviroquant.

8.5.1 In Enviroquant, load the data file, select Quant, Calculate/generate report. Recoveries must fall within 70-130%. If any recoveries fail, corrective action must be taken before sample analysis can begin. Corrective action includes, but is not limited to, instrument maintenance, reprepping ICV and/or analyzing a new initial calibration.

8.6 Upon completion of an acceptable initial calibration and ICV, the analysis of a Calibration blank is required by injecting 1uL of Hexane for the aliphatic analysis or Methylene chloride for aromatic analysis fraction, followed by sample analysis, including method blanks and QC samples (MS, MSD, MBS, MBSD, sample DUP). See section 8.7.8 for sample analysis.

8.7 Continuing Calibration verification for the aliphatic analysis or the aromatic analysis.

8.7.1 The working calibration curve and retention times must be verified by the analysis of a 100ppm tandard every 24 hours or every 20 samples and at the end of the analytical sequence, whichever comes first. The verification of a linear calibration is performed using the percent difference calculation.

$$\% \text{ Difference} = \frac{\overline{CF} - CF_v}{\overline{CF}} \times 100$$

The % difference calculated for the calibration verification standard must be within ±30% for each compound and surrogates, ±25% for each carbon range before any sample analyses may take place.

8.7.2 Calibration verification of a non-linear calibration is performed using percent drift calculation:

$$\% \text{ Drift} = \frac{\text{Calculated concentration - Theoretical concentration}}{\text{Theoretical concentration}} \times 100$$

The % drift calculated for the calibration verification standard must be within ±25% for each carbon range and ±30% for each compound before any sample analyses may take place.

8.7.3 The surrogate in the calibration verification analyses must fall within previously established retention time windows. If the retention time does not fall within the ± 3σ window, take corrective taken to restore the system (i.e. instrument maintenance) or a new calibration curve must be prepared and analyzed.

8.7.4 Upon completion of the continuing calibration verification standard, load the data file. Select the initial calibration method, Quant, Calculate/generate report. Verify that all compounds meet the requirements of Sections 8.7.1 and/or 8.7.2.

8.7.5 The analysis of a Hexane blank for the aliphatic analysis or Methylene Chloride for the aromatic analysis is required after the continuing calibration verification standard. The blank must be analyzed every 24 hours or after every continuing calibration verification for the analysis of any sample and is used to determine the baseline area, or column bleed.

8.7.6 Surrogate Standards (SS) - The SS responses and retention times in the calibration check standard must be evaluated during or immediately after data acquisition. If the retention time(s) for the SS is outside the determined RT window, the chromatographic system must be inspected for malfunctions and corrections must be made. If the area(s) for the SS changes by +/- 50% from the last daily calibration standard check, the GC must be inspected for malfunctions and corrections must be made.

8.7.7 Mass Discrimination

8.7.7.1 Mass discrimination can take place in the injection port. The heavier molecules do not enter the column as a defined plug of vapor with the lighter molecules.

8.7.7.2 Placing a small plug of silanized glass wool one centimeter from the base of the glass injection liner minimizes Mass discrimination. The end of the capillary column is placed just below the glass wool. The capillary column should be placed flush with the surface of the gold seal. A full range alkane standard should be run to test the degree of mass discrimination before performing any actual sample analyses. The response factor ratio of C30/C20 must be greater than 0.8. If less than 0.8, the column should be repositioned until the mass discrimination is minimized.

8.7.8 Sample analysis

8.7.8.1 After all criteria have been met for the initial calibration and ICV or daily continuing calibration standard, the analysis of a Calibration blank is required by injecting 1uL of Hexane for the aliphatic analysis or Methylene chloride for aromatic analysis fraction, followed by sample analysis, including method blanks and QC samples (MS, MSD, MBS, MBSD). All sample extracts must be allowed to warm to ambient temperature before injection on the GC system. Using the Chemstation software, select the instrument (i.e. GC #8). Select sequence. Edit sequence log table, entering sample information (name, vial position, data file). Save sequence. Select position and run, select the specific line (the desire vial position), select run sequence.

8.7.8.2 Once the analysis of the samples, blanks and qc samples is completed, from the

EnviroQuant software, load the continuing calibration file in order to load the correct quantitation method file or the quantitation method file can simply be loaded from The EnviroQuant software by selecting method and load the correct quantitation file. Load the data file to be quantitated, select Quant, Calculate/Generate Report, OK. To quantitate multiple data files extracts. Select Jobs, Report Destination, Start Report Manager, OK, RPT1, OK. Select Jobs again, Queue Quant List of Files, Quant No Report, select the data files to be quantitated, process.

8.7.8.3 Once the files have been processed, return to report manager and select start. When all files have been quantitated. From EnviroQuant, load and generate to the printer the continuing calibration standard. Load each data file, select Quant, Qedit Quant Result. For the carbon ranges, use the carbon range markers to integrate horizontally each carbon range. Exit and save the data file. If the initial analysis of a sample has a concentration of any compound that exceeds the initial calibration range, the sample must be reanalyzed at higher dilution.

8.7.8.4 After the completion process of all Qedting of the samples, Double click on the EnvForms. Select import data. Click on Retrieve Data (GC), double click on the directory and instrument where the data files are located and run the program. Once the program has been run, associate the appropriate MBSs with their proper MS and MSD and the sample that was spiked, select send to Lims, print Run Log, surrogates form2, spike form3. Verify that all QC criteria are met before reporting any data from the analytical sequence.

8.8 Calculations

8.8.1 External standard calibration - The concentration of each carbon range for each fraction in the sample is to be determined by calculating the amount of analyte injected, from the peak response, using the calibration factor. The areas of each carbon range that was associated from the blank of hexane or Methylene chloride and the area of the surrogates must be subtracted from their corresponding carbon range summed area. Additionally, any areas associated with naphthalene and/or 2-methylnaphthalene in an aliphatic carbon range are to be subtracted from the appropriate aliphatic carbon range summed area prior to calculating the calibration factors. The concentration of a specific carbon range is calculated as follows:

8.8.1.1 Aqueous samples

$$C(ug/L) = \frac{(A)(D)(V_e)}{CF(V_s)}$$

Where:

C = Concentration of each Hydrocarbon Carbon Range (or EPH), ug/L

A = Area response of each Carbon Range (or EPH) to be measured.

D = Dilution Factor

V_s = Volume of sample, L

V_e = Final volume of the extract

CF = Calibration Factor of each carbon range for each fraction (see section 7.1.2)

Where:

$$CF = \frac{Summed\ area\ of\ peaks\ in\ carbon\ range}{Total\ concentration\ injected\ (ng/L)}$$

8.8.2 Nonaqueous

$$C(ug/g) = \frac{(A)(D)(V_e)}{CF(S)}$$

Where:

C = Concentration of each Hydrocarbon Carbon Range (or EPH) ug/g (dry weight basis)

A = Area response of each Carbon Range or EPH to be measured.

D = Dilution Factor

Ve = Final volume of the extract

CF = Calibration Factor of each carbon range for each fraction (see section

7.1.2).

Where:

$$CF = \frac{Summed\ area\ of\ peaks\ in\ carbon\ range}{Total\ concentration\ injected\ (ng/uL)}$$

S =Dry sample weight, grams

8.8.3 Total EPH Concentration = Total of the 4 Aromatic carbon ranges and 4 Aliphatic carbon ranges.

8.9 Percent Recovery of Surrogate Standard (s)

Percent recovery based on External Calibration

$$\%SS\ Recovery = \frac{C_{of}}{C_{ot}} * 100$$

Where:

C_{of} = Concentration of surrogate found
C_{ot} = Concentration of surrogate added.

8.10 Percent Solids (P)

$$P = \frac{D_s}{T_s} * 100$$

Where:

D_s = Weight dry Sample, g

T_s = Weight wet Sample, g

8.11 Dry Weight (S)

$$S = \frac{Wet\ Weight\ x\ P}{100}$$

Where:

P = Percent solids

9.0 QUALITY CONTROL

9.1 At the beginning of each analytical run and every 24 hours or 20 samples, Methylene chlorides blank for aromatic analysis or Hexane for aliphatic analysis must be run to determine the area attributed to column bleed. This area must be subtracted from all samples. The area response must be within + or – 20% of the initial baseline response .

9.2 A Method Blank (prep blank) is extracted at a frequency of at least one for each group of up to 20 samples prepared at the same time, by the same procedure. The method blank is used to determine if any interferences were extracted. The concentration of any compound in the blank must not be greater than 5X the MDL. If the concentration is greater than 5X the MDL, and the sample concentration is greater than 10x the blank, reextraction is not necessary. If the concentration in the sample is less than 10x the blank, then reextraction is necessary.

9.3 Surrogate recoveries: Interim Surrogate recovery limits are specified below. Laboratory generated limits will be established after a minimum of 20 data points are collected. If any one surrogate falls outside the limits due to co elution or if the sample extract was diluted, reanalysis is not needed.

Aqueous Samples/Soil Samples	
(COD)-1-Chlorooctadecane (Aliphatic)	40-140%
(OTP)-o-Terphenyl (Aromatic)	40-140%

9.3.1 If the recovery of COD is recovered low, outside QC limits and/or is observed in the aromatic fraction and/or OTP is recovered low, outside QC limits and/or is observed in the aliphatic fraction, the sample must be refractionated using the remaining 1ml extract and analyzed. If the refractionated sample still indicates low surrogate recoveries, re-extraction of the sample will be required.

9.3.2 If the reextracted sample surrogate recoveries are within QC limits, report only the reextracted sample results. If the reextracted sample surrogate recoveries are outside QC limits (confirming matrix effect), report the original sample results and document in nonconformance summary.

9.4 A Matrix Spike Duplicate (MS) must be extracted and analyzed with each prep batch up to 20 samples of the same matrix. Interim QC limits are 40%-140% for each carbon range (RPD should be ±50%). Laboratory generated limits will be established after a minimum of 20 data points are collected. Reextraction or reanalysis is not necessary as long as the MBS and MBSD meet all QC criteria.

9.4.1 A Sample Duplicate must be extracted and analyzed with each prep batch up to 20 samples of the same matrix. The results should not differ by more than 50 %. A matrix spike duplicate may be used if no positive EPH samples are in the batch.

9.5 MBS/MBSD - For each analytical batch (up to 20 samples of a similar matrix) the laboratory must analyze a method blank spike (MBS) and method blank spike duplicate (MBSD). The recovery of the MBS and MBSD must be 40% - 140%. Lower recoveries are permissible for n-Octane but the recoveries must be greater than 25% and must be noted in the case narrative. The standard used for MBSs must be of different source from that used for the calibration standards. The recoveries of each of the carbon ranges as well as the individual recoveries must be reported. The Analytical batch precision is determined from the Relative Percent Difference (RPD) of the concentrations (not the recoveries) of the MBS/MBSD pair. The RPDs for the aliphatic and aromatic carbon range concentrations (the sum of the individual compounds' concentrations within a carbon range) must be ≤25%.

9.5.1 Each fractionation Aliphatic sample and QC sample are evaluated for potential breakthrough on a sample-specific basis by evaluating the %recovery of the fractionation surrogates and on a batch-specific basis by qualifying the concentrations of Naphthalene and 2-Methylnaphthalene in both the aliphatic and the aromatic fractions of the MBS and MBSD. Because Naphthalene and 2-Methylnaphthalene are weakly polar, these compounds can easily mobilize into the aliphatic fraction with excessive volume of hexane, therefore it is essential to monitor the presence of these two compounds in the aliphatic fraction in the MBS and MBSD. If either the concentration of Naphthalene or 2-Methylnaphthalene in the aliphatic fraction exceeds 5% of the total concentration for Naphthalene or 2-Methylnaphthalene in MBS and MBSD, then the MBS, MBSD and any sample extract that was fractionated together with the MBSs must be refractionated and reanalyzed.

Note: The total concentration for Naphthalene or 2-Methylnaphthalene in the MBS and MBSD pair includes the summation of the concentration detected in the aliphatic and aromatic fractions.

Example of Naphthalene % Breakthrough Calculation
Naphthalene in aromatic fraction = 50
Naphthalene in aliphatic fraction = 1.5
Total naphthalene concentration = 51.5

% Naphthalene Breakthrough = 1.5/51.5x100=2.9%

9.5.2 If the fractionation surrogate recovery for either compound is outside 40%-140% for any sample extract then fractionation must be repeated on the affected sample.

9.5.3 If the MBS and MBSD spiking compounds fall outside the QC criteria after refraction and reanalysis then all samples associated with the QC must be reextracted and reanalyzed, volume permitting.

9.6 Demonstration of Capability (DOC): The analyst must make an initial and yearly demonstration of ability to generate acceptable accuracy and precision data. The analyst must perform the following operation:

9.6.1 Seven quality control check samples (MBS) containing 50 ppm of all compounds (obtained from an external or second source) must be prepared and analyzed.

9.6.2 Calculate the average recovery (X) and the standard deviation of the recovery (s) Using the seven results. The average recovery for each compound must be ±40%. Until acceptable performance is demonstrated, sample analysis may not begin.

9.7 MDL and MDL verification: An MDL study must be performed annually. Seven replicate standards are extracted and analyzed. Once the MDL is calculated (see SOP No. 1009), an MDL verification standard must be extracted and analyzed at a concentration that is 2 – 3 times the calculated MDL.

10.0 SAFETY

10.1 Handle all chemicals appropriately. The toxicity or carcinogenicity of each reagent used in this method has not been defined precisely. Each chemical compound should be treated as a potential health hazard. Exposure to these chemicals must be reduced to the lowest possible level by whatever means available.

10.2 Wear the appropriate protective clothing (Safety glasses, laboratory coat, and gloves)

11.0 NONCONFORMANCE AND CORRECTIVE ACTION

11.1 Any unplanned deviation from this procedure must be documented on a nonconformance memo.

12.0 RECORD MAINTENANCE

12.1 All raw data files are kept on magnetic media for a minimum of 5 years.

12.2 All hard copy packages are filed and saved for a minimum of 5 years.

12.3 All run logbooks, standard prep logbooks, refrigerator logs, extraction logs are saved for a minimum of 5 years.

13.0 POLLUTION PREVENTION

13.1 The chemicals needed for these analyses are purchased as needed, therefore eliminating the disposal of unused expired standards.

13.2 The sample bottles provided are appropriate to obtain a representative sample, but limit the amount of sample required for disposal.

14.0 WASTE MANAGEMENT

14.1 Samples and chemicals are disposed of following the procedures outlined in SOP 7003 (Sample Storage and Disposal).

14.2 Solvent extracts are dumped into appropriate solvent waste drums for disposal.

TABLE 1

REPORTING LIMITS

Compound	RL (mg/kg)
>C12-C16 Aliphatics	30
>C16-C21 Aliphatics	30
>C21-C40 Aliphatics	30
C9-C12 Aliphatics	30
>C10-C12 Aromatics	30
>C12-C16 Aromatics	30
>C16-C21 Aromatics	30
>C21-C36 Aromatics	30

SOP REVISION LOG

SOP NUMBER 6011

DATE	REV. #	INITIALS	REVISION
2/4/10	1	JR	Section 2.0 – added reference to Method 8015B
		JR	Section 6.6 – removed double reference to second source std
4/7/10	2	JR	Section 3.4 and 3.5 – corrected numbering of sections
			Section 8.1 moved to 5.1
			Section 6.6 – added 'aliphatic' for clarification
			Section 6.8 – added 'aromatic' for clarification
			Section 6.4 – added compounds
8/27/10	3	JR	Section 3.1 – for non-aqueous samples with >1700 mg/kg EPH, the extracts are then solvent exchanged and fractionated into Aliphatic and Aromatic fractions.
8/27/10	3	JR	Section 6.4 - change to surrogate solution Mix
8/27/10	3	JR	Section 6.6-6.8 - was modified to include standard for non-fractionation samples.
8/27/10	3	JR	Section 8.2 was added to include standard procedure for non-fractionation samples.
			Section 5.1 updated chromatographic conditions
6/4/13	4	RC/AH	Section 5.2 – added additional model number
6/6/13	4	RC/AH	Section 6.9.2 – Updated aromatic calibration - added 120 and 150 PPM, removed 300 and 500PPM
6/6/13	4	RC/AH	Section 8.3.4 – updated the Benzo(ghi)perylene range to 1.0 min
2/20/15	5	RK/EJ	Sec 6.5, 6.6, 6.8, 6.10: changed standards suppliers
2/20/15	5	RK/EJ	Sec 6.7: Updated to reflect current practices.
2/20/15	5	EJ	Table 1: Added reporting limits
4/28/15	6	EJ	Sec 1.3: Added reporting limits.
3/14/16	7	AH/EJ	Sec.5.1.1, 5.7: updated to current lab practices
3/22/16	7	AH/EJ	Sec 6.6.3: added volumes of $MeCl_2$
3/22/16	7	AH/EJ	Sec 8.2.2: changed Hexane to Methylene chloride
3/25/16	7	AH/EJ	Sec 7.1: removed "in the dark"
02/21/17	8	AH/EJ	Sec 6.0: Updated to current lab practices
08/25/17	9	RC	Updated SOP title to reflect correct version of method (3)
08/25/17	9	RC	Section 2.4: updated method reference to correct version of method (3)

HAMPTON-CLARKE, INC.

STANDARD OPERATING PROCEDURE

GC/FID ANALYSIS OF TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS METHOD NJDEP EPH 10/08 Rev3

Prepared By:	_____ Prepared By	Date:	6/5/19
Concurred By:	_____ Technical Specialist	Date:	6/5/19
Approved By:	_____ QA Officer	Date:	6/5/19
Approved By:	_____ Laboratory Director	Date:	6/5/2019

GC/FID ANALYSIS OF TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS METHOD NJDEP EPH 10/08 Rev3

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GC/FID ANALYSIS OF TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS METHOD NJDEP EPH 10/08 Rev3

1.0 PURPOSE AND APPLICATION

1.1 This SOP is used to determine the collective concentrations of extractable aliphatic and aromatic petroleum hydrocarbons in water, soil, sediment and sludge samples. This method is applicable to the analysis of Extractable Petroleum Hydrocarbons (EPH).

1.2 This method is restricted for use by, or under the supervision of, analysts experienced in the use of gas chromatographs and skilled in the interpretation of gas chromatograms.

1.3 Reporting Limits for this method are: for soils 60 mg/kg, for waters 300 ug/L.

2.0 REFERENCES

2.1 Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 1, March 2003, Method 8000C.

2.2 Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 4, June 2003, Method 8015D.

2.3 Hampton-Clarke Quality Assurance Manual, Current Revision.

2.4 Analysis of Extractable Petroleum Hydrocarbon Compounds (EPH) in aqueous, Soil, Sediment and Sludge", NJ DEP EPH 10/08 Rev 3.

3.0 METHOD SUMMARY

3.1 A measured volume or weight of sample is extracted using the appropriate matrix-specific extraction technique (see SOPs 3212 and 3213). The extracts are then analyzed by GC/FID. For non-aqueous samples that have not been known to be contaminated with #2 diesel fuel and have greater than 1700 mg/kg total EPH, the extracts are then solvent exchanged into hexane and separated into aliphatic and aromatic fraction using fractionation silica cartridge technique (see SOP3214). The extracts are re-concentrated and subsequently analyzed separately by GC/FID. Each of the resultant chromatograms of the aliphatic and aromatic fractions is used to quantitate four distinct carbon number ranges. Each carbon number range is defined using equivalent carbon (EC) numbers. The EC is related to a compound's boiling point and retention time on a gas chromatography column normalized to the actual carbon numbers of n-alkanes. For example,

the EC of Acenaphthylene is 15.06 because its boiling point and GC retention time are halfway between those of n-Tetradecane (a straight 14-carbon chain compound) and n-hexadecane (a straight 16-carbon chain compound). The EC numbers are used because they are more closely related to environmental mobility. The four EC number ranges for the aliphatic fractions are: EC9 to EC12, EC12 to EC16, EC16 to EC21 and EC21 to EC40. Similarly, the resultant chromatograms of the aromatic fractions are used to quantitate four distinct carbon number ranges: EC10 to EC12, EC12 to EC16, EC16 to EC21 and EC21 to EC36.

3.2 The EPH concentration is determined by integration of the FID chromatogram. Average calibration factors or response factors using the aliphatic standard mixture are used to calculate the concentration of each carbon range and total EPH. Average calibration factors or response factors using the aromatic standard mixture are used to calculate the concentration of each carbon range. Concentrations of each carbon range from both fractions are summed for a total EPH concentration.

3.3 The quantitation limit for each carbon range in soil is approximately 10 mg/kg and in water 100 ug/L.

3.4 Approximate Dynamic Range

3.4.1 EPH

Soil 80 - 16000 mg/kg
Aqueous 0.8 - 160 mg/L

Individual Carbon Ranges

Soil 10 - 2,000 mg/kg
Aqueous 0.10-20 mg/L

3.5 Compounds

3.5.1 Aliphatic Hydrocarbon Standard
Aliphatic Hydrocarbon (EC #)
n-Nonane (C9)
n-Decane (C10)
n-Dodecane (C12)
n-Tetradecane (C14)
n-Hexadecane (C16)
n-Octadecane (C18)
n-Eicosane (C20)
n-Heneicosane (C21)

n-Docosane (C22)
n-Tetracosane (C24)
n-Hexacosane (C26)
n-Octacosane (C28)
n-Triacontane (C30)
n-Dotriacontane (C32)
n-Tetratriacontane (C34)
n-Hexatriacontane (C36)
n-Octatriacontane (C38)
n-Tetracontane (C40)

3.5.2 Aromatic Hydrocarbon Standard

Aromatic Hydrocarbon (EC #)
Acenaphthene (C15.5)
Acenaphthylene (C15.06)
Anthracene (C19.43)
Benzo[a]anthracene (C26.37)
Benzo[a]pyrene (C31.34)
Benzo[b]fluoranthene (C30.14)
Benzo[g,h,i]perylene (C34.01)
Benzo[k]fluoranthene (C30.14)
Chrysene (C27.41)
Dibenz[a,h]anthracene (C30.36)
Fluoranthene (C21.85)
Fluorene (C16.55)
Indeno[1,2,3-cd]pyrene (C35.01)
2-Methylnaphthalene (C12.89)
Naphthalene (C11.7)
Phenanthrene (C19.36)
Pyrene (C20.8)
1,2,3-Trimethylbenzene (C10.1)

4.0 INTERFERENCES

4.1 Contamination by carryover can occur whenever high-concentration and low-concentration samples are analyzed in sequence. To reduce the potential for carryover, the sample syringe must be thoroughly rinsed between samples with an appropriate solvent.

4.2 Before processing any sample, the analyst shall demonstrate daily, through the analysis of a method blank, that the entire system is interference-free.

4.3 High purity solvents must be used to minimize interference problems.

4.4 Auto sampler vial septum should be replaced after each injection to minimize possibility of alkane contamination that can occur with re-analyzed extracts.

4.5 Naturally occurring alkanes may be detected by this method and may interfere with product identification. Naturally occurring plant waxes include odd carbon number alkanes from n-C25 through n-C35, and exhibit a dominant odd/even chain length distribution.

5.0 REQUIRED EQUIPMENT

5.1 Gas chromatograph - Agilent Gas chromatograph (Model 6890). An analytical system complete with a temperature programmable gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns and gases.

5.1.1 Chromatographic conditions (base operating conditions)

Oven:

Initial Temperature: 50°C
Initial Time: 1.00 min
Ramps:

#	Rate	Final temp	Final time
1	15.00	170	1.00
2	10.00	200	0.00
3	23.0	340	4.00

Run time: 22.09

Front Inlet:
Mode: Split, splitless
Initial temp: 260°C (on)
Pressure: 13.95 psi (on)
Split ratio: 3:1 / various
Split flow: 8.0 mL/min/ various
Total flow: 8.0 mL/min
Gas saver: On
Saver flow: 20.0 mL/min
Saver time: 2.00 min
Gas type: Hydrogen

Column 1:
Initial flow: 2.7 mL/min
Nominal init pressure: 13.96 psi
Average velocity: 65 cm/sec
Inlet: Front Inlet
Outlet: Front detector

Front Detector (FID):
Temperature: 320 °C (on)
Hydrogen flow: 40.0 mL/min (on)
Air flow: 350.0 mL/min (on)
Mode: Constant makeup flow
Makeup flow: 10.0 mL/min (on)
Makeup Gas Type: Hydrogen

Front Injector:
Injection Volume: 0.5uL

5.2 Hewlett Packard HP 7683/7673 auto sampler.

5.3 GC column - Agilent J&W DB-5MS UI, 30 meter, 0.25 mm ID and 0.25 um phase part # 122-5532UI

5.4 Autosampler vials – 2mL.

5.5 Micro syringes – 5uL and larger.

5.6 Data System – A computer system with EnviroQuant ChemStation G1701aa Version a.03.00 software is interfaced to the gas chromatograph that allows the continuous acquisition and storage on machine-readable media of all detector signals obtained throughout the duration of the chromatographic program. The software has the ability to integrate the abundance of any signal between specified time limits

5.7 Vials – 1-4 mL or 1-7 mL to store samples

5.8 Detector - Flame ionization (FID)

5.9 Analytical balance capable of accurately weighing 0.0001 g.

6.0 STANDARDS AND REAGENTS

6.1 **NOTE:** Store the standard solutions (stock, composite, calibration, and surrogate standards) at 4°C in polytetrafluoroethylene (PTFE)-sealed containers in the dark. All Aliphatic standards need to be stored at room temperature. All stock standard solutions prepared in house are replaced after one year or sooner if routine QC (Sec. 9.0) indicates a problem. All intermediate and working calibration standard solutions are replaced after six months or sooner if routine QC indicates a problem.

6.2 o-Terphenyl (OTP) surrogate standard – Prepare a 4000 ppm surrogate standard as follows:

6.2.1 Weigh 40 mg of neat o-Terphenyl (T2800-25G) into a 10ml volumetric flask. Bring to volume with Methylene chloride. Stopper and invert the mixture 2 to 3 times.

6.3 1-Chlorooctadecane (COD) surrogate standard – Prepare a 1000 ppm surrogate standard as follows:

6.3.1 weigh 10 mg of neat 1-Chlorooctadecane (N-10042-1G) into a 10ml volumetric flask. Bring to volume with Methylene chloride. Stopper and invert the mixture 2 to 3 times.

6.4 Surrogates Solution Mix – Prepare a 1000ppm surrogate mix by weighing out separately each, 50 mg of neat 1-Chlorooctadecane (ChemService O-629) and 50 mg of neat o-Terphenyl (Aldrich T280-0) into a 50ml volumetric flask. Bring to volume with Methylene chloride. Stopper and invert the mixture 2 to 3 times.

6.5 Fractionation Surrogate Mix (4000PPM) – Purchase as solution from Restek, p/n: 31469 containing Bromonaphthalene (Chem Service N10293-500ug) and 2-Fluorobiphenyl (Sigma-Aldrich 102741-10g).

6.6 Aliphatic Calibration Standards – Calibration standards are purchased from Restek-30540. This standard contains 1000ppm of individual alkane (C9, C10, C12, C14, C16, C18, C20, C21, C22, C24, C26, C28, C30, C38, C34, C36, C38, C40), Naphthalene and 2-Methylnaphthalene.

6.6.1 500ppm secondary standard Mix A: Initial calibration standards are prepared at six different concentration from a secondary dilution standard that is prepared by combining 1000uL of the Surrogates Solution Mix (as prepared in Section 6.4) with 1000uL of the 1000ppm Calibration Std (Accustandard, p/n S-18448-R2) in a 4 ml vial. Mix by inverting 2 to 3 times.

6.6.2 500ppm secondary standard Mix B: Initial calibration standards are prepared at six different concentration from a secondary dilution standard that is prepared by combining 1000uL of COD surrogate std (as prepared in Section 6.3) with 1000uL of the 1000ppm Calibration Std (Restek-30540) in a 4 ml vial. Mix by inverting 2 to 3 times

6.6.3 Prepare independently the 6 working aliphatic calibration concentration standards for Mix A and for Mix B as follows:

Cal Conc	µL of 500 ppm (Sect. 6.5.1)	µL of Hexanes	For samples not requiring fractionation µL of $MeCl_2$
10 ppm	20	980	980
50 ppm	100	900	900
100 ppm	200	800	800
200 ppm	400	600	600
300 ppm	600	400	400
500 ppm	*	-	-

* - Use 500ppm stock prepared in Section 6.6.1 and 6.6.2

6.7 Aliphatic ICV Standard – 50ul of 2000ppm ICV Cal Std (restek-30540) with 100 ul of surrogate std (Sec. 6.4) with 850 ul of Hexane.

6.8 Aromatic Calibration Standards – Calibration standards are purchased from Restek 31469. This standard contains 1000ppm of individual aromatic compound (Acenaphthene, Acenaphthylene, Anthracene, Benzo[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[g,h,i]perylene, Benzo[k]fluoranthene, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, 2-Methylnaphthalene, Naphthalene, Phenanthrene, Pyrene, 1,2,3-Trimethylbenzene).

6.8.1 500ppm secondary standard: Initial calibration standards are prepared at six different concentration from a secondary dilution standard that is prepared by combining 250uL of the OTP surrogate std (as prepared in Section 6.2), 250 uL of the fractionation surrogate mix (section 6.5), 1000uL of the 1000ppm Calibration Std (Restek 31469) and 500uL of Methylene Chloride in a 4 ml vial. Mix by inverting 2 to 3 times.

6.8.2 Prepare working aromatic calibration standards as follows:

Calibration Concentration	µL of 500 ppm (Sect. 6.9.1)	µL of $MeCl_2$
10 ppm	20	980
50 ppm	100	900
100 ppm	200	800
120 ppm	240	760
150 ppm	300	700
200 ppm	400	600

* - Use 500ppm stock prepared in Section 6.9.1

6.9 Aromatic ICV Standard – Prepare a 100 ppm second source Initial Calibration Verification (ICV) standard as follows: Combine 100uL of a 1000ppm ICV cal std (Restek 31469), 25uL of the surrogate std (as prepared in Section 6.2), 25 uL of the fractionation surrogate mix (section 6.5) and 850uL of Methylene chloride.

7.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

7.1 Extracts must be stored under refrigeration at 4±2°C and analyzed within 40 days of extraction.

8.0 PROCEDURE

8.1 Initial Aliphatic calibration for samples requiring fractionation

8.1.1 Set up the sample introduction system as outlined in Sec. 5.1.1. Prepare calibration standards using the procedures described above (Sec. 6.6 and 6.8).

8.1.2 External standard calibration procedure for the aliphatic standard calibration Mix B:

8.1.2.1 The calibration procedure begins with determining the area attributable to column bleed by injecting 1uL of a Hexane blank for the aliphatic fraction analysis. When processing results, the integration area of each of the four carbon ranges is determined and subtracted out from all samples when calculating sample concentrations). Add 1mL of Hexane to an auto sampler vial.

8.1.2.2 Load the Hexane vial, calibration standard vials for mix B (prepared in Sec. 6.6) and the ICV (prepared in Sec. 6.8) on the auto sampler tray. Using the Chemstation software, select the instrument (i.e. GC #8). Select the correct method, then edit. Follow the HP Chemstation software to set and save the

instrument method by following the acquisition parameters defined in Section 8.1.

8.1.2.3 Select sequence. Edit sequence log table, entering sample information (name, vial position, data file). Save sequence and select run sequence.

8.1.2.4 Once the analysis of the Hexane blank and the calibration standards are complete, calculate the calibration factor (CF) and the percent relative standard deviation (%RSD) of the CF for each individual compound and surrogate, and in addition to separate CF for each carbon range of interest. Calculate the CFs for the C9-C12, C12-C16, C16-C21 and C21-C40 Aliphatic Hydrocarbon carbon ranges from the appropriate aliphatic analysis chromatogram using Chemstation software.

For the aliphatic fraction, use the following compounds as carbon range markers:

Range	Compound	EC
C9-C12	n-Nonane	9.0
	n-Dodecane	12.0
C12-C16	n-Dodecane + 0.1 min	
	n-Hexadecane	16.0
C16-C21	n-Hexadecane + 0.1 min	
	n-Heneicosane	21.0
C21-C40	n-Heneicosane + 0.1min	
	n-Tetracontane	40.0

(Please note: The "+ 0.1 minutes" noted above in the aliphatic fractions are maximums. Less than the "compound + 0.1 minute" as the carbon range marker can be use if peak shape and chromatographic resolution are favorable.)

8.1.2.5 Choose and save the desired method, based on the instrument date. Load the mid level calibration standard data file. Select Quant, calculate/generate report. Select Quant, Qedit quant results. Verify or integrate all compounds based on RT. Exit and save. Update retention times and save the method. Thereafter, load each data file of the standards and quantitate with the new saved method. Edit each file and make sure each compound is properly identified then update the curve using the EnviroQuant Software. To update the quant method with the responses of each standard, from the EnviroQuant menu, select InitCal, click on Quick Levels Update, Clear Old Response, No to requant files before update, Single data File/Level and add each data file as per their concentration levels to the new quant method.

Note: For the carbon ranges, the quant method responses are updated by tabulating the summation of the peak areas of all the compounds in each carbon range. The areas for the surrogates must be subtracted out from the area summation of the range in which they elute. Also, any areas associated with naphthalene and 2-methylnaphthalene in the aliphatic fraction must be subtracted out from the appropriate carbon range.

8.1.2.6 Once the initial calibration is updated, save the method. Select InitCal, Response Factor to Screen or printer. Once an acceptable curve is verified as per the criteria of the method (below), select InitCal, Response Factors to CSV(form6). From the PC window, locate and double click on the EnvForms. Select import data, click on Retrieve Data. Double click on the directory and instrument where data file is located and run the program. Once the program has been run, print the initial calibration standard form6 and the run log and make sure all criteria are met as follows:

8.1.2.7 If the RSD is $\leq 25\%$ for each compound, surrogates and the carbon range, then the response of the instrument is considered linear and the mean calibration factor can be used to quantitate sample results. If the RSD is greater than 25% for any compound, then the source of the problem must be identified and corrected and a new curve need to be reanalyzed.

8.2 Initial Aliphatic calibration for samples not requiring fractionation (EPH NJDEP CAT 1 and CAT 2).

8.2.1 Set up the sample introduction system as outlined in Sec. 5.1.1. Prepare calibration standards using the procedures described above (Sec. 6.6 and 6.7).

8.2.2 External standard calibration procedure for the aliphatic standard calibration Mix A:

8.2.2.1 The calibration procedure begins with determining the area attributable to column bleed by injecting 1uL of a Methylene chloride blank for the aliphatic fraction analysis. When processing results, the integration area of each of the total carbon ranges is determined and subtracted out from all samples when calculating sample concentrations). Add 1mL of Methylene chloride to an auto sampler vial.

8.2.2.2 Load the Methylene chloride vial, calibration standard vials for mix A (prepared in Sec. 6.6) and the ICV (prepared in Sec. 6.7) on the auto sampler tray. Using the Chemstation software, select the instrument (i.e. GC #8). Select the correct method, then edit. Follow the HP Chemstation software to set and save the instrument method by following the acquisition parameters defined in Section 8.1.

8.2.2.3 Select sequence. Edit sequence log table, entering sample information (name, vial position, data file). Save sequence and select run sequence.

8.2.2.4 Once the analysis of the Methylene chloride blank and the calibration standards are complete, calculate the calibration factor (CF) and the percent relative standard deviation (%RSD) of the CF for each individual compound and surrogate, and in addition to separate CF for each carbon range of interest. Calculate the CFs for the C9-C28, >C28-C40, C9-C40 Aliphatic Hydrocarbon carbon ranges from the appropriate aliphatic analysis chromatogram using Chemstation software.

For the aliphatic fraction, use the following compounds as carbon range markers:

Range	Compound	EC
C9-C28	n-Nonane	9.0
	n-Octacosane	28.0
>C28-C40	n-Octacosane + 0.1 min	
	n-Tetracontane	40.0
C9-C40	n-Nonane	
	n-Tetracontane	40.0

(Please note: The "+ 0.1 minutes" noted above in the aliphatic fractions are maximums. Less than the "compound + 0.1 minute" as the carbon range marker can be use if peak shape and chromatographic resolution are favorable.)

8.2.2.5 Choose and save the desired method, based on the instrument date. Load the mid level calibration standard data file. Select Quant, calculate/generate report. Select Quant, Qedit quant results. Verify or integrate all compounds based on RT. Exit and save. Update retention times and save the method. Thereafter, load each data file of the standards and quantitate with the new saved method. Edit each file and make sure each compound is properly identified then update the curve using the EnviroQuant Software. To update the quant method with the responses of each standard, from the EnviroQuant menu, select InitCal, click on Quick Levels Update, Clear Old Response, No to requant files before update, Single data File/Level and add each data file as per their concentration levels to the new quant method.

Note: For the carbon ranges, the quant method responses are updated by tabulating the summation of the peak areas of all the compounds in each carbon range. The areas for the surrogates must be subtracted out from the area summation of the range in which they elute. Also, any areas associated with naphthalene and 2-methylnaphthalene in the aliphatic fraction must be subtracted out from the appropriate carbon range.

8.2.2.6 Once the initial calibration is updated, save the method. Select InitCal, Response Factor to Screen or printer. Once an acceptable curve is verified as per

the criteria of the method (below), select InitCal, Response Factors to CSV(form6). From the PC window, locate and double click on the EnvForms. Select import data, click on Retrieve Data. Double click on the directory and instrument where data file is located and run the program. Once the program has been run, print the initial calibration standard form6 and the run log and make sure all criteria are met as follows:

If the RSD is $\leq$ 25% for each compound, surrogates and each carbon range, then the response of the instrument is considered linear and the mean calibration factor can be used to quantitate sample results. If the RSD is greater than 25% for any compound, then the source of the problem must be identified and corrected and a new curve need to be reanalyzed.

8.3 Initial aromatic calibration for samples requiring fractionation.

8.3.1 The calibration procedure begins with determining the area attributable to column bleed by injecting 1 uL of a Methylene Chloride blank for the aromatic fraction analysis. When processing results, the integration area of each of the four carbon ranges is determined and subtracted out from all samples when calculating sample concentrations). Add 1mL of Methylene Chloride to an auto sampler vial.

8.3.2 Load the Methylene Chloride vial, calibration standard vials (prepared in Sec. 6.7) and the ICV (prepared in Sec. 6.8) on the auto sampler tray. Using the Chemstation software, select the instrument (i.e. GC #8). Select the correct method, then edit. Follow the HP Chemstation software to set and save the instrument method by following the acquisition parameters defined in Section 8.1.

8.3.3 Select sequence. Edit sequence log table, entering sample information (name, vial position, data file). Save sequence and select run sequence.

8.3.4 Once the analysis of the Methylene Chloride blank and the calibration standards are complete, calculate the calibration factor (CF) and the percent relative standard deviation (%RSD) of the CF for each individual compound and surrogate, and in addition to separate CF for each carbon range of interest. Calculate the CFs for the C10-C12, C12-C16, C16-C21 and C21-C36 Aromatic Hydrocarbon carbon ranges from the appropriate aromatic analysis chromatogram using Chemstation software.

For the aromatic fraction, use the following compounds as carbon range markers:

Range	Compound	EC
C10-C12	1,2,3-Trimethylbenzene	10.1
	Naphthalene	11.7
C12-C16	Naphthalene + 0.1 min	
	Acenaphthene	15.5

C16-C21	Acenaphthene + 0.1 min	
	Pyrene	20.8
C21-C36	Pyrene + 0.1min	
	Benzo(g,h,i)perylene +1.0 min	34.01

(Please note: The "+ 0.1 minutes" noted above in the aromatic fractions are maximums. Less than the "compound + 0.1 minute" as the carbon range marker can be use if peak shape and chromatographic resolution are favorable.)

8.3.5 Choose and save the desired method, based on the instrument date. Load the mid level calibration standard data file. Select Quant, calculate/generate report. Select Quant, Qedit quant results. Verify or integrate all compounds based on RT. Exit and save. Update retention times and save the method. Thereafter, load each data file of the standards and quantitate with the new saved method. Edit each file and make sure each compound is properly identified then update the curve using the EnviroQuant Software. To update the quant method with the responses of each standard, from the EnviroQuant menu, select InitCal, click on Quick Levels Update, Clear Old Response, No to requant files before update, Single data File/Level and add each data file as per their concentration levels to the new quant method.

Note: For the carbon ranges, the quant method responses are updated by tabulating the summation of the peak areas of all the compounds in each carbon range. The areas for the surrogates must be subtracted out from the area summation of the range in which they elute.

8.3.6 Once the initial calibration is updated, save the method. Select InitCal, Response Factor to Screen or printer. Once an acceptable curve is verified as per the criteria of the method (below), select InitCal, Response Factors to CSV (form6). From the PC window, locate and double click on the EnvForms. Select import data, click on Retrieve Data. Double click on the directory and instrument where data file is located and run the program. Once the program has been run, print the initial calibration standard form6 and the run log and make sure all criteria are met as follows:

8.3.7 If the RSD is $\leq$ 25% for each compound, surrogates and the carbon range, then the response of the instrument is considered linear and the mean calibration factor can be used to quantitate sample results. If the RSD is greater than 25% for any compound, then the source of the problem must be identified and corrected and a new curve need to be reanalyzed.

8.4 RT windows: Retention time windows are established for each aliphatic compound, each aromatic compound and each surrogate on each GC. This procedure is repeated whenever a new column is installed. The average and SD of the RT is calculated. Absolute RT windows are established for the individual compounds (+ or – 0.05 minutes).

8.5 Initial Calibration Verification (ICV): Once the criteria in Section 8.1- 8.3 have been met, the ICV must be analyzed immediately following initial calibration, before any samples are analyzed. When done acquiring, process the data file of the ICV from Enviroquant.

8.5.1 In Enviroquant, load the data file, select Quant, Calculate/generate report. Recoveries must fall within 70-130%. If any recoveries fail, corrective action must be taken before sample analysis can begin. Corrective action includes, but is not limited to, instrument maintenance, reprepping ICV and/or analyzing a new initial calibration.

8.6 Upon completion of an acceptable initial calibration and ICV, the analysis of a Calibration blank is required by injecting 1uL of Hexane for the aliphatic analysis or Methylene chloride for aromatic analysis fraction, followed by sample analysis, including method blanks and QC samples (MS, MSD, MBS, MBSD, sample DUP). See section 8.7.8 for sample analysis.

8.7 Continuing Calibration verification for the aliphatic analysis or the aromatic analysis.

8.7.1 The working calibration curve and retention times must be verified by the analysis of a 100ppm tandard every 24 hours or every 20 samples and at the end of the analytical sequence, whichever comes first. The verification of a linear calibration is performed using the percent difference calculation.

$$\% \text{ Difference} = \frac{\overline{CF} - CF_v}{\overline{CF}} \times 100$$

The % difference calculated for the calibration verification standard must be within ±30% for each compound and surrogates, ±25% for each carbon range before any sample analyses may take place.

8.7.2 Calibration verification of a non-linear calibration is performed using percent drift calculation:

$$\% \text{ Drift} = \frac{\text{Calculated concentration - Theoretical concentration}}{\text{Theoretical concentration}} \times 100$$

The % drift calculated for the calibration verification standard must be within ±25% for each carbon range and ±30% for each compound before any sample analyses may take place.

8.7.3 The surrogate in the calibration verification analyses must fall within previously established retention time windows. If the retention time does not fall within the ± 3σ window, take corrective taken to restore the system (i.e. instrument maintenance) or a new calibration curve must be prepared and analyzed.

8.7.4 Upon completion of the continuing calibration verification standard, load the data file. Select the initial calibration method, Quant, Calculate/generate report. Verify that all compounds meet the requirements of Sections 8.7.1 and/or 8.7.2.

8.7.5 The analysis of a Hexane blank for the aliphatic analysis or Methylene Chloride for the aromatic analysis is required after the continuing calibration verification standard. The blank must be analyzed every 24 hours or after every continuing calibration verification for the analysis of any sample and is used to determine the baseline area, or column bleed.

8.7.6 Surrogate Standards (SS) - The SS responses and retention times in the calibration check standard must be evaluated during or immediately after data acquisition. If the retention time(s) for the SS is outside the determined RT window, the chromatographic system must be inspected for malfunctions and corrections must be made. If the area(s) for the SS changes by +/- 50% from the last daily calibration standard check, the GC must be inspected for malfunctions and corrections must be made.

8.7.7 Mass Discrimination

8.7.7.1 Mass discrimination can take place in the injection port. The heavier molecules do not enter the column as a defined plug of vapor with the lighter molecules.

8.7.7.2 Placing a small plug of silanized glass wool one centimeter from the base of the glass injection liner minimizes Mass discrimination. The end of the capillary column is placed just below the glass wool. The capillary column should be placed flush with the surface of the gold seal. A full range alkane standard should be run to test the degree of mass discrimination before performing any actual sample analyses. The response factor ratio of C30/C20 must be greater than 0.8. If less than 0.8, the column should be repositioned until the mass discrimination is minimized.

8.7.8 Sample analysis

8.7.8.1 After all criteria have been met for the initial calibration and ICV or daily continuing calibration standard, the analysis of a Calibration blank is required by injecting 1uL of Hexane for the aliphatic analysis or Methylene chloride for aromatic analysis fraction, followed by sample analysis, including method blanks and QC samples (MS, MSD, MBS, MBSD). All sample extracts must be allowed to warm to ambient temperature before injection on the GC system. Using the Chemstation software, select the instrument (i.e. GC #8). Select sequence. Edit sequence log table, entering sample information (name, vial position, data file). Save sequence. Select position and run, select the specific line (the desire vial position), select run sequence.

8.7.8.2 Once the analysis of the samples, blanks and qc samples is completed, from the EnviroQuant software, load the continuing calibration file in order to load the correct quantitation method file or the quantitation method file can simply be loaded from The EnviroQuant software by selecting method and load the correct quantitation file. Load the data file to be quantitated, select Quant, Calculate/Generate Report, OK. To quantitate multiple data files extracts. Select Jobs, Report Destination, Start Report Manager, OK, RPT1, OK. Select Jobs again, Queue Quant List of Files, Quant No Report, select the data files to be quantitated, process.

8.7.8.3 Once the files have been processed, return to report manager and select start. When all files have been quantitated. From EnviroQuant, load and generate to the printer the continuing calibration standard. Load each data file, select Quant, Qedit Quant Result. For the carbon ranges, use the carbon range markers to integrate horizontally each carbon range. Exit and save the data file. If the initial analysis of a sample has a concentration of any compound that exceeds the initial calibration range, the sample must be reanalyzed at higher dilution.

8.7.8.4 After the completion process of all Qedting of the samples, Double click on the EnvForms. Select import data. Click on Retrieve Data (GC), double click on the directory and instrument where the data files are located and run the program. Once the program has been run, associate the appropriate MBSs with their proper MS and MSD and the sample that was spiked, select send to Lims, print Run Log, surrogates form2, spike form3. Verify that all QC criteria are met before reporting any data from the analytical sequence.

8.8 Calculations

8.8.1 External standard calibration - The concentration of each carbon range for each fraction in the sample is to be determined by calculating the amount of analyte injected, from the peak response, using the calibration factor. The areas of each carbon range that was associated from the blank of hexane or Methylene chloride and the area of the surrogates must be subtracted from their corresponding carbon range summed area. Additionally, any areas associated with naphthalene and/or 2-methylnaphthalene in an aliphatic carbon range are to be subtracted from the appropriate aliphatic carbon range summed area prior to calculating the calibration factors. The concentration of a specific carbon range is calculated as follows:

8.8.1.1 Aqueous samples

$$C(ug/L) = \frac{(A)(D)(V_e)}{CF(V_s)}$$

Where:

C = Concentration of each Hydrocarbon Carbon Range (or EPH), ug/L

A = Area response of each Carbon Range (or EPH) to be measured.

D = Dilution Factor

V_s = Volume of sample, L

V_e = Final volume of the extract

CF = Calibration Factor of each carbon range for each fraction (see section 7.1.2)

Where:

$$CF = \frac{Summed\ area\ of\ peaks\ in\ carbon\ range}{Total\ concentration\ injected\ (ng/L)}$$

8.8.1.2 Nonaqueous samples

$$C(ug/g) = \frac{(A)(D)(V_e)}{CF(S)}$$

Where:

C = Concentration of each Hydrocarbon Carbon Range (or EPH) ug/g (dry weight basis)

A = Area response of each Carbon Range or EPH to be measured.

D = Dilution Factor

Ve = Final volume of the extract

CF = Calibration Factor of each carbon range for each fraction (see section 7.1.2).

Where:

$$CF = \frac{Summed\ area\ of\ peaks\ in\ carbon\ range}{Total\ concentration\ injected\ (ng\ /\ uL)}$$

S =Dry sample weight, grams

8.8.2 Total EPH Concentration = Total of the 4 Aromatic carbon ranges and 4 Aliphatic carbon ranges.

8.9 Percent Recovery of Surrogate Standard (s)

Percent recovery based on External Calibration

$$\%\,SS\ Recovery = \frac{C_{of}}{C_{ot}} * 100$$

Where:

C_{of} = Concentration of surrogate found
C_{ot} = Concentration of surrogate added.

8.10 Percent Solids (P)

$$P = \frac{D_s}{T_s} * 100$$

Where:

D_s = Weight dry Sample, g

T_s = Weight wet Sample, g

8.11 Dry Weight (S)

$$S = \frac{Wet\ Weight\ x\ P}{100}$$

Where: P = Percent solids

9.0 QUALITY CONTROL

9.1 At the beginning of each analytical run and every 24 hours or 20 samples, Methylene chlorides blank for aromatic analysis or Hexane for aliphatic analysis must be run to determine the area attributed to column bleed. This area must be subtracted from all samples. The area response must be within + or – 20% of the initial baseline response.

9.2 A Method Blank (prep blank) is extracted at a frequency of at least one for each group of up to 20 samples prepared at the same time, by the same procedure. The method blank is used to determine if any interferences were extracted. The concentration of any compound in the blank must not be greater than 5X the MDL. If the concentration is greater than 5X the MDL, and the sample concentration is greater than 10x the blank, reextraction is not necessary. If the concentration in the sample is less than 10x the blank, then reextraction is necessary.

9.3 Surrogate recoveries: Interim Surrogate recovery limits are specified below. Laboratory generated limits will be established after a minimum of 20 data points are collected. If any one surrogate falls outside the limits due to co elution or if the sample extract was diluted, reanalysis is not needed.

Aqueous Samples/Soil Samples	
(COD)-1-Chlorooctadecane (Aliphatic)	40-140%
(OTP)-o-Terphenyl (Aromatic)	40-140%

9.3.1 If the recovery of COD is recovered low, outside QC limits and/or is observed in the aromatic fraction and/or OTP is recovered low, outside QC limits and/or is observed in the aliphatic fraction, the sample must be refractionated using the remaining 1ml extract and analyzed. If the refractionated sample still indicates low surrogate recoveries, re-extraction of the sample will be required.

9.3.2 If the reextracted sample surrogate recoveries are within QC limits, report only the reextracted sample results. If the reextracted sample surrogate recoveries are outside QC limits (confirming matrix effect), report the original sample results and document in nonconformance summary.

9.4 A Matrix Spike Duplicate (MS) must be extracted and analyzed with each prep batch up to 20 samples of the same matrix. Interim QC limits are 40%-140% for each carbon range (RPD should be ±50%). Laboratory generated limits will be established after a minimum of 20 data points are collected. Reextraction or reanalysis is not necessary as long as the MBS and MBSD meet all QC criteria.

9.4.1 A Sample Duplicate must be extracted and analyzed with each prep batch up to 20

samples of the same matrix. The results should not differ by more than 50 %. A matrix spike duplicate may be used if no positive EPH samples are in the batch.

9.5 MBS/MBSD - For each analytical batch (up to 20 samples of a similar matrix) the laboratory must analyze a method blank spike (MBS) and method blank spike duplicate (MBSD). The recovery of the MBS and MBSD must be 40% - 140%. Lower recoveries are permissible for n-Octane but the recoveries must be greater than 25% and must be noted in the case narrative. The standard used for MBSs must be of different source from that used for the calibration standards. The recoveries of each of the carbon ranges as well as the individual recoveries must be reported. The Analytical batch precision is determined from the Relative Percent Difference (RPD) of the concentrations (not the recoveries) of the MBS/MBSD pair. The RPDs for the aliphatic and aromatic carbon range concentrations (the sum of the individual compounds' concentrations within a carbon range) must be ≤25%.

9.5.1 Each fractionation Aliphatic sample and QC sample are evaluated for potential breakthrough on a sample-specific basis by evaluating the %recovery of the fractionation surrogates and on a batch-specific basis by qualifying the concentrations of Naphthalene and 2-Methylnaphthalene in both the aliphatic and the aromatic fractions of the MBS and MBSD. Because Naphthalene and 2-Methylnaphthalene are weakly polar, these compounds can easily mobilize into the aliphatic fraction with excessive volume of hexane, therefore it is essential to monitor the presence of these two compounds in the aliphatic fraction in the MBS and MBSD. If either the concentration of Naphthalene or 2-Methylnaphthalene in the aliphatic fraction exceeds 5% of the total concentration for Naphthalene or 2-Methylnaphthalene in MBS and MBSD, then the MBS, MBSD and any sample extract that was fractionated together with the MBSs must be refractionated and reanalyzed.

Note: The total concentration for Naphthalene or 2-Methylnaphthalene in the MBS and MBSD pair includes the summation of the concentration detected in the aliphatic and aromatic fractions.

Example of Naphthalene % Breakthrough Calculation
Naphthalene in aromatic fraction = 50
Naphthalene in aliphatic fraction = 1.5
Total naphthalene concentration = 51.5

% Naphthalene Breakthrough = 1.5/51.5x100=2.9%

9.5.2 If the fractionation surrogate recovery for either compound is outside 40%-140% for any sample extract then fractionation must be repeated on the affected sample.

9.5.3 If the MBS and MBSD spiking compounds fall outside the QC criteria after refraction

and reanalysis then all samples associated with the QC must be reextracted and reanalyzed, volume permitting.

9.6 Demonstration of Capability (DOC): The analyst must make an initial and yearly demonstration of ability to generate acceptable accuracy and precision data. The analyst must perform the following operation:

9.6.1 Seven quality control check samples (MBS) containing 50 ppm of all compounds (obtained from an external or second source) must be prepared and analyzed.

9.6.2 Calculate the average recovery (X) and the standard deviation of the recovery (s) Using the seven results. The average recovery for each compound must be ±40%. Until acceptable performance is demonstrated, sample analysis may not begin.

9.7 MDL and MDL verification: An MDL study must be performed annually. Seven replicate standards are extracted and analyzed. Once the MDL is calculated (see SOP No. 1009), an MDL verification standard must be extracted and analyzed at a concentration that is 2 – 3 times the calculated MDL.

10.0 SAFETY

10.1 Handle all chemicals appropriately. The toxicity or carcinogenicity of each reagent used in this method has not been defined precisely. Each chemical compound should be treated as a potential health hazard. Exposure to these chemicals must be reduced to the lowest possible level by whatever means available.

10.2 Wear the appropriate protective clothing (Safety glasses, laboratory coat, and gloves)

11.0 NONCONFORMANCE AND CORRECTIVE ACTION

11.1 Any unplanned deviation from this procedure must be documented on a nonconformance memo.

12.0 RECORD MAINTENANCE

12.1 All raw data files are kept on magnetic media for a minimum of 5 years.

12.2 All hard copy packages are filed and saved for a minimum of 5 years.

12.3 All run logbooks, standard prep logbooks, refrigerator logs, extraction logs are saved for a minimum of 5 years.

13.0 POLLUTION PREVENTION

13.1 The chemicals needed for these analyses are purchased as needed, therefore eliminating the disposal of unused expired standards.

13.2 The sample bottles provided are appropriate to obtain a representative sample, but limit the amount of sample required for disposal.

14.0 WASTE MANAGEMENT

14.1 Samples and chemicals are disposed of following the procedures outlined in SOP 7003 (Sample Storage and Disposal).

14.2 Solvent extracts are dumped into appropriate solvent waste drums for disposal.

TABLE 1

REPORTING LIMITS

Compound	RL (mg/kg)
>C12-C16 Aliphatics	30
>C16-C21 Aliphatics	30
>C21-C40 Aliphatics	30
C9-C12 Aliphatics	30
>C10-C12 Aromatics	30
>C12-C16 Aromatics	30
>C16-C21 Aromatics	30
>C21-C36 Aromatics	30

SOP REVISION LOG

SOP NUMBER 6011

DATE	REV. #	INITIALS	REVISION
2/4/10	1	JR	Section 2.0 – added reference to Method 8015B
		JR	Section 6.6 – removed double reference to second source std
4/7/10	2	JR	Section 3.4 and 3.5 – corrected numbering of sections
			Section 8.1 moved to 5.1
			Section 6.6 – added 'aliphatic' for clarification
			Section 6.8 – added 'aromatic' for clarification
			Section 6.4 – added compounds
8/27/10	3	JR	Section 3.1 – for non-aqueous samples with >1700 mg/kg EPH, the extracts are then solvent exchanged and fractionated into Aliphatic and Aromatic fractions.
8/27/10	3	JR	Section 6.4 - change to surrogate solution Mix
8/27/10	3	JR	Section 6.6-6.8 - was modified to include standard for non-fractionation samples.
8/27/10	3	JR	Section 8.2 was added to include standard procedure for non-fractionation samples.
			Section 5.1 updated chromatographic conditions
6/4/13	4	RC/AH	Section 5.2 – added additional model number
6/6/13	4	RC/AH	Section 6.9.2 – Updated aromatic calibration - added 120 and 150 PPM, removed 300 and 500PPM
6/6/13	4	RC/AH	Section 8.3.4 – updated the Benzo(ghi)perylene range to 1.0 min
2/20/15	5	RK/EJ	Sec 6.5, 6.6, 6.8, 6.10: changed standards suppliers
2/20/15	5	RK/EJ	Sec 6.7: Updated to reflect current practices.
2/20/15	5	EJ	Table 1: Added reporting limits
4/28/15	6	EJ	Sec 1.3: Added reporting limits.
3/14/16	7	AH/EJ	Sec.5.1.1, 5.7: updated to current lab practices
3/22/16	7	AH/EJ	Sec 6.6.3: added volumes of $MeCl_2$
3/22/16	7	AH/EJ	Sec 8.2.2: changed Hexane to Methylene chloride
3/25/16	7	AH/EJ	Sec 7.1: removed "in the dark"
02/21/17	8	AH/EJ	Sec 6.0: Updated to current lab practices
08/25/17	9	RC	Updated SOP title to reflect correct version of method (3)
08/25/17	9	RC	Section 2.4: updated method reference to correct version of method (3)
06/03/19	10	SRB	Section 2.2: updated method 8015B to 8015D
			Section 7.1: specified refrigeration temp
			throughout: checked spelling, formatting, etc.
06/05/19	10	SRB	Section 5.3: updated column info

Dewberry Standard Operating Procedure (SOP)

Title: pH WATER-FIELD, Measurement of pH for Water in the Field
Method: EPA 150.1/Standard Methods 4500 H
Laboratory Director: Thomas B. Waldron
Date: May 2, 2006
Revised Date:October 4, 2006

1. **Scope and Application**: This method is applicable to the field determination of pH of water samples using the following methods: EPA 150.1 and SM 4500H.

2. **Method Summary** : The pH of a water sample is determined electrometrically using a combination electrode. For each batch of 20 samples or less a duplicate sample is analyzed.

3. **Interferences** : Coatings of oily materials or particulates can impair electrode response. Any coatings may be removed by wiping and rinsing with distilled water. Additional cleaning may be necessary as stated in the manufacturer's manuals.

4. **Apparatus**:

   4.1 Horiba U-22XD Water Quality Meter, Manufacturer Number 5053005. The pH electrode was factory sealed when the Horiba U-22XD was received from the manufacturer.

   4.2 Sample Containers

   4.3 Temperature compensating probe, or combination electrode capable of temperature compensation.

5. **Reagents** :

   5.1 Buffer solutions: pH = 4, 7, 10 (purchased from commercial vendor)

   5.2 Deionized water

6. **Standards: NA**

7. **Sample Handling and Preservation**: pH samples must be run within 15 minutes of collection (Analyze Immediately Parameter). Sample containers should be filled completely prior to analysis.

8. **Safety**:

   8.1 Employees must abide by the policies and procedures in the Corporate Safety Manual and this document.

8.2 Eye protection, lab coat and appropriate gloves must be worn while samples, standards, solvents, and reagents are being handled.

8.3 All questions pertaining to any safety procedure should be brought to the Laboratory Director or Department Health and Safety Manager.

8.4 SPECIFIC SAFETY CONCERNS OR REQUIREMENTS: None

8.5 PRIMARY MATERIALS USED: There are no materials used in this method that have a serious or significant hazard rating. NOTE: This list does not include all materials used in the method. A complete list of materials used in the method can be found in the reagents and materials section. Employees must review the information in the MSDS for each material before using it for the first time or when there are major changes to the MSDS.

9. Calibration Procedure:

9.1 Following manufacturer specifications, calibrate the pH meter(s) daily (or before use) using a 2-point calibration on pH buffers 4.0 and 10.0. The 4 and 10 buffer must be within +/- 0.05 pH units. Record the actual pH values as well as the slope. Read and record the pH 7.0 buffer. The pH 7.0 buffer must fall within +/-0.2 pH units (6.8-7.2) of the true value for the calibration to be considered valid.

9.2 Rinse electrode with deionized water.

9.3 Place in buffer 4.0. Stir constantly until meter is stable.

9.4 Press the “Enter” key after stable.

9.5 Record value and repeat with pH buffer 10.0

9.6 Dispose of buffers immediately after use.

9.7 Record values, time, date and analyst

9.8 If it has been greater than 3 hours since the meter has last been calibrated, the 7.0 buffer must be reread and recorded. Again the pH 7.0 buffer must fall within +/-0.2 pH units (6.8-7.2) of the true value. If the value is outside of this range the meter must be re-calibrated.

10. Measurement Procedure: Following the Dewberry SOP for LFPS, collect a grab groundwater sample of at least 100 mls in a clean container. Record the date and time of collection, the date and time of analysis and the technician initials. (Note: Recording both times verifies that the pH readings were conducted within 15 minutes of collection.) Wash the sensor two or three times with distilled water and immerse a properly calibrated water quality meter into the container. Stir the sample while measuring. Allow the reading to stabilize and record the results. Collect and analyze a duplicate sample for every twenty (20) samples collected.

11. Calculations: No calculations are necessary. Report pH value directly from meter.

12. Quality Control:

12.1 One (1) duplicate pH measurement will be performed for every twenty (20) samples measured. The values should be within +/-0.2 pH units.

12.2 At a minimum of yearly, read a known quality control sample obtained from an outside vendor. The pH must fall within the range specified by the manufacturer.

12.3 As stated above, a daily check and calibration must be performed. In addition, every 3 hours, check with pH buffer 7.0. Result must be +/- 0.2 pH units.

13. Non-Conformance and Corrective Action:

13.1 Any unplanned deviation from this procedure must be documented in a nonconformance memo.

13.2 Errors in pH measurement generally arise from improperly functioning electrodes. If the pH reading is unstable, the electrode junction may be clogged (as evidenced by crystallization of the electrode solution). Clean the electrode and re-calibrate the meter. If the problem persists the electrode may need to be replaced.

13.3 If the pH sensor has become fouled, use a piece of gauze dampened with detergent and wipe off contamination.

14. Record Maintenance:

14.1 The current pH calibration logbook will be kept in the laboratory within easy access to the technician performing the work.

14.2 Once full the logbook will be kept in a laboratory specific indexed archive file. A record of the index will be maintained in the quality control file.

Prepared by:

_____Date_____

Laboratory QA/QC Officer

_____Date_____

Laboratory Manager

_____Date_____

Dewberry Standard Operating Procedure (SOP)

Title: DISSOLVED OXYGEN-FIELD, Measurement of Dissolved Oxygen for Water in the Field
Method: EPA 360.1/Standard Methods 4500 O G
Laboratory Director: Thomas B. Waldron
Date: May 2, 2006
Revised Date:October 5, 2006

1. **Scope and Application**: This method is applicable to the field determination of dissolved oxygen from water samples using the following methods: EPA Method 360.1.

2. **Method Summary**: The current or potential of a sample is correlated with dissolved oxygen concentrations. A duplicate sample is analyzed on a daily basis or every 20 samples whichever is less.

3. **Interferences**:

   3.1 Dissolved inorganic salts and reactive compounds can interfere with the output of the dissolved oxygen probe.

   3.2 Dissolved oxygen probes are temperature sensitive, and temperature compensation is normally provided by the manufacturer.

   3.3 Reactive compounds may interfere with the output or the performance of dissolved oxygen probes. Reactive gases which pass through the membrane probes may interfere. For example, chlorine will depolarize the cathode and cause a high probe-output. Long-term exposures to chlorine will coat the anode with the chloride of the anode metal and eventually desensitize the probe. Alkaline samples in which free chlorine does not exist will not interfere. Hydrogen sulfide will interfere with membrane probes if the applied potential is greater than the half-wave potential of the sulfide ion. If the applied potential is less than the half-wave potential, an interfering reaction will not occur, but coating of the anode with the sulfide of the anode metal can take place.

4. **Apparatus**:

   4.1 Horiba U-22XD Water Quality Meter, Manufacturer Number 5053005.

   4.2 Sample Containers

   4.3 Temperature compensating probe, or combination electrode capable of temperature compensation

5. Reagents:

5.1 Deionized Water: Put 1 or 2 liters of water in a container. Use an air pump to bubble air through the solution until it is oxygen-saturated.

5.2 Wash the probe 2-3 times in the tap water and put it in the span calibration solution.

6. Standards: NA

7. Sample Handling and Preservation: DO samples must be run within 15 minutes of collection (Analyze Immediately Parameter). Sample containers should be filled completely prior to analysis.

8. Safety:

8.1 Employees must abide by the policies and procedures in the Corporate Safety Manual and this document.

8.2 Eye protection, lab coat and appropriate gloves must be worn while samples, standards, solvents, and reagents are being handled.

8.3 All questions pertaining to any safety procedure should be brought to the Laboratory Director or Department Health and Safety Manager.

8.4 SPECIFIC SAFETY CONCERNS OR REQUIREMENTS: None

8.5 PRIMARY MATERIALS USED: There are no materials used in this method that have a serious or significant hazard rating. NOTE: This list does not include all materials used in the method. A complete list of materials used in the method can be found in the reagents and materials section. Employees must review the information in the MSDS for each material before using it for the first time or when there are major changes to the MSDS.

9. Procedure:

9.1 Use a 10mL graduated cylinder to ad 15mL of Deionized Water to the titration tube.

9.2 Use a Direct Reading Titrator, 0-1 Range(1.0mL capacity) to add 2mL of Potassium Bi-iodate.

9.3 Add 2 drops of Sulfuric Acid, 5N.

9.4 use the 0.1g spoon to add 0.2g Potassium Iodide Crystals.

9.5 Swirl to dissolve. Solution will turn yellowish brown.

9.6 Fill another Direct Reading Titrator with Sodium Thiosulfate Solution, 0.025N.

9.7 While gently swirling the tube, add Sodium thiosulfate, 0.02N until the color fades to pale yellow. It will be necessary to refill the Direct Reading Titrator.

9.8 Add 3 drops of Starch Indicator Solution. The solution will turn blue.

9.9 Continue adding Sodium Thiosulfate, 0.025N until the blue color disappears and the solution is colorless.

9.10 Read the test result directly from the scale where the large ring on the Titrator meets the Titrator barrel. Include the value of the original amount dispensed (1mL). If the reading is 2.0 +/- 0.1mL, the Sodium Thiosulfate, 0.025N is satisfactory. If not, discard and replace with new reagent.

10. <u>Calibration:</u>

10.1 Turn on the Horiba U-22XD Water Quality Meter, allowing the probe to polarize and the temperature to stabilize before calibrating.

10.2 Set the Horiba U-22XD unit for fresh water readings. Set the S.SET Sub-Mode to 0.0%.

10.3 Use the "MODE" Key to move the lower cursor to SPAN.

10.4 After the readout has stabilized, while slowly moving the probe up and down in the solution, set the readout value to the appropriate DO value for the temperature of this solution. For DO values at various temperatures, refer to the Horiba Instruction Manual, Section 3, Page 34.

10.5 Press "ENT" Key to complete the calibration for DO.

10.6 Press "MODE" to return to the Main Mode. The instrument is now calibrated and ready to measure dissolved oxygen and temperature.

11. <u>Measurement Procedure</u>: Following the Dewberry SOP for LFPS, collect a grab groundwater sample of at least 100 mls in a clean container. Record the date and time of collection, the date and time of analysis and the technician initials. (Note: Recording both times verifies that the DO readings were conducted within 15 minutes of collection.) Wash the sensor two or three times with distilled water and immerse a properly calibrated water quality meter into the container. Allow the reading to stabilize and record the results.

12. Calculations: No calculations are necessary. Report DO value directly from meter.

13. Quality Control:

13.1 A duplicate is analyzed once per day or every twenty samples whichever is less.

13. Nonconformance Summary and Corrective Action: Data that fails to meet minimum acceptance criteria will be annotated (flagged) with qualifiers and/or appropriate narrative comments defining the nature of the outage. If applicable, a Corrective Action Report will be initiated in order to provide for investigation and follow-up.

Prepared by:

_____Date_____

Laboratory QA/QC Officer

_____Date_____

Laboratory Manager

_____Date_____

Dewberry Standard Operating Procedure (SOP)

Title: TEMPERATURE-FIELD, Measurement of Temperature in the Field
Method: EPA 170.1/Standard Methods 2550B
Laboratory Director: Thomas Waldron
Date: May 2, 2006
Revision Date: October 9, 2006

1. **Scope and Application**: This method is applicable to the field determination of temperature of water samples using the following methods: EPA Method 170.1 and Standard Method 4500H.

2. **Sample Handling and Preservation**: Samples measured for temperature samples must be run within 15 minutes of collection (Analyze Immediately Parameter).

3. **Apparatus**:

   3.1 Horiba U-22XD Water Quality Meter, Manufacturer's Model Number 5053005.

   3.2 NIST Thermometer.

   3.3 Sample Containers.

4. **Calibration Procedure:** Our in house water quality meter is calibrated quarterly per manufacturer specifications against the NIST thermometer listed in the Apparatus section above. Calibration is done by placing the NIST thermometer in the same location and conditions (in an incubator or a refrigerator or into a ice bath) as the in house water quality meter.

   The temperature readings are determined and recorded for both thermometer and water quality meter. Date and name of technician conducting the calibration and the serial numbers of meters are recorded in a journal. If the temperature readings are not the same then a correction factor is determined and used to adjust the temperature reading collected from the in house water quality meter.

   If the NIST read 20.1°C and the in house read 20.5°C then the correction factor would be –0.4°C. Any temperature readings obtained from that in house water quality meter would have 0.4° taken off the reading before reporting. Records are maintained for all correction factors.

5. **Maintenance**: Daily and monthly maintenance is performed per manufacturer instructions.

6. **Measurement Procedure**: Following the Dewberry SOP for LFPS, collect a grab groundwater sample of at least 100 ml in a clean container. Record the date and time of collection, the date and time of analysis and the technician initials. (Note: Recording both times verifies that the temperature readings were conducted within 15 minutes of collection.) Immerse a properly calibrated water quality meter into the container. Allow the reading to stabilize and record the results (apply any appropriate correction factors).

7. **Quality Control**:

   7.1 Glass thermometers must be calibrated yearly using the NIST certified thermometer.

   7.2 A duplicate is analyzed on a daily basis or every 20 samples whichever is less.

   7.3 The digital thermometer will be calibrated quarterly to the N.I.S.T. thermometer.

8. **Nonconformance Summary:** Data that fails to meet minimum acceptance criteria will be annotated (flagged) with qualifiers and/or appropriate narrative comments defining the nature of the outage. If applicable, a Corrective Action Report will be initiated in order to provide for investigation and follow-up.

Prepared by:

_____Date_____

Laboratory QA/QC Officer

_____Date_____

Laboratory Manager

_____Date_____

Groundwater Sampling Using Low-Flow Purge and Sampling
Dewberry Standard Operating Procedure

This Standard Operating Procedure has been prepared to enable the reader to properly purge a groundwater well and sample it using the low-flow methods defined by the U.S. Environmental Protection Agency (USEPA) and New Jersey Department of Environmental Protection (NJDEP).

This method should be used for sampling metals only unless otherwise dictated by a project manager. Sampling and analysis for compounds other than metals using low-flow purge methods requires work plan approval by the NJDEP. Sampling for metals has become an accepted method by the State. Essentially, the benefit of low-flow purge and sampling is that suspended solids found in over-pack and adjacent substrate do not become mixed in water thereby altering metals concentrations through physical and chemical processes.

Equipment

-Adjustable rate, positive displacement pump (i.e.; peristaltic or Grundfos® submersible pumps with variable speed motor)
-Power source (generator) for pump
-Disposable Teflon tubing (dedicated to each well)
-Electronic water level measuring device
-Photoionization detector (PID)
-Flow measurement vessel (graduated cylinder) and stop watch
-Monitoring device (i.e.; Horiba U-22) with flow through cell for water quality parameters*
-Decontamination supplies:
    wash basins, brushes, detergent (i.e.; Alconox), tap/distilled/deionized water, alcohol, acid (when sampling aqueous for metals), containers for waste water storage, and polyethylene sheeting)
-Log book
-Bungee cords
-Sample bottles for respective analysis with preservatives when applicable
-Coolers and zip lock style plastic bags for ice and sample bottle containment for transport
-Chain of custody and labeling for samples
-Approved Field Sampling & QA/QC plan
-Approved Health & Safety Plan

*Water quality parameters: temperature, pH, specific conductance, turbidity, dissolved oxygen, and redox)

Pre-sampling Procedure

(1) Record in log book the weather conditions, site investigator(s) names, well identification, and other pertinent site information.

(2) Check well for damage to casing, lock, etc. and record any in log book if observed.

(3) Measure VOCs at well head with PID prior to opening well. Open well head and measure VOCs again.

(4) Measure depth to water, free-product thickness if present and depth of well. If product is present do not perform low-flow purging. If free-product is not present then measure depth to water and total well depth (well depth changes over time due to sediment accumulation, this also determines that nothing is obstructing the well column).

Sampling Procedure

(1) Lower pump with attached tubing and power line into well at the approximate center of the saturated screened interval. Set the pump intake such that the intake is at least two feet above the bottom of the well so it does not uptake sediment or disturb settled solids. In order to lower the assembly to the proper depth, either measure tubing based on desired interval prior to attaching to pump or lower entire assembly into well with measuring device at same time.

(2) Measure the depth to water again prior to pumping. This will be monitored during purge and ideally minimal draw down will occur or stabilization should occur.

(3) At five minute intervals, record water level, water quality parameters and flow rate. A separate standardized table should be used for records of each well.

(4) Purge rate should be maintained at 200 to 500 milliliters per minute. Below 200 ml/min pumps can run too hot and alter water quality parameters.

To measure flow/purge rate use a stop watch and a graduated cylinder. First make sure flow through cell is stable and will not fall down, if need be, bungee cord it to the well or some other fixed object. Connect a two foot section of tubing to the out flow nipple on the flow through cell to make measuring easier. Place graduated cylinder under outflow and simultaneously start stop watch. Measure flow initially until you obtain 200 to 500 ml/min. Then measure flow in this manner each 5 minutes when recording water quality parameters.

(5) Water quality is considered stable when three consecutive readings are observed within +/- 0.1 for pH, +/- 3% for conductivity, +/- 10 mV for redox potential, and +/- 10% for turbidity and dissolved oxygen.

(6) Sample VOCs first then others jars can be filled and stored.

(7) Measure depth to water and reseal/lock the well.

References

U.S. Environmental Protection Agency. March Region II division distribution letter 1998. Final USEPA Region II Low Stress (Low Flow) Ground Water Sampling Standard Operating Procedure.

The Low-Down on Low Flow. Site Remediation News, November 1997 (Volume 9 Number 3). New Jersey Department of Environmental Protection (NJDEP).

Puls, R.W. and M.J. Barcelona. April 1996. Ground water issue. Low-flow (minimal drawdown) ground water sampling procedures. EPA/540/S-95/504. Ada, Oklahoma. R.S. Kerr Lab.

NJDEP. August 2005. Field Sampling Procedures Manual.

Low Flow Purging and Sampling
Ground Water Sampling Measurements and Calculations

WELL NUMBER	WELL INFORMATION					Date: 12/12/07
	Well Diameter (inches)	Total Depth* (ft)	Depth to Water (ft)	Depth to Product (ft)	PID (ppm)	Dewberry Personnel: Monal Vanodia
MW-18	4	14.5	4.63	—	1013	Site Name: NJTA Richard Stockton Service Area 65
						Site Location: Mile Marker 58.7
						Project Number: 5000681

* Use a previously determined Total Depth. Confirm the Total Depth of well after sampling.

PURGING INFORMATION						
Pump Type	Tubing Type	Pump Intake* Depth (ft)	Purge Start Time	Purge Stop Time	Flow Rate (ml/m)	Total Purge Vol. (gal)
bladder	Teflon	7.5	1240	1305	150	1.0

* Pump Intake Depth is typically the midpoint of the saturated section of the well screen.

PURGING PARAMETERS (measurements are to be taken approximately every 5 minutes)										
	Criteria:	0.3 ft	–	± 0.1 su	± 3%	± 10%	± 10 mv	± 10%		
Time	Flow Rate (ml/m)	Depth to Water (ft)	Temp (°C)	pH (su)	Cond (mS/cm)	D.O. (ppm)	Eh (mv)	Turbidity (NTU)	Initials	Water Conditions/Comments
12:40	150	4.56	14.75	5.27	9.99	1.76	80	25.6	MW	Odor
12:45	150	4.70	14.39	5.18	17.7	2.21	80	22.3	MW	
12:50	150	4.70	13.33	5.24	17.6	0.97	73	20.1	MV	
12:55	150	4.69	13.38	5.22	17.5	0.81	73	17.6	MW	
13:00	150	4.70	13.39	5.21	17.5	0.97	73	16.7	MW	
13:05	150	4.71	13.59	5.20	17.4	0.92	73	17.2	MW	

Analytical Parameters: DPVOA +10, MTBE, TBA, Naphthalene, Methane, Alkalinity, Chloride, Sulfate, Nitrate-Nitrogen, COD, Ammonia-Nitrogen, Carbon Dioxide, Ferrous Iron, Dissolved Mn, Total Iron, Total Mn

Sample Start Time: 13:10

Sample Finish Time: 1340

Weather Conditions: mostly sunny 40°

Revised 05.04

Low Flow Purging and Sampling
Ground Water Sampling Measurements and Calculations

WELL NUMBER	WELL INFORMATION					Date:
	Well Diameter (inches)	Total Depth* (ft)	Depth to Water (ft)	Depth to Product (ft)	PID (ppm)	Dewberry Personnel:
						Site Name:
						Site Location:
						Project Number:

* Use a previously determined Total Depth. Confirm the Total Depth of well after sampling.

PURGING INFORMATION						
Pump Type	Tubing Type	Pump Intake* Depth (ft)	Purge Start Time	Purge Stop Time	Flow Rate (ml/m)	Total Purge Vol. (gal)

* Pump Intake Depth is typically the midpoint of the saturated section of the well screen.

PURGING PARAMETERS (measurements are to be taken approximately every 5 minutes)										
Criteria:		0.3 ft	--	± 0.1 su	± 3%	± 10%	± 10 mv	± 10%		
Time	Flow Rate (ml/m)	Depth to Water (ft)	Temp (°C)	pH (su)	Cond (mS/cm)	D.O. (ppm)	Eh (mv)	Turbidity (NTU)	Initials	Water Conditions/Comments

SOIL GAS SAMPLING

SOP#: 2042
DATE: 06/01/96
REV. #: 0.0

1.0 SCOPE AND APPLICATION

Soil gas monitoring provides a quick means of waste site evaluation. Using this method, underground contamination can be identified, and the source, extent, and movement of the pollutants can be traced.

This standard operating procedure (SOP) outlines the methods used by U.S. EPA/ERT in installing soil gas wells; measuring organic vapor levels in the soil gas using a Photoionization Detector (PID), Flame Ionization Detector (FID) and/or other air monitoring devices; and sampling the soil gas using Tedlar bags, Tenax sorbent tubes, and/or Summa canisters.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

A 3/8" diameter hole is driven into the ground to a depth of four to five feet using a commercially available slam bar. Soil gas can also be sampled at other depths by the use of a longer bar or bar attachments. A 1/4" O.D. stainless steel probe is inserted into the hole. The hole is then sealed around the top of the probe using modeling clay. The gas contained in the interstitial spaces of the soil is sampled by pulling the sample through the probe using an air sampling pump. The sample may be stored in Tedlar bags, drawn through sorbent cartridges, or analyzed directly using a direct reading instrument. The air sampling pump is not used for Summa canister sampling of soil gas. Sampling is achieved by soil gas equilibration with the evacuated Summa canister.

Other field air monitoring devices, such as the combustible gas indicator (MSA CGI/02 Meter, Model 260) and the Organic Vapor Analyzer (Foxboro OVA, Model 128), can also be used dependent on specific site conditions. Measurement of soil temperature using a temperature probe may also be desirable. Bagged samples are usually analyzed in a field laboratory using a portable Photovac GC.

Power driven sampling probes may be utilized when soil conditions make sampling by hand unfeasible (i.e., frozen ground, very dense clays, pavement, etc.). Commercially available soil gas sampling probes (hollow, 1/2 = O.D. steel probes) can be driven to the desired depth using a power hammer (e.g., Bosch Demolition Hammer or Geoprobe™). Samples can be drawn through the probe itself, or through Teflon tubing inserted through the probe and attached to the probe point. Samples are collected and analyzed as described above.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

3.1 Tedlar Bags

Soil gas samples are generally contained in 1.0-L Tedlar bags. Bagged samples are best stored in dark plastic bags placed in coolers to protect the bags from any damage that may occur in the field or in transit. In addition, coolers insure the integrity of the samples by keeping them at a cool temperature and out of direct sunlight. Samples should be analyzed as soon as possible, preferably within 24 - 48 hours.

3.2 Tenax Tubes

Bagged samples can also be drawn onto Tenax or

other sorbent tubes to undergo lab GC/MS analysis. If Tenax tubes are to be utilized, special care must be taken to avoid contamination. Handling of the tubes should be kept to a minimum and only while wearing nylon or other lint-free gloves. After sampling, each tube should be stored in a clean, sealed culture tube; the ends packed with clean glass wool to protect the sorbent tube from breakage. The culture tubes should be kept cool and wrapped in aluminum foil to prevent any photodegradation of samples (see Section 7.4.).

3.3 Summa Canisters

The Summa canisters used for soil gas sampling have a 6 liter sample capacity and are certified clean by GC/MS analysis before being utilized in the field. After sampling is completed, they are stored and shipped in travel cases.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

4.1 PID Measurements

A number of factors can affect the response of a PID (such as the HNu PI 101). High humidity can cause lamp fogging and decreased sensitivity. This can be significant when soil moisture levels are high, or when a soil gas well is actually in groundwater. High concentrations of methane can cause a downscale deflection of the meter. High and low temperature, electrical fields, FM radio transmission, and naturally occurring compounds, such as terpenes in wooded areas, will also affect instrument response.

Other field screening instruments can be affected by interferences. Consult the manufacturers manuals.

4.2 FID Measurements

A number of factors can affect the response of an FID (such as the OVA model 128). High humidity can cause the FID to flame out or not ignite at all. This can be significant when soil moisture levels are high, or when a soil gas well is actually in groundwater. The FID can only read organic based compounds (they must contain carbon in the molecular structure). The FID also responds poorly to hydrocarbons and halogenated hydrocarbons (such as gasoline, propane fuel). High and low temperature, electrical fields and FM radio transmission will also affect instrument response.

4.3 Factors Affecting Organic Concentrations in Soil Gas

Concentrations in soil gas are affected by dissolution, adsorption, and partitioning. Partitioning refers to the ratio of component found in a saturated vapor above an aqueous solution to the amount in the solution; this can, in theory, be calculated using the Henry's Law constants. Contaminants can also be adsorbed onto inorganic soil components or "dissolved" in organic components. These factors can result in a lowering of the partitioning coefficient.

Soil "tightness" or amount of void space in the soil matrix, will affect the rate of recharging of gas into the soil gas well.

Existence of a high, or perched, water table, or of an impermeable underlying layer (such as a clay lens or layer of buried slag) may interfere with sampling of the soil gas. Knowledge of site geology is useful in such situations, and can prevent inaccurate sampling.

4.4 Soil Probe Clogging

A common problem with this sampling method is soil probe clogging. A clogged probe can be identified by using an in-line vacuum gauge or by listening for the sound of the pump laboring. This problem can usually be eliminated by using a wire cable to clear probe (see Section 7.1.3.).

4.5 Underground Utilities

Prior to selecting sample locations, an underground utility search is recommended. The local utility companies can be contacted and requested to mark the locations of their underground lines. Sampling plans can then be drawn up accordingly. Each sample location should also be screened with a metal detector or magnetometer to verify that no underground pipes or drums exist.

5.0 EQUIPMENT/APPARATUS

5.1 Slam Bar Method

- Slam Bar (1 per sampling team).
- Soil gas probes, stainless steel tubing, 1/4" O.D., 5 ft length.
- Flexible wire or cable used for clearing the

tubing during insertion into the well.

- C "Quick Connect" fittings to connect sampling probe tubing, monitoring instruments, and Gilian pumps to appropriate fittings on vacuum box.
- C Modeling clay.
- C Vacuum box for drawing a vacuum around Tedlar bag for sample collection (1 per sampling team).
- C Gilian pump Model HFS113A adjusted to approximately 3.0 L/min (1 to 2 per sample team).
- C 1/4" Teflon tubing, 2 ft to 3 ft lengths, for replacement of contaminated sample line.
- C 1/4" Tygon tubing, to connect Teflon tubing to probes and quick connect fittings.
- C Tedlar bags, 1.0 L, at least 1 bag per sample point.
- C Soil Gas Sampling labels, field data sheets, logbook, etc.
- C PID/FID, or other field air monitoring devices, (1 per sampling team).
- C Ice chest, for carrying equipment and for protection of samples (2 per sampling team).
- C Metal detector or magnetometer, for detecting underground utilities/pipes/drums (1 per sampling team).
- C Photovac GC, for field-lab analysis of bagged samples.
- C Summa canisters (plus their shipping cases) for sample, storage and transportation.
- C Large dark plastic garbage bags

5.2 Power Hammer Method

- C Bosch demolition hammer.
- C 1/2" O.D. steel probes, extensions, and points.
- C Dedicated aluminum sampling points.
- C Teflon tubing, 1/4".
- C "Quick Connect" fittings to connect sampling probe tubing, monitoring instruments, and Gilian pumps to appropriate fittings on vacuum box.
- C Modeling clay.
- C Vacuum box for drawing a vacuum around Tedlar bag for sample collection (1 per sampling team).
- C Gilian pump Model HFS113A adjusted to approximately 3.0 L/min (1 to 2 per sample team).
- C 1/4" Teflon tubing, 2 ft to 3 ft lengths, for replacement of contaminated sample line.
- C 1/4" Tygon tubing, to connect Teflon tubing to probes and quick connect fittings.
- C Tedlar bags, 1.0 L, at least 1 bag per sample point.
- C Soil Gas Sampling labels, field data sheets, logbook, etc.
- C HNu Model P1101, or other field air monitoring devices, (1 per sampling team).
- C Ice chest, for carrying equipment and for protection of samples (2 per sampling team).
- C Metal detector or magnetometer, for detecting underground utilities/pipes/drums (1 per sampling team).
- C Photovac GC, for field-lab analysis of bagged samples.
- C Summa canisters (plus their shipping cases) for sample, storage and transportation.
- C Generator w/extension cords.
- C High lift jack assembly for removing probes.

5.3 Geoprobe™ Method

The Geoprobe is a hydraulically-operated sampling device mounted in a customized four-wheel drive vehicle. The sampling device can be deployed from the truck and positioned over a sample location. The base of the sampling device is positioned on the ground. The weight of the vehicle is hydraulically raised on the base. As the weight of the vehicle is transferred to the probe, the probe is pushed into the ground. A built-in hammer mechanism allows the probe to be driven past some dense stratigraphic horizons. When the probe reaches the sample depth, up to 50 feet under favorable geologic situations, samples can be collected.

Soil gas can be collected from specific depths in two general ways. One method involves withdrawing a sample directly from the probe rods, after evacuating a sufficient volume of air from the probe rods. The other method involves collecting a sample through tubing attached by an adaptor to the bottom probe rod section. Correctly used, this method provides more reliable results. Manufacturer's instructions and the SOP for the Model 5400 Geoprobe™ Operation should be followed when using this method.

6.0 REAGENTS

- C PID/FID or calibration gases for field air monitoring devices (such as methane and

isobutylene).

- Deionized organic-free water, for decontamination.
- Methanol, HPLC grade, for decontamination.
- Ultra-zero grade compressed air, for field blanks.
- Standard gas preparations for Photovac GC calibration and Tedlar bag spikes.
- Propane Torch (for decontamination of steel probes)

7.0 PROCEDURES

7.1 Soil Gas Well Installation

1. Initially a hole slightly deeper than the desired depth is made. For sampling up to 5 feet, a 5-ft single piston slam bar is used. For deeper depths, a piston slam bar with threaded 4-foot-long extensions can be used. Other techniques can be used, so long as holes are of narrow diameter and no contamination is introduced.

2. After the hole is made, the slam bar is carefully withdrawn to prevent collapse of the walls of the hole. The soil gas probe is then inserted.

3. It is necessary to prevent plugging of the probe, especially for deeper holes. A metal wire or cable, slightly longer than the probe, is placed in the probe prior to inserting into the hole. The probe is inserted to full depth, then pulled up three to six inches, then cleared by moving the cable up and down. The cable is removed before sampling.

4. The top of the sample hole is sealed at the surface against ambient air infiltration by using modeling clay molded around the probe at the surface of the hole.

5. If conditions preclude hand installation of the soil gas wells, the power driven system may be employed. The generator powered demolition hammer is used to drive the probe to the desired depth (up to 12 Ft may be attained with extensions). The probe is pulled up 1-3 inches if the retractable point is used. No clay is needed to seal the hole. After sampling, the probe is retrieved using the high lift jack assembly.

6. If semi-permanent soil gas wells are required, the dedicated aluminum probe points are used. These points are inserted into the bottom of the power driven probe and attached to the Teflon tubing. The probe is inserted as in step 5. When the probe is removed, the point and Teflon tube remain in the hole, which may be sealed by backfilling with clean sand, soil, or bentonite.

7.2 Screening with Field Instruments

1. The well volume must be evacuated prior to sampling. Connect the Gilian pump, adjusted to 3.0 L/min, to the sample probe using a section of Teflon tubing as a connector. The pump is turned on, and a vacuum is pulled through the probe for approximately 15 seconds. Longer time is required for sample wells of greater depths.

2. After evacuation, the monitoring instrument(s) (i.e. HNu or OVA) is connected to the probe using a Teflon connector. When the reading is stable, or peaks, the reading is recorded on soil gas data sheets.

3. Of course, readings may be above or below the range set on the field instruments. The range may be reset, or the response recorded as a greater than or less than figure. Recharge rate of the well with soil gas must be considered when resampling at a different range setting.

7.3 Tedlar Bag Sampling

1. Follow step 7.2.1 to evacuate well volume. If air monitoring instrument screening was performed prior to sample taking, evacuation is not necessary.

2. Use the vacuum box and sampling train (Figure 1) to take the sample. The sampling train is designed to minimize the introduction of contaminants and losses due to adsorption. All wetted parts are either Teflon or stainless steel. The vacuum is drawn indirectly to avoid contamination from sample pumps.

3. The Tedlar bag is placed inside the vacuum box, and attached to the sampling port. The sample probe is attached to the sampling port via Teflon tubing and a "Quick Connect" fitting.

4. A vacuum is drawn around the outside of the bag, using a Gilian pump connected to the vacuum box evacuation port, via Tygon tubing and a "Quick Connect" fitting. The vacuum causes the bag to inflate, drawing the sample.

5. Break the vacuum by removing the Tygon line from the pump. Remove the bagged sample from the box and close valve. Record data on data sheets or in logbooks. Record the date, time, sample location ID, and the PID/FID instrument reading(s) on sample bag label.

CAUTION: Labels should not be pasted directly onto the bags, nor should bags be labeled directly using a marker or pen. Inks and adhesive may diffuse through the bag material, contaminating the sample. Place labels on the edge of the bags, or tie the labels to the metal eyelets provided on the bags. Markers with inks containing volatile organics (i.e., permanent ink markers) should not be used.

Chain of Custody Sheets must accompany all samples submitted to the field laboratory for analysis.

7.4 Tenax Tube Sampling

Samples collected in Tedlar bags may be adsorbed onto Tenax tubes for further analysis by GC/MS.

7.4.1 Additional Apparatus

A. Syringe with a luer-lock tip capable of drawing a soil gas or air sample from a Tedlar bag onto a Tenax/CMS sorbent tube. The syringe capacity is dependent upon the volume of sample begin drawn onto the sorbent tube.

B. Adapters for fitting the sorbent tube between the Tedlar bag and the sampling syringe. The adapter attaching the Tedlar bag to the sorbent tube consists of a reducing union (1/4" to 1/16" O.D. -- Swagelok cat. # SS-400-6-ILV or equivalent) with a length of 1/4" O.D. Teflon tubing replacing the nut on the 1/6" (Tedlar bag) side. A 1/4" I.D. silicone O-ring replaces the ferrules in the nut on the 1/4" (sorbent tube) side of the union.

The adapter attaching the sampling syringe to the sorbent tube consists of a reducing union (1/4" to 1/16" O.D. -- Swagelok Cat. # SS-400-6-ILV or equivalent) with a 1/4" I.D. silicone O-ring replacing the ferrules in the nut on the 1/4" (sorbent tube) side and the needle of a luer-lock syringe needle inserted into the 1/16" side. (Held in place with a 1/16" ferrule.) The luer-lock end of the needle can be attached to the sampling syringe. It is useful to have a luer-lock on/off valve situated between the syringe and the needle.

C. Two-stage glass sampling cartridge (1/4" O.D. x 1/8" I.D. x 5 1/8") contained in a flame-sealed tube (Manufacturer: Supelco Custom Tenax/Spherocarb Tubes) containing two sorbent sections retained by glass wool:

Front section: 150 mg of Tenax-GC
Back section: 150 mg of CMS (Carbonized Molecular Sieve)

These tubes are prepared and cleaned in accordance with EPA Method EMSL/RTP-SOP-EMD-013 by the vendor. The vendor sends ten tubes per lot made to the REAC GC/MS Laboratory and they are tested for cleanliness, precision, and reproductability.

D. Teflon-capped culture tubes or stainless steel tube containers for sorbent tube storage and shipping. These containers should be conditioned by baking at 120 degrees C for at least two hours. The culture tubes should contain a glass wool plug to prevent sorbent tube breakage during transport. Reconditioning of the containers should occur between uses or after extended periods of disuse (i.e., two weeks or more).

E. Nylon gloves or lint-free cloth. (Hewlett Packard Part # 8650-0030 or equivalent.)

7.4.2 Sample Collection

Handle sorbent tubes with care, using nylon gloves (or other lint-free material) to avoid contamination.

Immediately before sampling, break one end of the sealed tube and remove the Tenax cartridge.

Connect the valve on the Tedlar bag to the sorbent tube adapter. Connect the sorbent tube to the sorbent tube adapter with the Tenax (white granular) side of the tube facing the Tedlar bag. Connect the sampling syringe assembly to the CMS (black) side of the sorbent tube. Fittings on the adapters should be finer-tight. Open the valve on the Tedlar bag. Open the on/off valve of the sampling syringe. Depending on work plan stipulations, at least 10% of the soil gas samples analyzed by this GC method must be submitted for confirmational GC/MS analysis (according to modified methods TO-1 [Tenax absorbent] and TO-2 [Carbon Molecular Sieve (CMS) absorbent]). Each soil gas sample must be absorbed on replicate Tenax/CMS tubes. The volume absorbed on a Tenax/CMS tube is dependent on the total concentration of the compounds measured by the photovac/GC or other applicable GC:

Total Concentration (ppm)	Sample Volume (mL)
>10	Use Serial Dilution
10	10 - 50
5	20-100
1	100-250

After sampling, remove the tube from the sampling train with gloves or a clean cloth. DO NOT LABEL OR WRITE ON THE TENAX/CMS TUBE.

Place the sorbent tube in a conditioned stainless steel tube holder or culture tube. Culture tube caps should be sealed with Teflon tape.

7.4.3 Sample Labeling

Each sample tube container (not tube) must be labeled with the site name, sample station number, date sampled, and volume sampled.

Chain of custody sheets must accompany all samples to the laboratory.

7.4.4 Quality Assurance (QA)

Before field use, a QA check should be performed on each batch of sorbent tubes by analyzing a tube by thermal desorption/cryogenic trapping GC/MS.

At least one blank sample must be submitted with each set of samples collected at a site. This trip blank must be treated the same as the sample tubes except no sample will be drawn through the tube.

Sample tubes should be stored out of UV light (i.e., sunlight) and kept on ice until analysis. Samples should be taken in duplicate, when possible.

7.5 Summa Canister Sampling

1. Follow step 7.2.1 to evacuate well volume. If PID/FID readings were taken prior to taking a sample, evacuation is not necessary.

2. Attach a certified clean, evacuated 6-liter Summa canister via the 1/4" Teflon tubing.

3. Open valve on Summa canister. The soil gas sample is drawn into the canister by pressure equilibration. The approximate sampling time for a 6 liter canister is 20 minutes.

4. Site name, sample location, number, and date must be recorded on a chain of custody form and on a blank tag attached to the canister.

8.0 CALCULATIONS

8.1 Field Screening Instruments

Instrument readings are usually read directly from the meter. In some cases, the background level at the soil gas station may be subtracted:

Final Reading = Sample Reading - Background

8.2 Photovac GC Analysis

Calculations used to determine concentrations of individual components by Photovac GC analysis are beyond the scope of this SOP and are covered in ERT SOP #2109, *Photovac GC Analysis for Soil Water and Air/Soil Gas.*

9.0 CALIBRATION

9.1 Field Instruments

It is recommended that the manufacturers' manuals be consulted for correct use and calibration of all instrumentation.

9.2 Gilian Model HFS113A Air Sampling Pumps

Flow should be set at approximately 3.0 L/min; accurate flow adjustment is not necessary. Pumps should be calibrated prior to bringing into the field.

10.0 QUALITY ASSURANCE/ QUALITY CONTROL

10.1 Sample Probe Contamination

Sample probe contamination is checked between each sample by drawing ambient air through the probe via a Gilian pump and checking the response of the FID/PID. If readings are higher than background, replacement or decontamination is necessary.

Sample probes may be decontaminated simply by drawing ambient air through the probe until the HNu reading is at background. More persistent contamination can be washed out using methanol and water, then air drying. For persistent volatile contamination, use of a portable propane torch may be needed. Using a pair of pliers to hold the probe, run the torch up and down the length of the sample probe for approximately 1-2 minutes. Let the probe cool before handling. When using this method, make sure to wear gloves to prevent burns. Having more than one probe per sample team will reduce lag times between sample stations while probes are decontaminated.

10.2 Sample Train Contamination

The Teflon line forming the sample train from the probe to the Tedlar bag should be changed on a daily basis. If visible contamination (soil or water) is drawn into the sampling train, it should be changed immediately. When sampling in highly contaminated areas, the sampling train should be purged with ambient air, via a Gilian pump, for approximately 30 seconds between each sample. After purging, the sampling train can be checked using an FID or PID, or other field monitoring device, to establish the cleanliness of the Teflon line.

10.3 FID/PID Calibration

The FID and PIDs should be calibrated at least once a day using the appropriate calibration gases.

10.4 Field Blanks

Each cooler containing samples should also contain one Tedlar bag of ultra-zero grade air, acting as a field blank. The field blank should accompany the samples in the field (while being collected) and when they are delivered for analysis. A fresh blank must be provided to be placed in the empty cooler pending additional sample collection. One new field blank per cooler of samples is required. A chain of custody sheet must accompany each cooler of samples and should include the blank that is dedicated to that group of samples.

10.5 Trip Standards

Each cooler containing samples should contain a Tedlar bag of standard gas to calibrate the analytical instruments (Photovac GC, etc.). This trip standard will be used to determine any changes in concentrations of the target compounds during the course of the sampling day (e.g., migration through the sample bag, degradation, or adsorption). A fresh trip standard must be provided and placed in each cooler pending additional sample collection. A chain of custody sheet should accompany each cooler of samples and should include the trip standard that is dedicated to that group of samples.

10.6 Tedlar Bag Check

Prior to use, one bag should be removed from each lot (case of 100) of Tedlar bags to be used for sampling and checked for possible contamination as follows: the test bag should be filled with ultra-zero grade air; a sample should be drawn from the bag and analyzed via Photovac GC or whatever method is to be used for sample analysis. This procedure will ensure sample container cleanliness prior to the start of the sampling effort.

10.7 Summa Canister Check

From each lot of four cleaned Summa canisters, one is to be removed for a GC/MS certification check. If the canister passes certification, then it is re-evacuated and all four canisters from that lot are available for sampling.

If the chosen canister is contaminated, then the entire lot of four Summas must be recleaned, and a single canister is re-analyzed by GC/MS for certification.

10.8 Options

10.8.1 Duplicate Samples

A minimum of 5% of all samples should be collected in duplicate (i.e., if a total of 100 samples are to be collected, five samples should be duplicated.) In choosing which samples to duplicate, the following criteria applies: if, after filling the first Tedlar bag, and, evacuating the well for 15 seconds, the second HN (or other field monitoring device being used) reading matches or is close to (within 50%) the first reading, a duplicate sample may be taken.

10.8.2 Spikes

A Tedlar bag spike and Tenax tube spike may be desirable in situations where high concentrations of contaminants other than the target compounds are found to exist (landfills, etc.). The additional level of QA/QC attained by this practice can be useful in determining the effects of interferences caused by these non-target compounds. Summa canisters containing samples are not spiked.

11.0 DATA VALIDATION

11.1 Blanks (Field and Tedlar Bag Check)

For each target compound, the level of concentration found in the sample must be greater than three times the level (for that compound) found in the field blank which accompanied that sample to be considered valid. The same criteria apply to target compounds detected in the Tedlar bag pre-sampling contamination check.

12.0 HEALTH AND SAFETY CONSIDERATIONS

Due to the remote nature of sampling soil gas, special considerations can be taken with regard to health and safety. Because the sample is being drawn from underground, and no contamination is introduced into the breathing zone, soil gas sampling usually occurs in Level D. Ambient air is constantly monitored using the HNu PI101 to obtain background readings during the sampling procedure. As long as the levels in ambient air do not rise above background, no upgrade of the level of protection is needed.

When conducting soil gas sampling, leather gloves should be worn, and proper slam bar techniques should be implemented (bend knees). Also, an underground utility search should be performed prior to sampling. (See Section 4.5).

13.0 REFERENCES

Gilian Instrument Corp., Instruction Manual for Hi Flow Sampler: HFS113, HFS 113 T, HFS 113U, HFS 113 UT, 1983.

HNu Systems, Inc., Instruction Manual for Model PI 101 Photoionization Analyzer, 1975.

N.J.D.E.P., Field Sampling Procedures Manual, Hazardous Waste Programs, February, 1988.

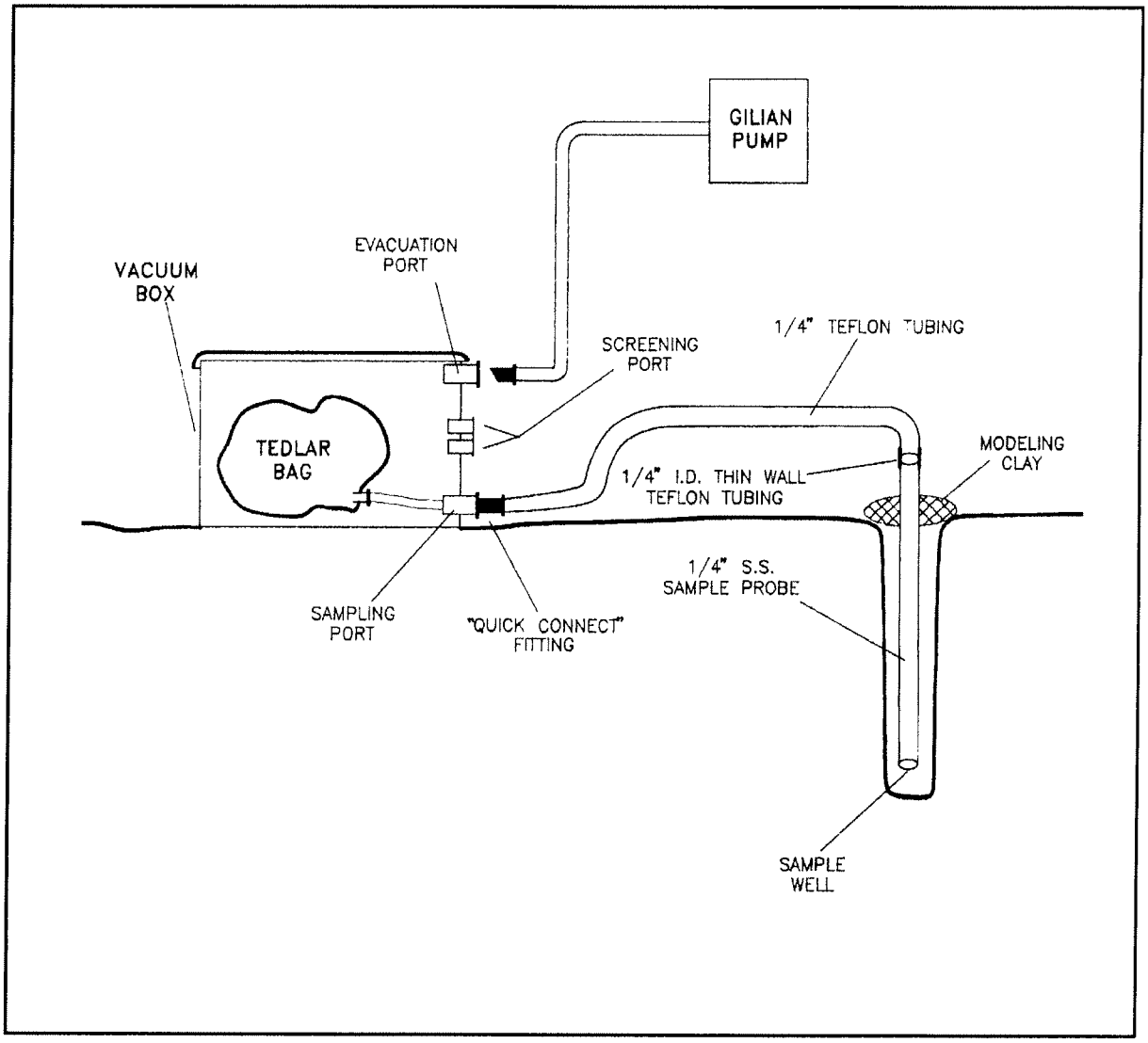
Roy F. Weston, Inc., Weston Instrumentation Manual, Volume I, 1987.

U.S.E.P.A., Characterization of Hazardous Waste Sites - A Methods Manual: Volume II, Available Sampling Methods, 2nd Edition, EPA-600/4-84-076, December, 1984.

APPENDIX A

Figure

FIGURE 1. Sampling Train Schematic



APPENDIX B

HNu Field Protocol

Field Procedure

The following sections detail the procedures that are to be followed when using the HNu in the field.

Startup Procedure

a. Before attaching the probe, check the function switch on the control panel to ensure that it is in the off position. Attach the probe by plugging it into the interface on the top of the readout module. Use care in aligning the prongs in the probe cord with the plug in; don't force.

b. Turn the function switch to the battery check position. The needle on the meter should read within or above the green battery are on the scale. If not, recharge the battery. If the red indicator light comes on, the battery needs recharging.

c. Turn the function switch to any range setting. Look into the end of the probe for no more than two to three seconds to see if the lamp is on. If it is on, it will give a purple glow. Do not stare into the probe any longer than three seconds. Long term exposure to UV light can damage eyes. Also, listen for the hum of the fan motor.

d. To ZERO the instrument, turn the function switch to the standby position and rotate the zero adjustment until the meter reads zero. A calibration gas is not needed since this is an electronic zero adjustment. If the span adjustment setting is changed after the zero is set, the zero should be rechecked and adjusted, if necessary. Wait 15 to 20 seconds to ensure that the zero reading is stable. If necessary, readjust the zero.

Operational Check

a. Follow the startup procedure.

b. With the instrument set on the 0-20 range, hold a solvent-based major market near the probe tip. If the meter deflects upscale, the instrument is working.

Field Calibration Procedure

a. Follow the startup procedure and the operational check.

b. Set the function switch to the range setting for the concentration of the calibration gas.

c. Attach a regulator (HNu 101-351) to a disposable cylinder of isobutylene gas (HNu 101-351). Connect the regulator to the probe of the HNu with a piece of clean Tygon tubing. Turn on the value on the regulator.

d. After fifteen seconds, adjust the span dial until the meter reading equals the concentration of the calibration gas used. Be careful to unlock the span dial before adjusting it. If the span has to be set below 3.0, calibration internally or return to equipment maintenance for repair.

e. Record in the field logbook: the instrument ID no. (EPA decal or serial number if the instrument is a rental); the initial and final span settings; the date and time; concentration and type of calibration has used; and the name of the person who calibrated the instrument.

Operation

a. Follow the startup procedure, operational check, and calibration check.

b. Set the function switch to the appropriate range. If the concentration of gases or vapors is unknown, set the function switch to the 0-20 ppm range. Adjust it if necessary.

c. While taking care not to permit the HNu to be exposed to excessive moisture, dirt, or contamination, monitor the work activity as specified in the Site Health and Safety Plan.

d. When the activity is completed or at the end of the day, carefully clean the outside of the HNu with a damp disposable towel to remove any visible dirt. Return the HNu to a secure area and place on charge.

e. With the exception of the probe's inlet and exhaust, the HNu can be wrapped in clear plastic to prevent it form becoming contaminated and to prevent water from getting inside in the event of precipitation.

STANDARD OPERATING PROCEDURE FOR CHAIN OF CUSTODY OF SAMPLES

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Revision Page

Date	Rev#	Summary of Changes	Sections
	1	Initial Approval	

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Attachments:

A.	Chain of custody form	X
B.	*Field data card and sample tag*	X

1.0 Scope & Application:

1.1 This Standard Operating Procedure is applicable to the sample control procedures used for chain of custody of representative samples collected from various locations. It includes samples collected from both ambient and source locations.

1.2 A sample is physical evidence collected from a facility or from the environment. An essential part of all enforcement investigations is that evidence gathered be controlled. To accomplish this, the following sample identification and chain of custody procedures are established.

2.0 Summary of Method:

2.1 The method of sample identification depends on the type of measurement or analyses performed. When in-situ measurements are made, the data are recorded directly in logbooks or Field Data Cards with identifying information, field observations, and remarks. Examples of in-situ measurements are pH, temperature, D.O., conductivity, and flow measurement. Samples other than in-situ measurements, are identified by a sample tag or label. These samples are removed from the sample location and transported to a laboratory for analyses. Before removal, however, a sample is often separated into portions depending upon the analyses to be performed. Each portion is preserved in accordance with applicable procedures and each sample container is identified by a sample tag / label.

2.2 Sample tags / labels shall be completed for each sample, using waterproof ink, unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because a ball point pen would not function in freezing weather. The information recorded on the sample tag/label includes:

Station Number - a number assigned by the project coordinator
Date - a six digit number indicating the year, month, day of collection
Time - a four digit number indicating military time of collection. e.g. 0954
Station Location - sampling station description
Samplers - each sampler is identified
Sample Number - a unique sample # established from the Field Data Card for each set of samples collected at one time and place
Parameter/pres. - the analysis to be conducted for the sample /sample preservation
Remarks - the samplers record pertinent observations affecting analyses, if any

2.3 A Field Data Card which assigns a unique number to each set of samples. must be completed for each sampling event. The field data card used for samples contains an appropriate place for designating the sample as a grab or a composite. and identifying the type of sample collected for analyses.

2.4 Due to the evidentiary nature of samples collected during enforcement investigations, possession must be traceable from the time the samples are collected until they are introduced as evidence inn legal proceedings. To maintain and document sample possession, chain of custody procedures are followed. A sample is under custody if:
- It is in your possession, or
- It is in your view, after being in your possession, or
- It was in your possession and then you then locked it up to prevent tampering, or
- It is in a designated secure area.

2.5 In collecting samples for evidence, collect only that number which provides a good representation of the media being sampled. To the extent possible, the quantity and types of samples and sample locations are determined prior to actual field work. As few people as possible should handle samples. The field sampler is personally responsible for the care and custody of the samples collected until they are transferred or dispatched properly.

2.6 Samples are accompanied by a chain of custody record. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the analyst at the laboratory. The samples are typically transferred to the sample receiving custodian at the laboratory.

3.0 Definitions:

3.1 **Bottle Blank: Analyte-free water is collected into a sample container, of the same lot as the containers used for the environmental samples. This evaluates contamination introduced from the sample container(s) from a common lot.**

3.2 Equipment/Rinse/Rinsate Blanks: A sample that is collected by pouring over or running analyte-free water through the sample collection equipment after decontamination and before sample collection. The sample is collected in the appropriate sample container with the proper preservative, identical to the samples. This represents background contamination resulting from the field equipment, sampling procedure, sample container, preservative, and shipment.

3.3 Field Blank: In the field, analyte-free water is collected into a sample container with preservatives. The sample containers are the same lot used for the environmental samples. This evaluates contamination introduced from the sample container(s) with applicable preservatives. Field blanks are not used for volatile samples.

3.4 Field Replicates Duplicates: Two or more samples collected at the same sampling

location. Field replicates should be samples collected side by side or by collecting one sample and immediately collecting the second sample. Field replicates represent the precision of the whole method, site heterogeneity, field sampling and the laboratory analysis.

3.5 Field Split Samples: Two or more representative subsamples taken from one environmental sample in the field. Prior to splitting, the environmental sample is homogenized to correct for sample heterogeneity that would adversely impact data comparability. Field split samples are usually analyzed by different laboratories (interlaboratory comparison) or by the same laboratory (intralaboratory comparison). Field splits are used to assess sample handling procedures from field to laboratory and laboratory's comparability.

3.6 Filter Blank: In the field, analyze-free water is passed through a filter and collected into in the appropriate sample container. The filter blank is then preserved. This procedure is identical to the sample collection.

3.7 Laboratory Quality Samples: Additional samples will be collected for the laboratory's quality control: matrix spike, matrix spike duplicate, laboratory duplicates, etc.

3.8 **Proficiency Testing (PT)/Performance Evaluation Sample (PES): A sample, the composition of which is unknown to the laboratory or analyst, provided to the analyst or laboratory to assess the capability to produce results within acceptable criteria.** This is optional depending on the data quality objectives.

3.9 Shipping Container Temperature Blank: A water sample that is transported to the laboratory to measure the temperature of the samples in the cooler.

4.0 Trip Blanks: A sample collected at the laboratory using analyte free water in the appropriate sample container with the proper preservative, taken out to the field, and returned to the laboratory for analysis without being opened. Trip blanks are generally for volatile organic compounds, low level metals, and gasoline range hydrocarbon samples. Used to assess contamination introduced during sample transport.

4.0 Health and Safety Warnings:

4.1 When working with potentially hazardous materials or situations, follow EPA, OSHA, and specific health or safety procedures.

4.2 All proper personal protection clothing and equipment is to be worn.

4.3 When sampling lagoons or surface impoundments containing known or suspected

hazardous substances, take adequate precautions. The sampling team member collecting the sample should not get too close of the edge of the impoundment, where bank failure may cause them to lose their balance.

4.4 Follow the Boat Safety SOP when conducting sampling from a boat.

4.5 Some samples may contain biological and chemical hazards. These samples should be handled with suitable protection to skin, eyes, etc.

5.0 Interferences:

5.1 Interference may result from using contaminated equipment, **solvents, reagents, sample container**, or sampling in a disturbed area.

5.2 Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of the sampling equipment is necessary.

5.3 All sampling equipment must be routinely demonstrated to be free from contaminants under the conditions of the analysis by running equipment blanks.

6.0 Personnel Qualifications:

6.1 All field samplers working at Superfund sites are required to take a 40 hour health and safety training course and a refresher course prior to engaging in any field activities.

6.2 The field sampler should be trained by an experienced sampler before initiating the procedure.

6.3 All personnel shall be responsible for complying with all quality assurance/quality control requirements that pertain to their organizational/technical function.

7.0 Equipment and Supplies:

7.1 log book, field data cards, custody seals, and chain of custody form

7.2 Zip lock plastic bags, large plastic bags, tape

7.3 Cooler(s) or other container(s) for securing samples

7.4 Padlock(s) (optional)

8.0 Sample Collection:

8.1 Sample control procedures, chain of custody procedures, are used in the collection of any type of samples. The level of control is strict for enforcement (evidence) samples and may be less for screening samples or water quality type samples.

8.2 The above (section 2.1 to 2.6) section address chain of custody procedures for enforcement type samples. Enforcement samples will also have custody seals placed on each individual sample container. Any automatic composite sampler will be secured with custody seals or padlocks to control access to the sample during collection.

8.3 All samples must have a unique field sample number that will identify it with a specific collection location/date/time and cannot be reused for the project. The field sample numbers may be generated during planning/preparation for the sampling or during sampling and can consist of up to 12 characters.

8.4 The sample containers may be pre-labeled (sample tagged) before sample collection or labeled (sample tagged) immediately after collection. The sample identification can consist of sample tags, labels, or indelible writing directly on the sample container. The required identifying sample information for any sample are:
-unique field sample number
-parameter(s) to be analyzed and sample preservation
-date & time of sample collection
-station number / location
-samplers

8.5 A chain of custody form will be used to transfer custody of samples to the laboratory. The form used may be as identified in the attachment or other chain of custody forms provided the same in formation is provided. Any alternative form used must at a minimum have a unique field sample number identifying each sample to be analyzed, parameter for analyses, sample collection date & time, sampler, custody transfer signature area.

9.0 Sample Handling, Preservation, and Storage:

9.1 Transfer the sample or collect directly a suitable labeled sample container.

9.2 Preserve the sample or use pre-preserved sample bottles, when appropriate.

9.3 Cap the container, use a custody seal if the sample is for enforcement and then place the container in a zip-lock plastic bag.

9.4 Place sample containers into cooler(s) ensuring that the bottles are in the ice but not totally immersed in water. Samples not requiring refrigeration do not need to be placed on ice.

9.5 Record all pertinent data in the logbook and on the field data card or sheet.

9.6 Complete the chain of custody form.

9.7 Samples may require short term storage in field locations prior to delivery to the laboratory for analyses. The storage may be in vehicles or lodging locations. The samples must be secured to limit access to them. A locked vehicle is considered controlled access. However, simply a locked lodging room is not secure due to potential custodial access. If an unattended lodging room is used for sample storage, the samples must be further secured. This may entail a padlock on the ice chest, samples in an ice chest secured in an inner bag with a custody seal on it, Ice chest taped shut with custody seal on the outside of it.

9.7 Attach the custody seals to the cooler prior to shipment if for investigation or shipment to another laboratory. If the samples are shipped, put the chain of custody form in a Zip-lock bag and tape to the inside cover of the cooler. Samples must be packaged to prevent breakage and leakage of any melted ice from the shipping container. The chain of custody form should have the courier name listed as receiving the samples for transport, however there will be no signature from the courier.

9.8 A list for the laboratory's containers and preservatives for the various analytes is located on the EPA Region 1 homepage under OEME.

9.10 Whenever samples are split with a source or other government agency, a separate chain of custody form should be completed for the samples and the relinquisher (sampler) and recipient should sign. If a representative is unavailable or refuses to sign for the samples, this can be noted in the "remarks" area of the form . When appropriate, as in the case where the representative is unavailable, the custody record should contain a statement that the samples were delivered to the designated location at the designated time. A copy of the chain of custody form for split samples must be kept with the project file.

10.0 Data and Records Management:

10.1 All data and information is to follow the Field Data Management SOP.

10.2 The chain of custody form is signed over to the laboratory. A copy is kept with the

sampling records.

10.3 The sampling data is stored at US EPA - NE, 11 Technology Dr, North Chelmsford, MA for at least 3 years.

11.0 Quality Control and Quality Assurance:

11.1 Representative samples are required. The sampler will evaluate the site specific conditions to assure the sample will be representative.

11.2 All sampling equipment must be decontaminated prior to use and after each discrete sample following the General Field Equipment - Cleaning, Preparation, and Decontamination SOP.

11.23 All field QC samples requirements in the SAP or QAPP must be followed. These may involve trip blanks, equipment blanks, field duplicates and the collection of extra samples for the laboratory's quality control.

12.0 Waste Management and Pollution Prevention:

12.1 During field sampling and analysis events there may be hazardous waste produced from the sample collection. The waste must be handled and disposed of in accordance with federal, state, and municipal regulations. Dispose of the hazardous waste produced at the site where the work was performed, if the operating site has proper disposal available. If there is no disposal that meets regulatory requirements, the waste must be transported back to EPA-NE and transferred to the hazardous waste manager for disposal. The sample volume should be minimized to reduce unnecessary waste.

12.2 This SOP for sample chain of custody will not generate any waste

U. S. EPA ENVIRONMENTAL RESPONSE TEAM

STANDARD OPERATING PROCEDURES

SOIL SAMPLING

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SUPERCEDES: SOP #2012; Revision 0.0; 11/16/94; U.S. EPA Contract 68-C4-0022.

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Sampling depths are assumed to be those that can be reached without the use of a drill rig, direct-push, or other mechanized equipment (except for a back-hoe). Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the actual procedures used should be documented and described in an appropriate site report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction. The amount of sample to be collected and proper sample container type are discussed in ERT/REAC SOP #2003 Rev. 0.0 08/11/94, *Sample Storage, Preservation and Handling.*

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary potential problems associated with soil sampling - cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT

Soil sampling equipment includes the following:

- Maps/plot plan
- Safety equipment, as specified in the site-specific Health and Safety Plan
- Survey equipment or global positioning system (GPS) to locate sampling points
- Tape measure
- Survey stakes or flags
- Camera and film
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- Appropriate size sample containers
- Ziplock plastic bags
- Logbook
- Labels
- Chain of Custody records and custody seals
- Field data sheets and sample labels
- Cooler(s)
- Ice
- Vermiculite
- Decontamination supplies/equipment
- Canvas or plastic sheet
- Spade or shovel
- Spatula
- Scoop
- Plastic or stainless steel spoons
- Trowel(s)
- Continuous flight (screw) auger
- Bucket auger
- Post hole auger
- Extension rods
- T-handle
- Sampling trier
- Thin wall tube sampler
- Split spoons
- Vehimeyer soil sampler outfit
  - Tubes
  - Points
  - Drive head
  - Drop hammer
  - Puller jack and grip
- Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in ERT/REAC SOP #2006 Rev. 0.0 08/11/94, *Sampling Equipment Decontamination*, and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.
2. Obtain necessary sampling and monitoring equipment.
3. Decontaminate or pre-clean equipment, and ensure that it is in working order.
4. Prepare schedules and coordinate with staff, client, and regulatory agencies, if appropriate.
5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.
6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant, should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations should be utility-cleared by the property owner or the On-Scene-Coordinator (OSC) prior to soil sampling; and utility clearance should always be confirmed before beginning work.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material is removed to the required depth and a stainless steel or plastic scoop is then used to collect the sample.

This method can be used in most soil types but is limited to sampling at or near the ground surface. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A flat, pointed mason trowel to cut a block of the desired soil is helpful when undisturbed profiles are required. Tools plated with chrome or other materials should not be used. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery because they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of approximately three feet.

The following procedure is used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from the hole. When sampling directly from the auger, collect the sample after the auger is removed from the hole and proceed to Step 10.

5. Remove auger tip from the extension rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Do not scrape the borehole sides. Avoid hammering the rods as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable state regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure is used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

3. Slowly withdraw the trier, making sure that the slot is facing upward.

4. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

Split spoon sampling is generally used to collect undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should

be performed in accordance with ASTM D1586-98, "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".

The following procedures are used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.

2. Place the sampler in a perpendicular position on the sample material.

3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.

4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.

5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler is typically available in 2 and 3 1/2 inch diameters. A larger barrel may be necessary to obtain the required sample volume.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

A backhoe can be used to remove sections of soil, when detailed examination of soil characteristics are required. This is probably the most expensive sampling method because of the relatively high cost of backhoe operation.

The following procedures are used for collecting soil samples from test pits or trenches:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of overhead and buried utilities.

2. Review the site specific Health & Safety plan and ensure that all safety precautions including appropriate monitoring equipment are installed as required.

3. Using the backhoe, excavate a trench approximately three feet wide and approximately one foot deep below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

4. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.

5. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.

6. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration

activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OHSA and corporate health and safety procedures, in addition to the procedures specified in the site specific Health & Safety Plan..

12.0 REFERENCES

Mason, B.J. 1983. Preparation of Soil Sampling Protocol: Technique and Strategies. EPA-600/4-83-020.

Barth, D.S. and B.J. Mason. 1984. Soil Sampling Quality Assurance User's Guide. EPA-600/4-84-043.

U.S. Environmental Protection Agency. 1984 Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. EPA-600/4-84-076.

de Vera, E.R., B.P. Simmons, R.D. Stephen, and D.L. Storm. 1980. Samplers and Sampling Procedures for Hazardous Waste Streams. EPA-600/2-80-018.

ASTM D 1586-98, ASTM Committee on Standards, Philadelphia, PA.

APPENDIX A
Figures
SOP #2012
February 2000

FIGURE 1. Sampling Augers

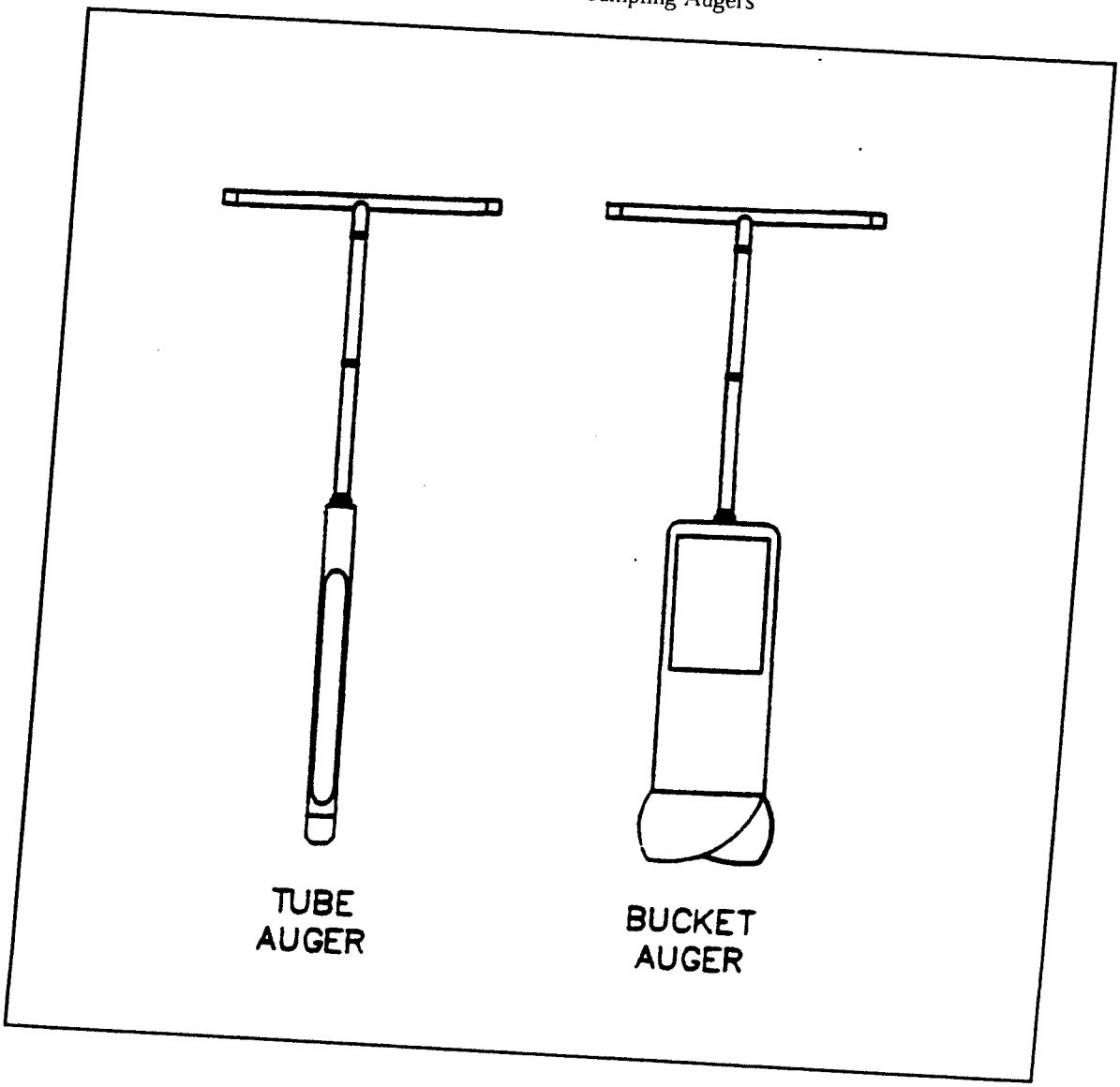
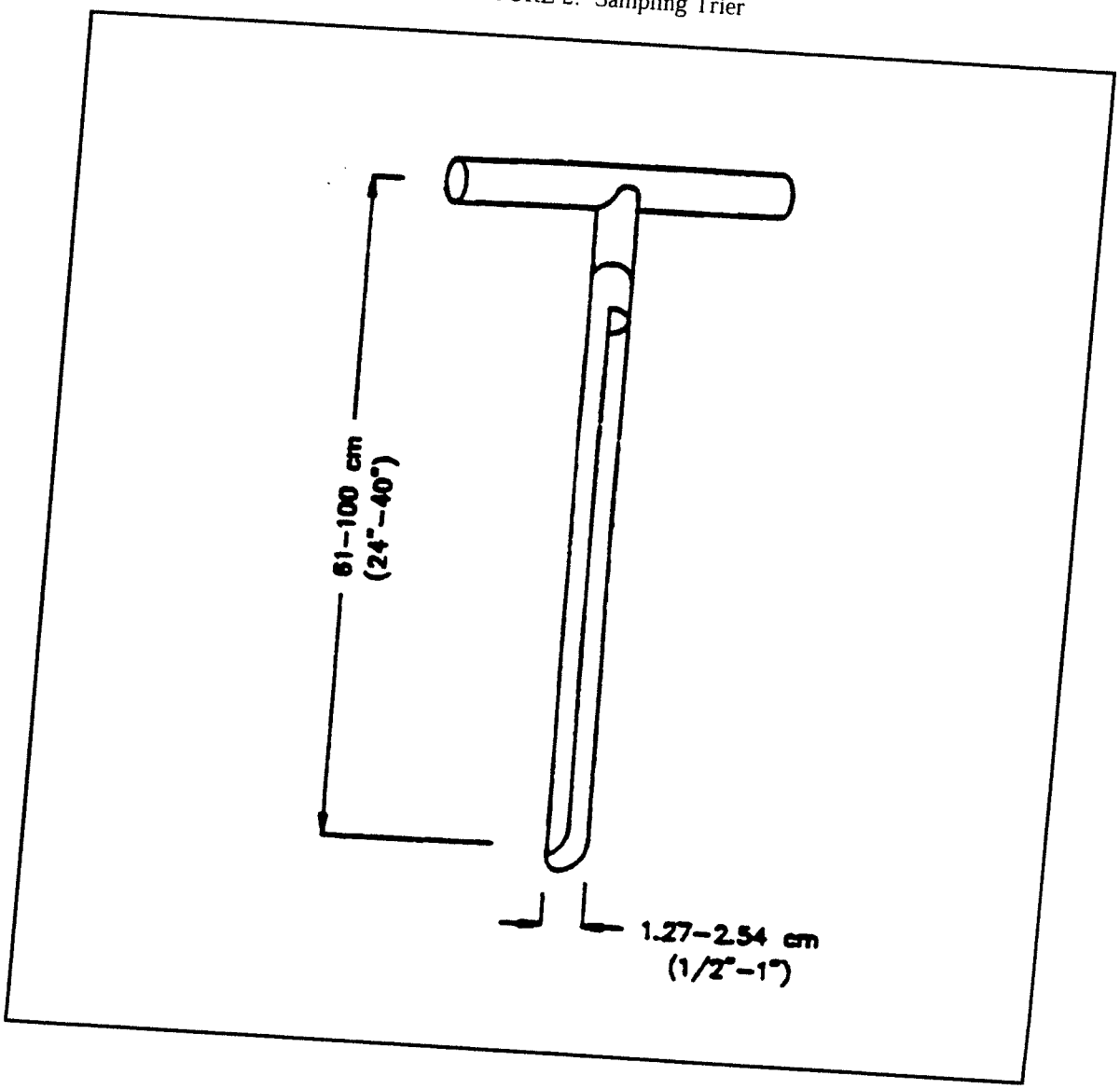


FIGURE 2. Sampling Trier



APPENDIX B:
UST-Related Historical Documents

SITE ASSESSMENT PLAN

Introduction

The site assessment plan for the Allied Builders Supply Co. facility has been formulated to evaluate whether soil contamination is present in the vicinity of the UST to be decommissioned. The site assessment plan formulated will be followed for the sole tank excavation to be performed.

The site assessment plan will consist of the following two tasks:

Task I: Soil Screening/Field Testing
Task II: Soil Sampling and Analyses

Task I: Soil Screening/Field Testing

During tank removal activities, observations will be made of the soils removed at the top of the tank and around any fill pipes, as well as in the excavation walls and floor. Observations will consist of visually inspecting the soils, examining the soils for odors, staining, and free product and screening the soils with an Organic Vapor Analyzer (OVA).

The screening evaluation will be especially applied to the base of the tank excavation in an effort to locate any "hot spots" that may indicate that a discharge or discharges have occurred in the past. In the event that soil contamination is indicated, additional soils will be excavated and the OVA will be used to screen the soils and assure that all impacted soils have been removed.

F. Contractor personnel, using Level B (supplied air) protection will enter tank to conduct decontamination procedures.

G. Decontamination procedures will consist of scraping all residue from walls and floor of tank. Next a biodegradable degreaser will be applied and walls and floor squeegeed and pumped dry. The final step will be to wipe clean and dry the entire interior of tank using clean, dry rags.

H. All residue will be pumped into appropriate holding drums or portable tanker for manifesting and disposal to an approved facility.

4. TANK REMOVAL

A. After decontamination is completed, excavation will occur to remove the tank from the ground. The tank will be secured and examined for corrosion holes or signs of leakage. If any evidence of a discharge is found the NJDEPE Hotline will be called immediately.

B. If no evidence of discharge is present the tank will be prepared for disposal by labelling with appropriate data and removed to an acceptable facility.

5. SITE ASSESSMENT - POST EXCAVATION

Throughout the entire excavation, decommissioning and post excavation procedures, observations will be made for evidence of contamination . If any indication of a discharge is suspected the NJDEPE Hotline will be immediately notified.

A. During and after removal of tank, soil surrounding the tank will be examined, incuding soil around any fill lines and piping for evidence of contamination.

B. If evidence of contamination is discovered, the NJDEPE Hotline will be notified and field tests performed to determine how much additional soil must be excavated and stockpilled utilizing the guidelines and procedures outlined in the Management of Excavated Soils .

6. SOIL SAMPLING

Soil sampling will occur based on the requirements outlined in NJDEPE Division of Water Resources Technical Guidance Document and Field Sampling Prodecure Manual. Samples collected will be delivered to N.J. Certified Laboratory for analyses. The soil sampling tasks are discussed in the following Site Assessment Plan.

7. BACK FILL OF EXCAVATION

After testing is complete, the tank void will be back-filled with clean, inert backfill material to current grade. If determined on site to be necessary, the excavation will be lined with plastic liner to segregate clean fill in tank void from surrounding host soils for future remediation.

TANK DECOMMISSIONING PLAN

1. GENERAL SCOPE OF WORK

Allied Builders Supply Co. has contracted with JCB Environmental Contractors to decommission, via removal, (1) 1000- gallon UST which contains unleaded gasoline. Tri-State Environmental Consultants, Inc. (TEC) has been subcontracted to perform all Site Assessment services. This site is located at 101 West Elizabeth Avenue in Linden, NJ.

2. SITE PREPARATION

As a safety precaution all ignition sources will be removed from the excavation site. Safety and protective equipment will be staged on site. Utility lines will be marked out to prevent hitting them during excavation activities. Tank product level will be verified prior to UST decommissioning activities.

3. TANK CLEANING PROCEDURE

Following API 1604 recommended practice for "Removal and Disposal of Used Underground Petroleum Storage Tanks":

A. Excavation of soil on top of tank exposing upper section of U.S.T.

B. Drain all piping back to tank and disconnect.

C. Render tank vapor free.

D. Plug all openings except vent.

E. Contractor will, if necessary, cut access hole in tank to allow entry for cleaning.

Following the removal of the tank from the excavation and completion of the soil screening operations, field tests will be performed to further evaluate if discharges have occurred. In the event that free product is present when the tank is removed, field testing will be implemented to ascertain the extent of contaminated soils.

Field testing will consist of the soil/water agitation method to determine if dissolved product is present within the soils. In addition, the field sorption test will be utilized to determine if free product is present within the soils.

Task 2: Soil Sampling and Analyses

Soil sampling and analyses will be performed whether or not evidence of a discharge from the tank is present. In the event that a discharge did occur soil sampling and analyses will be performed following the removal of impacted soils to confirm that all contaminated soils have been successfully removed from the tank area.

Soil sampling and analyses will be performed on soil samples collected at 5-foot intervals from the tank bed. It is anticipated that up to three soil samples will be collected and tested for PP VO+10. In the event that any of the soil samples collected from the gasoline UST beds indicate any contamiansts above NJDEPE standards, additional soil "hotspots" will be re-excavated and samples for PP VO+10.

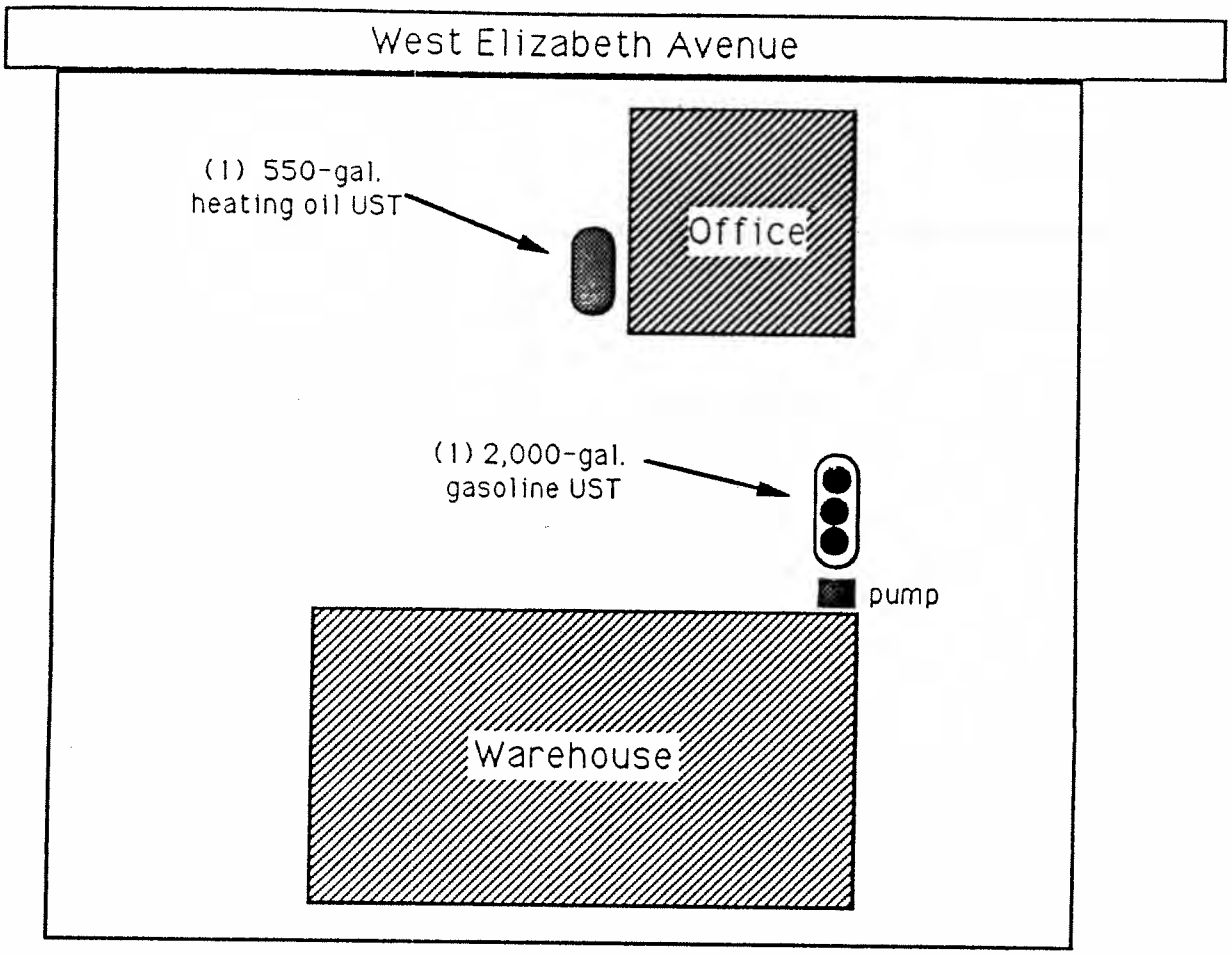
All soil samples will be collected with stainless steel trowels. Prior to sampling and between sampling episodes the trowels will be decontaminated in the following manner:

- washed in a liquinox and water solution
- tap water rinse
- distilled water rinse
-10% nitric acid rinse
-distilled water rinse
- acetone rinse
- air dry
- distilled water rinse

Collected soil samples will be placed into laboratory supplied glassware and then placed in a cooler on ice. Following their collection the soil samples will be immediately transported to the laboratory for analysis.

All analyses will be conducted by a NJDEPE-certified laboratory.

Figure 1 illustrates the proposed soil sampling locations. In the event that any discharges are noted during any part of the Site Assessment activities the NJDEPE Hotline will be immediately notified.



SCALE 1" = 50'

LEGEND

● Soil Sample

Figure 1
Sampling Location Map
Allied Builder's Supply Co.
101 West Elizabeth Avenue
Linden, NJ

TRI-STATE ENVIRONMENTAL CONSULTANTS

IMPLEMENTATION SCHEDULE

Tank removal activities will commence within two weeks following approval from the NJDEPE. The local fire inspector will be notified 1 week prior to UST removal. A permit will be obtained from the local building department immediately following approval from the NJDEPE. Site assessment activities including soil sampling will commence throughout the UST decommissioning process. Soil samples will be delivered to the laboratory immediately following their collection. It is anticipated that the soil sampling data will be generated in 1-2 weeks follwing receipt by the laboratory. The Closure Plan Implementation Summary Report will be produced one week following receipt of the laboratory data analyses.

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*MEMBER OF NEW YORK BAR ONLY

WRITER'S DIRECT LINE:
201-966-

July 22, 1993

Via Certified Mail, Return Receipt Requested

Hazardous Waste Enforcement Element
New Jersey Department of
Environmental Protection and Energy
401 East State Street
CN-028
Trenton, NJ 08625-0028

RE: Confirmation Report
101 West Elizabeth Avenue
Linden, Union County, New Jersey
Block 254, Lot 10
Case No. 93-6-24-1425-2

Gentlemen:

This firm represents 101 West Elizabeth Avenue Corporation, the owner of the above-referenced property, in connection with environmental matters. On Thursday, June 24, 1993, a 2,000 gallon gasoline underground storage tank ("UST") was removed by JCB Environmental Contractors, Greenbrook, New Jersey, pursuant to an NJDEPE approved Closure Plan. At the same time, a 500 gallon #2 fuel oil UST was closed in place. The property was formerly used as a lumber yard.

During excavation activities, a few small holes were observed on the side of the 2,000 gallon gasoline UST and small streaks of contamination were observed in the surrounding soil. On this basis, the NJDEPE non-emergency hotline was notified of the condition. Pursuant to N.J.A.C. 7:1E-5.8, kindly accept this

BRESSLER, AMERY & ROSS

letter as 101 West Elizabeth Avenue Corporation's Confirmation Report.

1. The condition was reported by the subsurface evaluator, Mr. Steven Hambos of Tri-State Environmental Consultants, 389 Mayer Court, Ridgefield, New Jersey.

2. The owner or operator of the property at the time the condition occurred was 101 West Elizabeth Avenue Corporation.

3. The source of the condition is the 2,000 gallon gasoline UST. 101 West Elizabeth Avenue Corporation intends to take soil samples to confirm that the 500 gallon #2 fuel oil UST is not a source.

4. The chemical abstract service number for gasoline is 8006-61-9.

5. The quantity of the hazardous substance involved is unknown. Approximately 70 tons of soil have been stockpiled on-site. 101 West Elizabeth Avenue Corporation is in the process of arranging for the proper disposal of this soil.

6. The date on which the condition began is unknown. However, the condition was discovered on Thursday, June 24, 1993 and reported to the NJDEPE's non-emergency hotline.

7. In order to evaluate these issues, 101 West Elizabeth Avenue Corporation has retained Edward N. Sailer of Sailer Environmental, Inc., 724 Boston Post Road, Madison, Connecticut 06443, telephone number (203) 245-7744.

If you have any questions concerning this matter or require additional information, please do not hesitate to contact me.

Very truly yours,

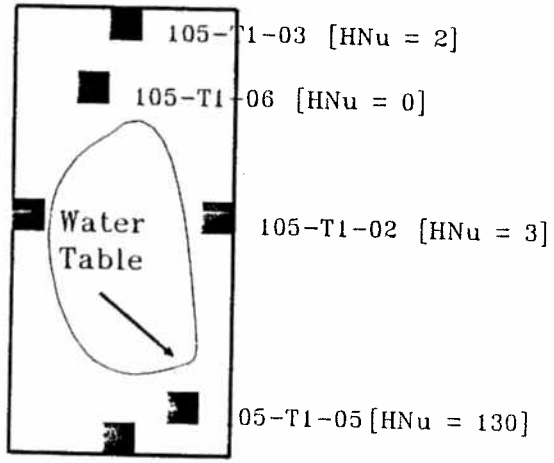
BRESSLER, AMERY & ROSS

Lori A. Connors

Lori A. Connors

LAC:gh
cc: Mr. Daniel Winters
Ronald J. Nelson, Esq.
David W. Reger, Esq.

Warehouse



LEGEND

Sample Locations ■

HNu Readings [HNu =]

TITLE

SOIL SAMPLE LOCATIONS
2,000 Gallon UST

PREPARED FOR

ALLIED BUILDING SUPPLY CORP.

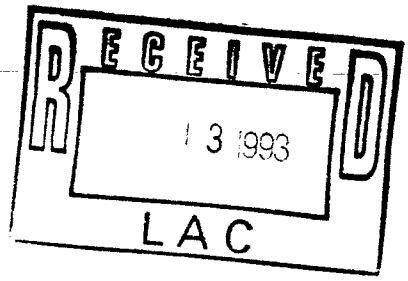
SAILER ENVIRONMENTAL INCORPORATED
724 BOSTON POST ROAD, P.O. BOX 21
MADISON, CONNECTICUT 06433

DRAWN BY	DATE
ENS	8/10/93
CHECKED BY	SCALE
ESK	NTS
PROJECT NO.	DRAWING NO.
105-01	1-1

SAILER
ENVIRONMENTAL
INCORPORATED

environmental
consultants

August 11, 1993



Lori A. Connors, Esq.
Bressler, Amery & Ross
P.O. Box 1980
Morristown, NJ 07962

Re: Allied Building Supply Co.
101 West Elizabeth Avenue
Linden, Union County, New Jersey
SEI Project No. 105-01

Dear Ms. Connors:

On July 26, 1993, Sailer Environmental, Inc. (SEI) inspected two underground tank excavations at the above referenced property, and collected soil samples from the former location of a 2,000 gallon underground storage tank. This letter report sets forth SEI's observations on that date, the sampling procedures that were employed, and a discussion of the sampling results.

BACKGROUND

Two underground storage tanks (USTs) were previously closed by JCB Environmental Contractors (JCB). These tanks were a 2,000 gallon UST that contained gasoline, and a 500 gallon #2 fuel oil tank. We understand that the 2,000 gallon UST was closed by removal in accordance with an Underground Storage Tank Closure Plan dated May 1993, prepared by Tri-State Environmental Consultants, Inc. (Tri-State). A copy of the Tri-State Closure Plan is provided as Attachment 1. The 500 gallon UST was closed by in place abandonment, because it is located beneath the office building on site.

At the time that the tanks were closed, JCB and/or Tri-State determined that both tanks were leaking, and reported the leaks to the NJDEPE Hotline. This verbal notification was subsequently confirmed in a July 22, 1993 letter to the NJDEPE from environmental counsel for Allied Building Supply Co. A copy of that letter is provided in Attachment 2.

SEI was contracted to collect soil samples from the open tank graves to determine the level of contamination, if any, that remained in the soils.

SOIL SAMPLING

On July 26, 1993, SEI inspected the two tank graves in preparation for soil sampling. It was determined that soil samples could not be obtained from the 500 gallon UST that had been abandoned in place because the excavation had collapsed, and access to the open end of the tank could not be gained. The 2,000 gallon UST grave, located immediately north of the warehouse, was found to be in stable condition and was sampled.

The 2,000 UST grave was approximately 23' by 10' in area, and was approximately 11.75' in depth at the center. Depth to standing water in the excavation was measured at 11.25', and is believed to represent the water table. A sketch of the tank grave is provided in Attachment 3.

Seven soil samples, including one duplicate sample were collected from the tank grave in accordance with the sampling procedures set forth in the New Jersey Department of Environmental Protection and Energy (NJDEPE) Technical Requirements for Site Remediation (NJAC 7:26E-1 et seq.). All samples were screened with an HNu model HW-101 photoionization detector equipped with a 10.2 ev probe. The results of the screening are provided in Attachment 3.

Four side wall samples were collected at approximately 0.5' above the water table elevation. These samples were numbered 105-T1-01, 105-T1-02, 105-T1-03, and 105-T1-04, and their locations are shown on Attachment 3. These samples were collected from a 0.5' -1.0' increment through the side wall. Two samples (105-T1-05 and 105-T1-06) were collected from the excavation floor at the 0 - 0.5' interval above the water table. A duplicate sample 105-T1-D was taken of sample 105-T1-01. A Trip Blank (105-T1-TB1) was provided for Quality Control/Quality Assurance (QA/QC) for the VOA+10 samples. A Field Blank was not provided by the laboratory. The decision was made to proceed without this blank.

The samples were submitted to International Hydronics Corporation, and analyzed for volatile organic compounds calibrated for xylene with a library search (VOA +10), and lead in accordance with the requirements set forth at Table 2-3 (25 NJR 2447).

SAMPLE RESULTS

International Hydronics Corporation's analytical report for these samples is provided in Attachment 4. A summary of the VOA sample results is provided below.

TABLE 1-1
SUMMARY OF VOA SAMPLE RESULTS[1] (mg/kg)

SAMPLE NUMBER	TOLUENE	ETHYLBENZENE	XYLENE (Total)
105-T1-01	0.33	ND	47
105-TI-02	ND	ND	ND
105-T1-03	ND	ND	ND
105-T1-04	ND	ND	ND
105-T1-05	32	4.7	48
105-T1-D	6.2	7.5	194
105-T1-TB1	ND	ND	ND

The sample results indicate that the soils in the 2,000 gallon UST grave meet the current NJDEPE Soil Cleanup Criteria[2], including the Impact to Groundwater Soil Cleanup Criteria, for all parameters except total xylene. The total xylene results for three of the samples meet the Residential Direct Contact, and Non Residential Direct Soil Cleanup Criteria, but exceed the Impact to Groundwater Soil Cleanup Criteria of 10 mg/kg.

The sample results for total lead indicate that the lead levels in the soils are well below the current NJDEPE Soil Cleanup Criteria.

---

[1]Trichloroflouromethane and methylene chloride were also reported in these sample results at or near the Quantitation Limit. These compounds are common laboratory contaminants and are not reported in the table. Tentatively Identified Compounds (TICs) were also reported in some samples. See Attachment 4 for a listing of TICs reported.

[2]The "Soil Cleanup Criteria" used in this evaluation is the criteria attached to a January 20, 1993 Memorandum of Karl Delaney, Director of the Division of Responsible Party Site Remediation, to Site remediation Program Staff.

DISCUSSION

Based on the above sample results, the NJDEPE may require the installation of a groundwater monitoring well within the tank grave to determine impact to groundwater. Depending on the results of the groundwater sampling, NJDEPE could require a full Remedial Investigation. However, because this site is proposed to be used as a parking area, and because there is a reasonable probability that off-site potable wells are not, and will not be impacted, we recommend that this matter be assigned to an NJDEPE BUST Case Manager for review before proceeding at risk. We also recommend that the 500 gallon UST access be re-excavated to allow sampling to assess the impact of that tank on the surrounding soils.

Should you have any questions or require any additional information, please call me.

Sincerely,

SAILER ENVIRONMENTAL, INC.

Edward N. Sailer
President

Enclosures

c: Mr. Daniel Winters
Ronald J. Nelson, Esq.

REMEDIAL INVESTIGATION ADDENDUM REPORT

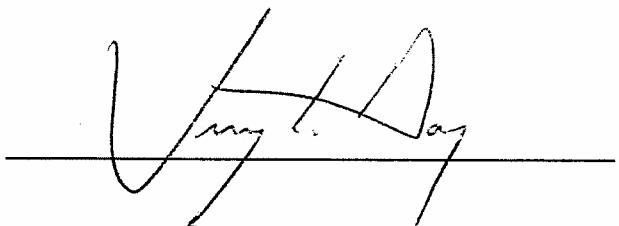
Prepared for:

Allied Building Supply Company
101 West Elizabeth Avenue
Linden, New Jersey 07083
Case # 93-06-24-1425

February 1994

Prepared By:

Vectre Corporation
P. O. Box 930
Lafayette, New Jersey 07848-9941



Jerry L. Haug, CPG
NJ UST Certification No. 0001777

REMEDIAL INVESTIGATION ADDENDUM REPORT

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Appendix B - Soil Sample Laboratory Data Package
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1.0 INTRODUCTION

This Remedial Investigation Addendum Report summarizes the following activities which have taken place at the Allied Building Supply Company site at 101 West Elizabeth Avenue, Linden, New Jersey:

- Gasoline UST removal in June 1993.
- Gasoline UST excavation site assessment conducted in July 1993.
- Soil boring investigation and installation of one monitoring well in August 1993.
- Installation of three additional monitoring wells for contaminant delineation, soil boring sample collection from former gasoline tank excavation, post excavation soil sampling from heating oil UST excavation, and collection of soil samples from the soil pile associated with the gasoline tank excavation, to evaluate soil quality for disposal or reuse options in November 1993.
- A well search for potable wells within a one-mile radius of the site.

The well search has been ordered but not yet received, and will be forwarded to the agency when it has been received. Due to extreme weather conditions and snow cover, the elevation of the well casings have not yet been surveyed; this activity should be completed the week of 2/18/94 and the Form Bs will be submitted under separate cover.



2.0 PREVIOUS INVESTIGATIONS

2.1 Tank Closure Activities

The gasoline tank was removed on June 24, 1993 in accordance with an approved closure plan submitted by **Tri-State Environmental Consultants, Inc.** in Fort Lee, New Jersey in May 1993. The tank was removed by **JCB Environmental Contractors** of Greenbrook, New Jersey. A few small holes were noted in one side of the tank and small streaks of visibly impacted soil were noted. The Environmental Hotline was called and a discharge reported (Case No. 93-06-24-1425-2).

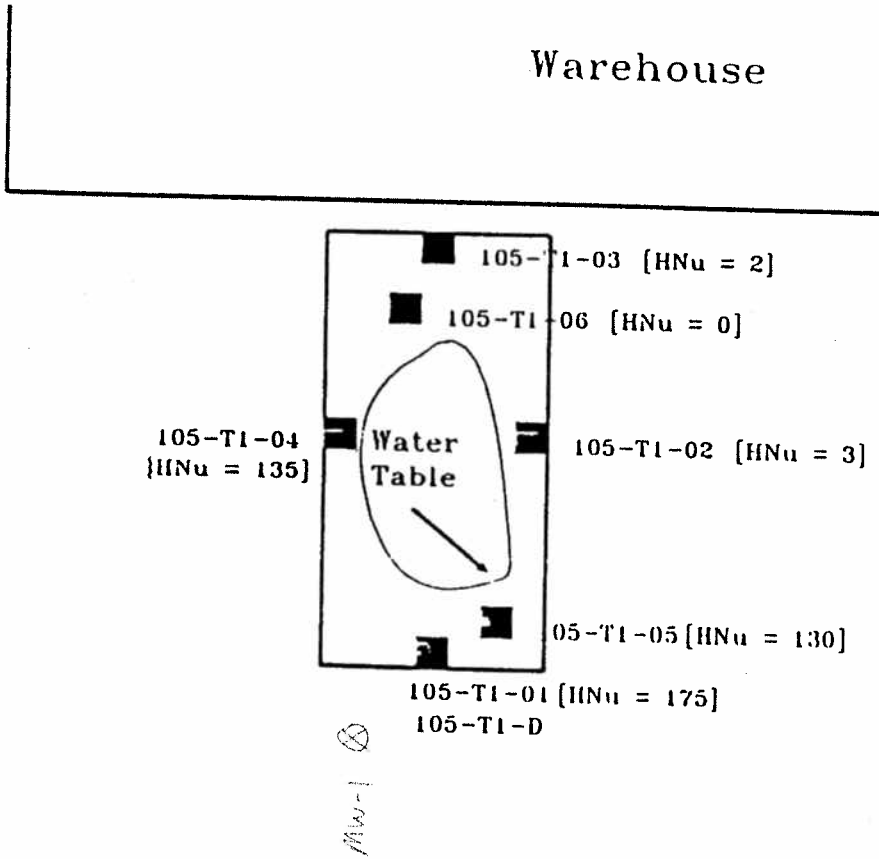
Approximately 70 tons of soil was removed during the tank removal and stockpiled onsite. A confirmation report was sent by **Bressler, Amery & Ross**, attorneys for the owner.

2.2 Investigation of Tank Grave

On July 26, 1993 soil samples were collected from the tank grave by **Sailer Environmental Incorporated** of Madison, Connecticut. Four side wall samples, two floor samples, and one duplicate sample were collected from the tank grave. Sample results are presented in Table 1, and sample locations are shown on Figure 1.

TABLE 1. Post Excavation Soil VOC Analytical Results (mg/kg)
From Report Dated 8-11-93 by Sailer Environmental, Inc.

Sample Number	Toluene	Ethylbenzene	Total xylenes
105-T1-01	0.33	U	47
105-T1-02	U	U	U
105-T1-03	U	U	U
105-T1-04	U	U	U
105-T1-05	32	4.7	48
105-T1-D	6.2	7.5	194
105-T1-TB1	U	U	U



LEGEND

Sample Locations ■

HNu Readings [HNu =]

TITLE: SOIL SAMPLE LOCATIONS 2,000 Gallon UST	
PREPARED FOR: ALLIED BUILDING SUPPLY CORP.	
SAILER ENVIRONMENTAL INCORPORATED 724 BOSTON POST ROAD, P.O. BOX 21 MADISON, CONNECTICUT 06433	DRAWN BY: ENS DATE: 8/10/93 CHECKED BY: ESK SCALE: NTS PROJECT NO.: 105-01 DRAWING NO.: 1-1

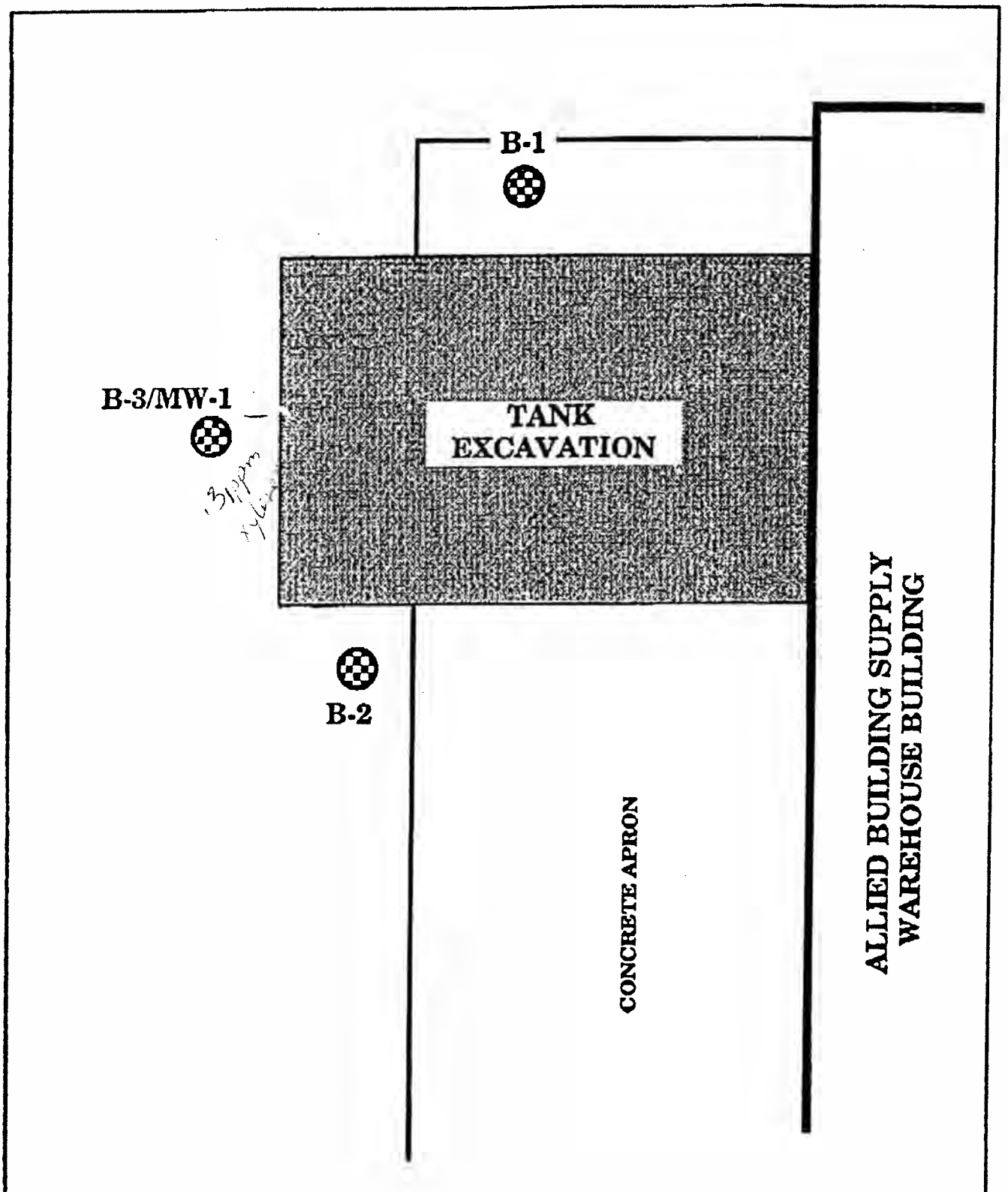
Based upon the analytical results from the soil samples, only two samples exceeded soil cleanup criteria for only one parameter, total xylenes, by a marginal amount. The report recommended installation of a ground water monitoring well.

2.3 Soil Boring/Well Installation

Three soil borings and one monitoring well were installed at the site on August 30, 1993 under the direction of **American Resource Consultants** of Doylestown, PA. Soil samples were collected from each soil boring and analyzed for volatile organic compounds. Results are summarized in Table 2, and boring locations are shown on Figure 2. A ground water sample was collected from the well on September 3, 1993.

TABLE 2. Soil Boring and Monitoring Well VOC Analytical Results (mg/kg) From American Resources Consultants, Inc. Report Dated 9-17-93

Sample Number 8/30/93	Acetone	Trichloro-fluoro-methane	Benzene	Toluene	Ethyl-benzene	Total xylenes
105-B1-10	0.020	U	U	U	U	U
105-B1-12	U	U	U	U	U	U
105-MW1-9	U	U	U	U	U	U
105-MW1-11	U	U	U	16.0	23.0	131.0
105-B2-09	U	U	U	U	U	U
105-B2-11	0.024	U	U	U	U	U
105-D-02	U	U	U	U	U	U
105-FB-02	U	0.003	U	U	U	U
105-TB-02	U	0.009	U	U	U	U
MW-1 (ground water)	U	U	0.28	3.0	0.62	3.9



101 W. ELIZABETH AVE. CORP. 101 WEST ELIZABETH AVE. LINDEN, NJ	BORING LOCATIONS

arc AMERICAN RESOURCE CONSULTANTS, INC. P.O. BOX 2227, DOYLESTOWN, PA 18901 215-348-0402	SCALE: NONE	DRAWN BY: SHC	DATE: 9/93
	PROJECT # 24991	CHK BY: TGP	FILE NAME: 101W.ELIZ

The only soil sample exceeding the NJDEPE proposed soil "impact to ground water" cleanup guidelines was at the water table in well MW-1, and only exceeded the cleanup criteria for xylene (10 mg/kg). No other sample in the vicinity of the tank reported any exceedences of cleanup criteria, and the report recommended no further action for soils. The ground water sample reported anomalous levels of gasoline constituents.

3.0 FIELD ACTIVITIES

Field activities for this investigation included the following tasks:

Task 1 - Installation of Ground Water Monitoring Wells

Task 2 - Collection of Soil Samples

Task 3 - Collection of Ground Water Samples

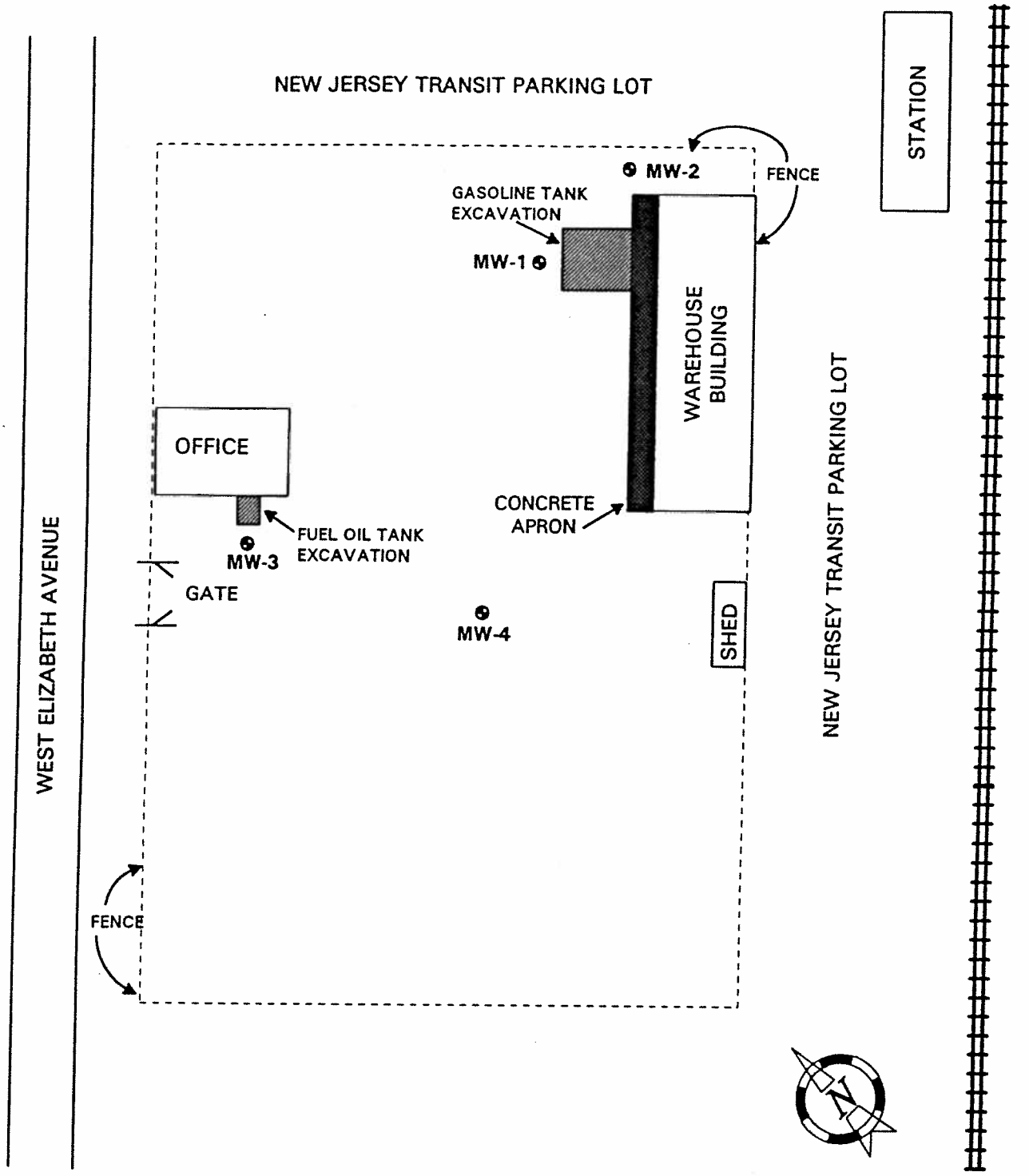
Details of each task are presented in the following sections.

3.1 Task 1 - Installation of Ground Water Monitoring Wells

Three 4" diameter ground water monitoring wells designated as MW-2, MW-3 and MW-4 were installed at the **Allied** site on November 19, 1993. The monitoring wells were installed utilizing a truck mounted air rotary drilling rig operated by **Summit Drilling Company** and supervised by a **Vectre Corporation** hydrogeologist. Figure 3 is a site plan depicting the location of the newly installed wells, as well as existing well MW-1 (installed in August 1993 by a previous consultant). Well logs and copies of the well permits are provided in Appendix A.

Borings for monitoring wells MW-2 and MW-4 were advanced to a depth of 20 feet below grade, and well MW-3 was advanced to a depth of 15 feet below grade. Drill cuttings were field screened with a ThermoEnvironmental Model 580B organic vapor meter (OVM) utilizing a photoionization detector. No OVM readings above zero were noted in any well.

After drilling to the appropriate depth the wells were completed in accordance with **NJDEPE** guidance documents and specifications. Each well was constructed with 4-inch diameter PVC solid casing and 0.020-inch slotted well screen. Each well was developed with a bailer and completed with a flush-mounted manhole and locking cap. Well construction details are presented in Appendix A.



SITE PLAN		
ALLIED BUILDING SUPPLY 101 WEST ELIZABETH AVENUE LINDEN NEW JERSEY		
NOT TO SCALE		
FIGURE NUMBER 3	PROJECT NUMBER SEL-V1	VECTRE™ Corporation

Subsurface materials consisted of seven to nine feet of red silty clay, overlying a fine to medium-grained sand varying in thickness from three to seven feet, underlain by red silty clay to the bottom of the hole. Well MW-3 was the most productive well, due to the thickest sand unit and shallowest water table. Wells MW-2 and MW-4 exhibited slow recharge characteristics, due to a lack of saturated thickness in the sand unit in MW-2 and a thinner sand unit in MW-4. Based upon purge rates during sampling, well MW-1 also has a relatively slow recharge rate.

Based upon local topography and surface hydrology, ground water flow is inferred to be southwest, towards Peach Orchard Brook. Well MW-2 was installed upgradient, well MW-3 was installed to assess the heating oil tank, and well MW-4 was installed to assess downgradient ground water conditions.

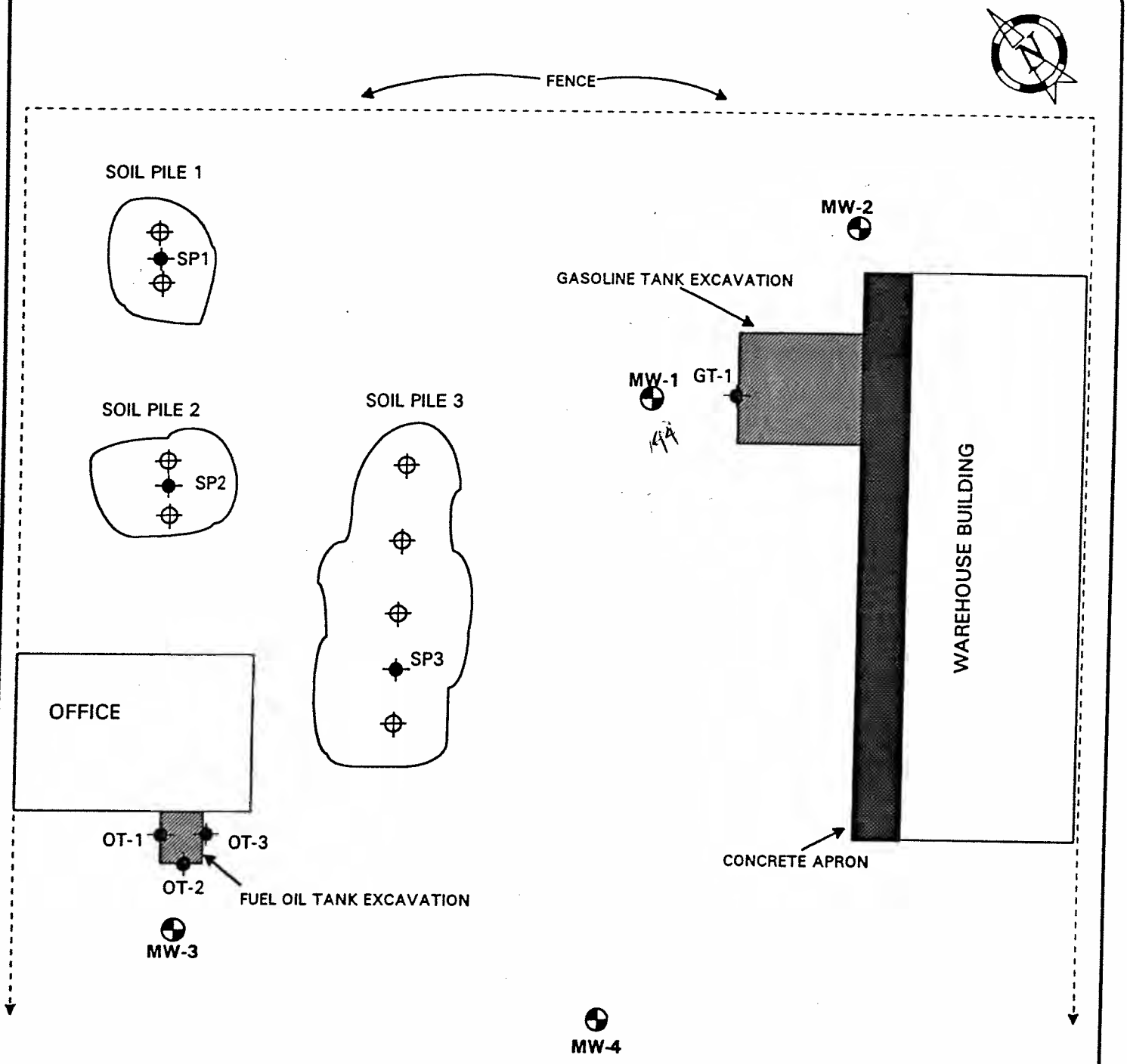
3.2 Soil Sample Collection

Soil samples were collected on November 24, 1994. A total of seven soil samples plus a field blank were collected. Soil sample locations are shown on Figure 4.

Soil Pile Samples

Soil excavated during removal of the gasoline tank was accumulated in three distinct piles at the **Allied** site. Location of the piles is shown on Figure 4. Soil pile #1 (sample SP1) is approximately 20 yd^3, soil pile #2 (sample SP2) is approximately 10 yd^3, and soil pile #3 (sample SP3) is approximately 45 yd^3 in volume. Each soil pile is approximately two to three feet high over most of its area, and SP1 is approximately four feet high at its highest point. The excavated material was generally sandy, with some clay, and concrete and asphalt pieces mixed in.

Each pile was screened with an OVM to identify the presence of organic vapors. Holes were dug using a shovel through the depth of the pile at several locations. No OVM readings above zero were recorded, and no odor or discoloration was observed. Screening locations are shown on Figure 4.



KEY

- FIELD SCREENED PROFILE
- SAMPLE LOCATION

SOIL SAMPLING LOCATIONS		
ALLIED BUILDING SUPPLY 101 WEST ELIZABETH AVENUE LINDEN NEW JERSEY		
NOT TO SCALE		
FIGURE NUMBER 4	PROJECT NUMBER SEL-V1	VECTRE™ Corporation

Because field screening procedures did not identify contaminated areas and could not be used to bias the sample locations, a soil sample was collected from each pile at a central location in the thickest section of each pile, to minimize the possibility of collecting samples that had been subjected to intensive weathering and volatilization.

Soil samples for laboratory analysis were retrieved directly from the soil pile with a decontaminated stainless steel trowel by a **Vectre** geologist wearing clean disposable latex gloves. Prior to collection of soil samples, the sampling trowel was thoroughly cleaned and decontaminated using the following procedures:

. Device washed with laboratory cleaner and water
. Device rinsed 3 times with distilled water
. Device rinsed with reagent grade methanol and allowed to dry
. Device rinsed with distilled water
. Device allowed time to dry

The samples were stored in a cooler at approximately 4° C and transported to the laboratory. Samples from the soil piles were analyzed for volatile organic compounds +10 peaks using EPA Method 8240. Analytical results are presented in Section 4.

Heating Oil Tank Excavation Soil Samples

Three samples were collected from the excavation which formerly contained a 550-gallon heating oil tank for the office building on site. Samples were collected from the sidewalls of the excavation, approximately six inches above the water table. Each sample was collected from approximately six to eight inches into the sidewall, to avoid sampling material that was intensively weathered. The samples were comprised of a reddish silty clay. Each sample was collected with a trowel, labeled, and handled as described above. The samples were analyzed for total petroleum hydrocarbons using EPA Method 418.1. Analytical results are presented in Section 4.

Tank Grave Soil Sample Collection

A soil sample was collected from the location of former sample 105-T1-D. The sample was collected approximately 0.5 feet above the water table, using a long-handled soil trier. The sample submitted for analysis was collected from approximately eight to ten inches in the wall, to mitigate the effect of weathering in the open excavation. The sample was comprised of red silty clay. The sample was labeled GT-1 and submitted to a laboratory for analysis of volatile organics plus 10 peaks using EPA Method 8240.

3.3 Ground Water Sample Collection

Groundwater samples were collected from all four monitoring wells on December 7, 1994. Each well was purged at least 3 well volumes using a centrifugal pump, with the exception of MW-2, which was purged 91% of three volumes due to slow recharge. Depth to water and purging data are presented in Table 3.

After purging, each well was sampled using a new, disposable PVC bailer which was used for that well only. The samples were labelled and stored in a cooler at approximatley 4° C for transport to the laboratory. A trip blank and field blank were prepared for quality control/quality assurance and submitted for analysis. All samples were analyzed for volatile organic compounds plus 10 peaks using EPA Method 624. Analytical results are presented in Section 4.



TABLE 3

WELL PURGING DATA

WELL ID	WELL DEPTH (FT)	DEPTH TO WATER (FT)	WATER COLUMN (FT)	THREE WELL VOLUMES (GAL)*	ACTUAL PURGE VOLUME
MW-1	18	8.70	9.30	18.21	26
MW-2	20	11.05	8.95	17.52	16
MW-3	15	8.25	6.75	13.23	25
MW-4	20	8.75	11.25	22.05	23

* One foot of water in a 4-inch well equivalent to 0.653 gal

4.0 ANALYTICAL RESULTS

4.1 Soil Sample Results

Soil sample results are summarized on Table 4. A complete laboratory analytical report including QA/QC procedures is provided in Appendix B.

Soil Pile Samples

Analytical results for the soil pile samples reported no target compounds above detection limits. No non-target compounds were reported in samples SP-1 and SP-2, and sample SP-3 reported a total of 0.50 mg/kg non-target compounds.

Heating Oil Tank Samples

Analytical results for the samples collected from the heating oil excavation reported concentrations of total petroleum compounds ranging from 29 mg/kg in OT-1 to 45 mg/kg in OT-3.

Former Gasoline Tank Excavation Soil Boring Sample Results

Analytical results for sample GT-1, collected from the location of previous sample 105-T1-D, reported concentrations of 0.015 mg/kg for total xylenes and 3.95 mg/kg for non-target compounds.

4.2 Ground Water Sample Results

Ground water sample results are summarized on Table 5, and a copy of the laboratory data package is included as Appendix C. No target or non-target compounds were reported above detection limits in monitoring wells MW-2, MW-3, and MW-4. Well MW-1 reported detectable concentrations of benzene, toluene, ethylbenzene, and xylene.

table 4

tab 5



5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Soil Piles

Field screening and analytical results for soil samples collected from the soil piles indicate that no volatile organic compounds were identified in any of the soil piles. Because no compounds were identified above levels of regulatory concern, there are no restrictions on further use of the soil.

Heating Oil Tank Excavation

None of the post-excavation samples collected from the heating oil tank excavation reported concentrations of petroleum hydrocarbons above levels of regulatory concern.

Tank Grave Soil Sample

The soil sample collected from the gasoline tank excavation reported no compounds at concentrations above levels of regulatory concern.

Ground Water

Field screening of drill cuttings and analytical results for ground water samples indicate that none of the three wells installed for this investigation are impacted to any degree by volatile organic compounds. Analytical results for the sample collected from MW-1 report similar levels of BTEX as were reported during an earlier sampling round. Borings conducted in the area during previous investigation reported no soil contamination other than in the borehole converted to MW-1. It is apparent that the problem is very localized, because even in the presence of a transmissive sand no contaminants have been identified in the three other wells installed at the site.

5.2 Recommendations

Soil Piles

As there have been no contaminants detected in the soil piles above levels of regulatory concern, no further action is required and it is recommended that the soil be replaced in the excavation and clean backfill used to restore the site to grade.

Oil Tank Samples

As there have been no contaminants above levels of regulatory concern reported in the oil tank excavation, no further action is recommended beyond restoring to grade.



Tank Excavation

As there have been no contaminants above levels of regulatory concern reported in the resampling of the former soil boring 105-MW1-11 location, no further action is recommended.

Ground Water

The presence of gasoline constituents in MW-1 indicates that a very localized zone of contamination may exist in the immediate area. It is recommended that MW-1 be sampled again in approximately three months to document the natural remediation of ground water in its vicinity through biodegradation and attenuation. It is also recommended that all four monitoring wells be sampled within six months to reconfirm the stability of existing ground water conditions. The ground water samples should be analyzed for BTEX using EPA Method 602.

APPENDIX A

DWR-138 M
12/91

New Jersey Department of Environmental Protection and Energy
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 26 - 35296
Atlas Sheet Coordinates 25 : 31 : 321

OWNER IDENTIFICATION - Owner 101 WEST ELIZABETH AVE.
Address 581 RAHWAY AVE.
City UNION State NJ Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW 2
County UNION Municipality LINDEN CITY Lot No. 10 Block No. 254
Address Allied Bldg. Suppl., 101 West Elizabeth Ave, Linden, NJ 07083

TYPE OF WELL (as per Well Permit Categories) MONITORING Date well completed 11/19/93
Regulatory Program Requiring Well UST Case I.D. # 93-06-24-1425
CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Vertex Corporation Tele. # 201 393-2500

WELL CONSTRUCTION

Total depth drilled 20 ft.
Well finished to 20 ft.
Borehole diameter:
Top 8 in.
Bottom 8 in.
Well was finished: ☐ above grade ☒ flush mounted
If finished above grade, casing height (stick up) above land surface — ft.
Was steel protective casing installed? ☐ Yes ☒ No

	Depth to Top (ft.) [From land surface]	Depth to Bottom (ft.)	Diameter (inches)	Type and Material
Inner Casing	0	9½"	4"	PVC Sch 40
Outer Casing (Not Protective Casing)				
Screen (Note slot size)	10	20	4"	PVC .020
Tail Piece				
Gravel Pack	8	20		Morie #1
Annular Seal/Grout	0	8		Portland & Bentonite
Method of Grouting	Tremie			

Static water level after drilling 13 ft.
Water level was measured using Tape
Well was developed for 1 hours at Surging gpm
Method of development Bail
Was permanent pumping equipment installed? ☐ Yes ☒ No
Pump capacity ____ gpm
Pump type: ____
Drilling Method Air
Drilling Fluid ____ Type of Rig Ford B-80
Name of Driller Donald Grahamer, Sr
Health and Safety Plan submitted? ☒ Yes ☐ No
Level of Protection used on site (circle one) None (D) C B A
N.J. License No. M 1212
Name of Drilling Company SUMMIT WELL DRILLING

GEOLOGIC LOG (Copies of other geologic logs and/or geophysical logs should be attached.)

See attached

I certify that I have drilled the above-referenced well in accordance with all well permit requirements and all applicable State rules and regulations.

Driller's Signature Donald Grahamer, Jr. Date 12/2/93

COPIES: White & Green - DEPE Canary - Driller Pink - Owner Goldenrod - Health Dept.

Summit DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

2544D Morningside Dr.
West Columbia, SC 29169
Telephone: (803) 739-9853
Toll Free: (800) 242-6648
FAX: (803) 796-9698

WELL LOG

WELL: MW2 DATE DRILLED: 11/19/1993 COORD #: 26.31.321 PERMIT #: 26-35296
SITE: Allied Building Supply Co, 101 West Elizabeth Avenue, , Linden, NJ 07083
OWNER: 101 W. Elizabeth Ave Corp, 581 Rahway Avenue, , Union, NJ 07083-0000

COUNTY: Union
XSTREET: Wood Avenue
USE: Monitor

INNER CASING: PVC
DIAMETER: 4"
LENGTH: 9.5'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE: PVC
DIAMETER: 4"
LENGTH: 10'
SLOT SIZE: .020

DRILLING METHOD: Air
SAMPLING METHOD: SS
HOLE DIAMETER: 8"
TOTAL DEPTH: 20'

SET WELL: 20'
GRAVEL PK SZ: Morie #1
DRILLER: D.J.Grahamer, Jr.
SURFACE COMPLETION: M

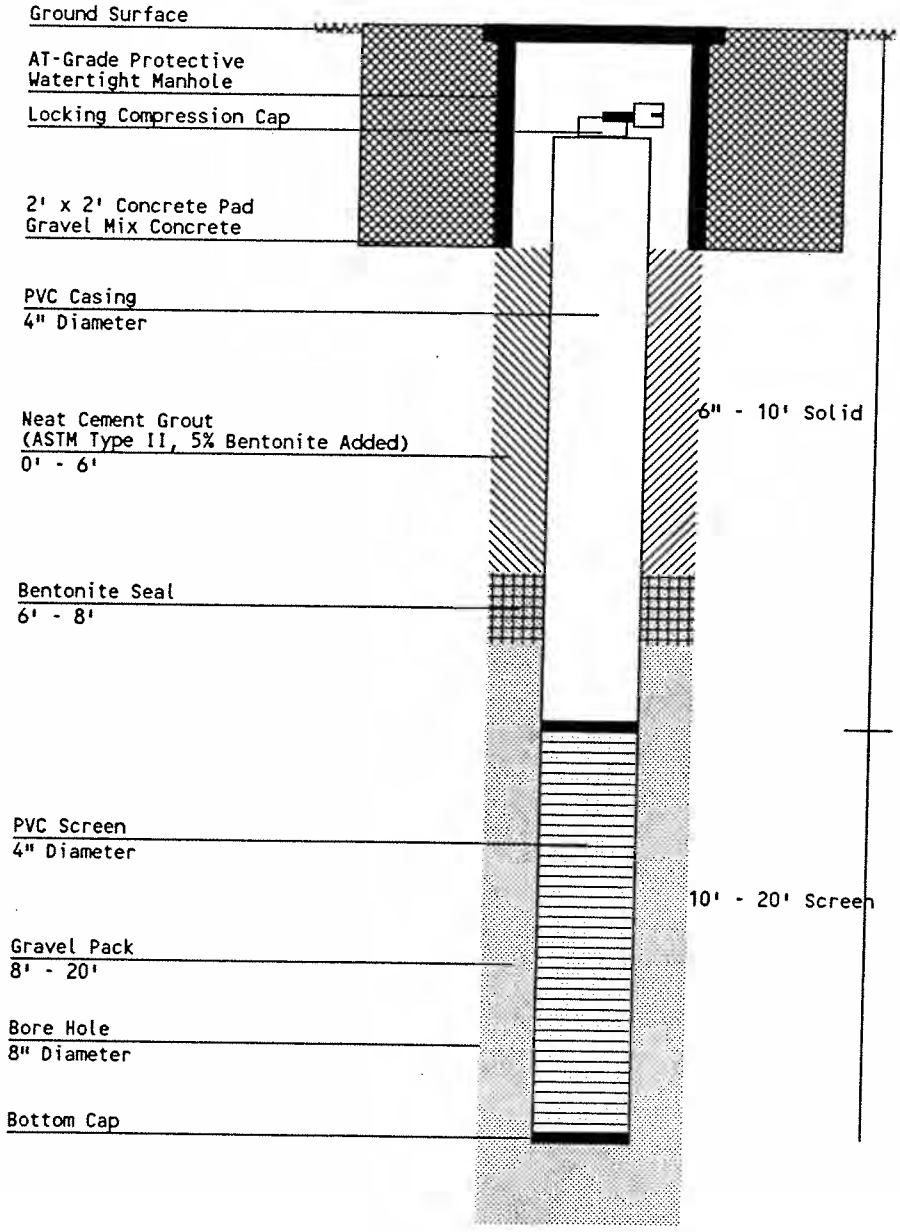
GAL PER MIN: SLOW RECHARGE
STAT H2O LVL: 13'
DEVELOPMENT METHOD: Bail

OPEN HOLE:
CASING SEAL: Portland & Pellets
DEVELOPMENT TIME: 1 hour
GEOLOGIC FORMATION:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
5' - 7'	6 - 14, 13 - 18
10' - 12'	12 - 12, 10 - 12

REMARKS / SOILS IDENTIFICATION

0' - 1 1/2' Fill.
1 1/2' - 9 1/2' Red-Brown silty clay, little M/F sand, trace M/F gravel.
9 1/2' - 14' Red-Brown D/F sand, little silt.
14' - 20' Red-Brown silty clay, little M/F sand, trace M/F grvl.



DWR-138 M
12/91

New Jersey Department of Environmental Protection and Energy
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 28 - 35297
Atlas Sheet Coordinates 26 : 31 : 321

OWNER IDENTIFICATION - Owner 101 WEST ELIZABETH AVE.
Address 581 RAHWAY AVE.
City UNION State NJ Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW3
County UNION Municipality LINDEN CITY Lot No. 10 Block No. 254
Address Allied Bldg. Supply, 101 West Elizabeth Ave. Linden, NJ 07036

TYPE OF WELL (as per Well Permit Categories) MONITORING Date well completed 11/19/93
Regulatory Program Requiring Well UST Case I.D. # 93-06-24-1425
CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Vette Corporation Tele. # 201 383-3500

WELL CONSTRUCTION

Total depth drilled 15 ft.
Well finished to 15 ft.
Borehole diameter:
Top 8 in.
Bottom 8 in.
Well was finished: ☐ above grade ☑ flush mounted
If finished above grade, casing height (stick up) above land surface – ft.
Was steel protective casing installed? ☐ Yes ☑ No

	Depth to Top (ft.) [From land surface]	Depth to Bottom (ft.)	Diameter (inches)	Type and Material
Inner Casing	6"	5'	4"	PVC Sch. 40
Outer Casing (Not Protective Casing)				
Screen (Note slot size)	5'	15'	4"	PVC. 020
Tail Piece				
Gravel Pack	3'	15'		Morie #1
Annular Seal/Grout	0'	3'		Portland & pellets
Method of Grouting	Gravity			

Static water level after drilling 8 ft.
Water level was measured using Tape
Well was developed for 1 hours at 2 gpm
Method of development Bail
Was permanent pumping equipment installed? ☐ Yes ☑ No
Pump capacity ____ gpm
Pump type: ____
Drilling Method Air
Drilling Fluid ____ Type of Rig ____
Name of Driller Donald Graham, Jr.
Health and Safety Plan submitted? ☑ Yes ☐ No
Level of Protection used on site (circle one) None (D) C B A
N.J. License No. M1212
Name of Drilling Company SUMMIT WELL DRILLING

GEOLOGIC LOG (Copies of other geologic logs and/or geophysical logs should be attached.)

See attached

I certify that I have drilled the above-referenced well in accordance with all well permit requirements and all applicable State rules and regulations.

Driller's Signature Donald Graham, Jr. Date 12/2/93

COPIES: White & Green - DEPE Canary - Driller Pink - Owner Goldenrod - Health Dept.

SUMMIT DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

2544D Morningside Dr.
West Columbia, SC 29169
Telephone: (803) 739-9853
Toll Free: (800) 242-6648
FAX: (803) 796-9698

WELL LOG

WELL: MW3 DATE DRILLED: 11/19/1993 COORD #: 26.31.321 PERMIT #: 26-35297
SITE: Allied Building Supply Co, 101 West Elizabeth Avenue, , Linden, NJ 07083
OWNER: 101 W. Elizabeth Ave Corp, 581 Rahway Avenue, , Union, NJ 07083-0000

COUNTY: Union
XSTREET: Wood Avenue
USE: Monitor

INNER CASING: PVC
DIAMETER: 4"
LENGTH: 4 1/2"

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE: PVC
DIAMETER: 4"
LENGTH: 10'
SLOT SIZE: .020

DRILLING METHOD: Air
SAMPLING METHOD: SS
HOLE DIAMETER: 8"
TOTAL DEPTH: 15'

SET WELL: 15'
GRAVEL PK SZ: Morie #1
DRILLER: D.J. Grahamer, Jr.
SURFACE COMPLETION: M

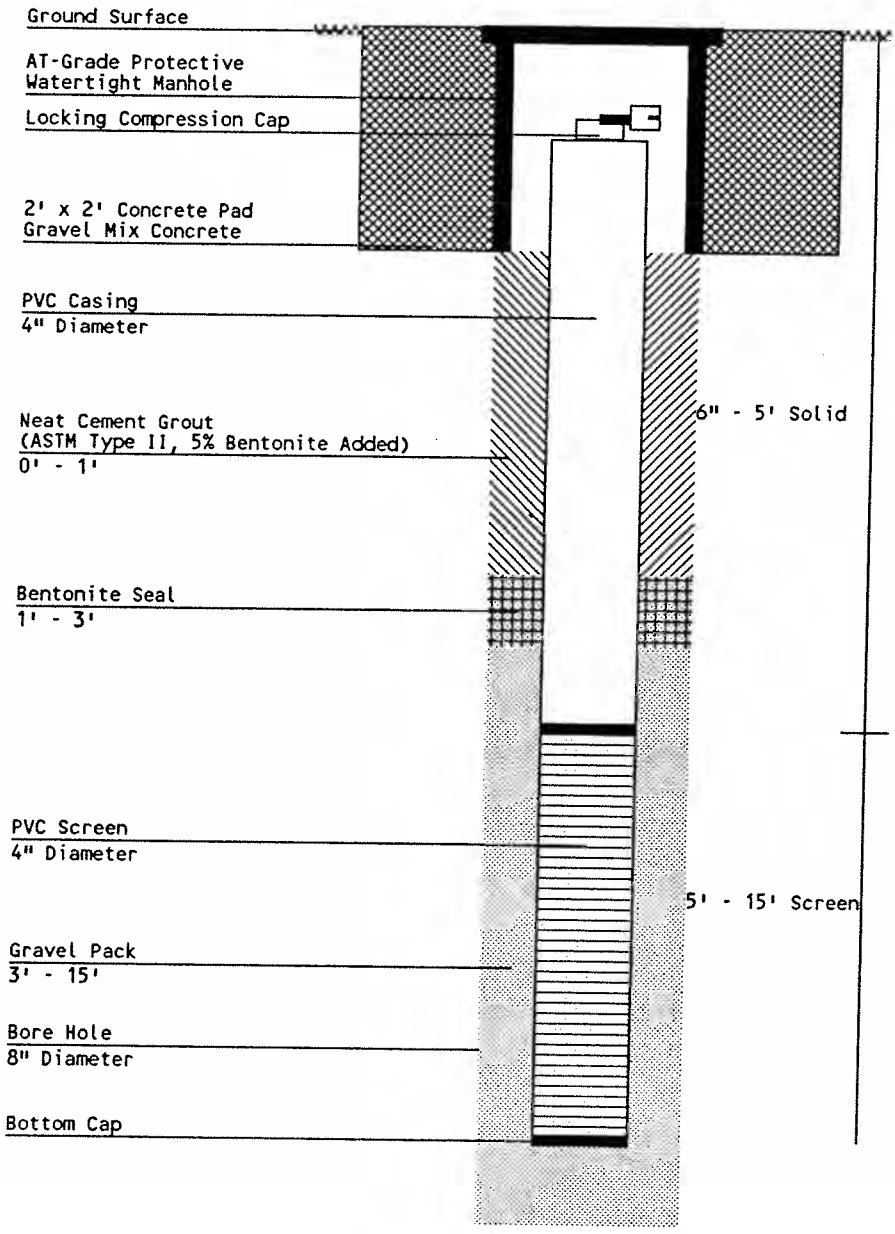
GAL PER MIN: 2
STAT H2O LVL: 8'
DEVELOPMENT METHOD: Bail

OPEN HOLE:
CASING SEAL: Portland & Pellets
DEVELOPMENT TIME: 1 hour
GEOLOGIC FORMATION:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
3' - 5'	10 - 7, 13 - 15
5' - 7'	10 - 13, 15 - 17
7' - 9'	8 - 11, 10 - 8
9' - 11'	8 - 7, 6 - 7
11' - 13'	5 - 5, 8 - 10
13' - 15'	8 - 7, 10 - 15
15' - 17'	6 - 8, 11 - 12

REMARKS / SOILS IDENTIFICATION

' - 3' Fill.
3' - 7' Red-Brown silty clay, little M/F sand, trace of M/F gravel.
7' - 14' Red-Brown D/F sand, little silt.
14' - 15' Red-Brown silty clay, little M/F sand, trace M/F grvl.



DWR-138 M
12/91

New Jersey Department of Environmental Protection and Energy
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 26 - 35298
Atlas Sheet Coordinates 26 : 31 : 321

OWNER IDENTIFICATION - Owner 101 WEST ELIZABETH AVE.
Address 581 RAHWAY AVE.
City UNION State NJ Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW4
County UNION Municipality LINDEN CITY Lot No. 10 Block No. 254
Address Allied Bldg Supply, 101 West Elizabeth Ave, Linden NJ 07083

TYPE OF WELL (as per Well Permit Categories) MONITORING Date well completed 11/19/93
Regulatory Program Requiring Well UST Case I.D. # 93-06-24-1425
CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Vertex Corporation Tele. # 201 383-2500

WELL CONSTRUCTION

Total depth drilled 20 ft.
Well finished to 20 ft.
Borehole diameter:
Top 8 in.
Bottom 8 in.
Well was finished: ☐ above grade ☑ flush mounted
If finished above grade, casing height (stick up) above land surface — ft.
Was steel protective casing installed? ☐ Yes ☑ No

	Depth to Top (ft.) [From land surface]	Depth to Bottom (ft.) [From land surface]	Diameter (inches)	Type and Material
Inner Casing	0"	5'	4"	PVC Sch 40
Outer Casing (Not Protective Casing)				
Screen (Note slot size)	5'	20'	4"	PVC .020
Tail Piece				
Gravel Pack	3'	20'		Morie # 1
Annular Seal/Grout	0	3'		Portland Cement
Method of Grouting	Gravity			

Static water level after drilling 13' ft.
Water level was measured using Tape
Well was developed for 1 hours at Surface gpm
Method of development Bail
Was permanent pumping equipment installed? ☐ Yes ☑ No
Pump capacity ____ gpm
Pump type: ____
Drilling Method Air
Drilling Fluid ____ Type of Rig Ford B-80
Name of Driller Donald Graham, Jr
Health and Safety Plan submitted? ☑ Yes ☐ No
Level of Protection used on site (circle one) None (D) C B A
N.J. License No. M1710
Name of Drilling Company SUBMIT WELL DRILLING

GEOLOGIC LOG (Copies of other geologic logs and/or geophysical logs should be attached.)

See attached

I certify that I have drilled the above-referenced well in accordance with all well permit requirements and all applicable State rules and regulations.

Driller's Signature Donald G. Graham, Jr. Date 12/2/93

COPIES: White & Green - DEPE Canary - Driller Pink - Owner Goldenrod - Health Dept.

Summit DRILLING CO., INC.
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2544D Morningside Dr.
West Columbia, SC 29169
Telephone: (803) 739-9853
Toll Free: (800) 242-6648
FAX: (803) 796-9698

WELL LOG

WELL: MW4 DATE DRILLED: 11/19/1993 COORD #: 26.31.321 PERMIT #: 26-35298
SITE: Allied Building Supply Co, 101 West Elizabeth Avenue, , Linden, NJ 07083
OWNER: 101 W. Elizabeth Ave Corp, 581 Rahway Avenue, , Union, NJ 07083-0000

COUNTY: Union
XSTREET: Wood Avenue
USE: Monitor

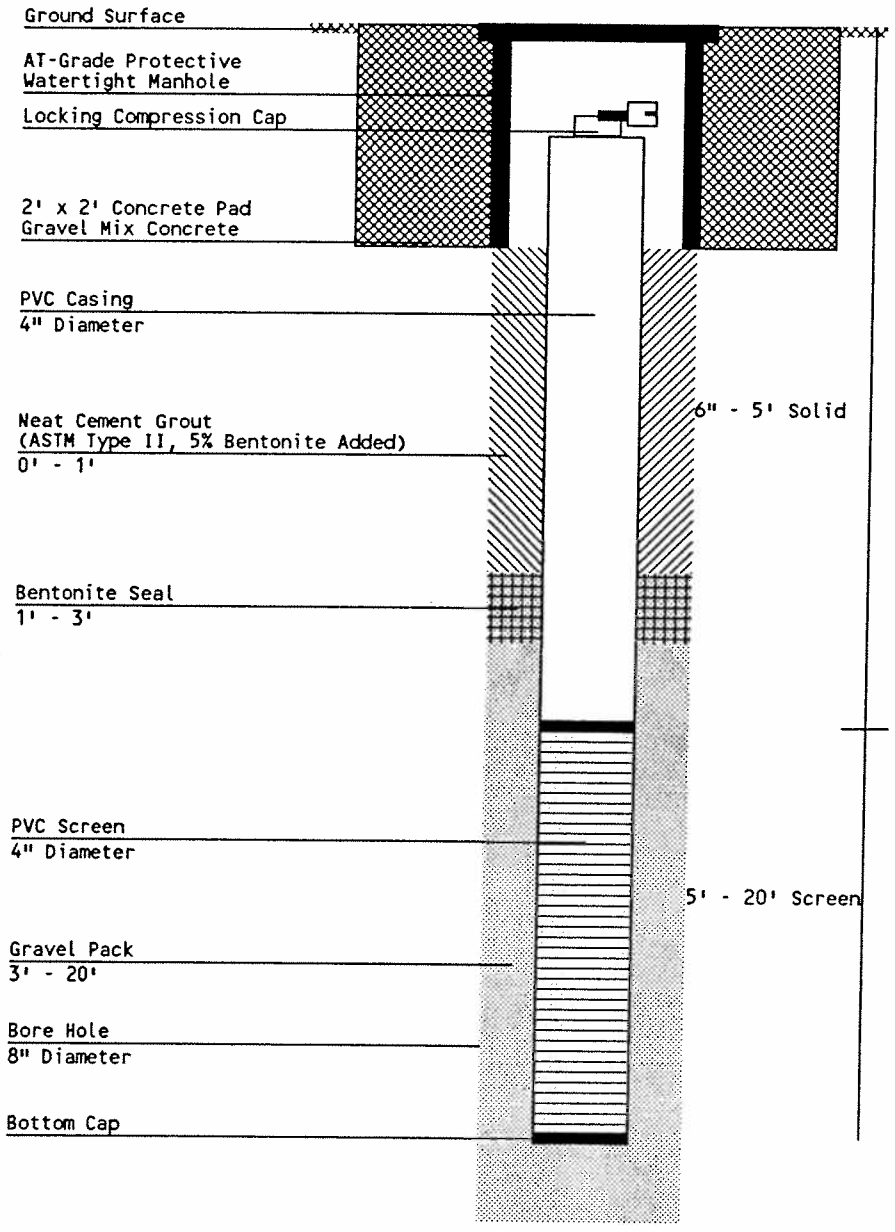
INNER CASING:	PVC	OUTER CASING:		SCREEN TYPE:	PVC	DRILLING METHOD:	Air
DIAMETER:	4"	DIAMETER:		DIAMETER:	4"	SAMPLING METHOD:	SS
LENGTH:	4 1/2"	LENGTH:		LENGTH:	15'	HOLE DIAMETER:	8"
				SLOT SIZE:	.020	TOTAL DEPTH:	20'

SET WELL: 20' GAL PER MIN: SLOW RECHARGE OPEN HOLE:
GRAVEL PK SZ: Morie #1 STAT H2O LVL: 13' CASING SEAL: Portland & Pellets
DRILLER: D.J. Grahamer, Jr. DEVELOPMENT METHOD: Bail DEVELOPMENT TIME: 1 hour
SURFACE COMPLETION: M GEOLOGIC FORMATION:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
3' - 5'	10 - 18, 22 - 35
5' - 7'	18 - 50/5"
7' - 9'	23 - 11, 13 - 13
6' - 11'	22 - 20, 5 - 7
11' - 13'	8 - 9, 12 - 13
13' - 15'	16 - 15, 20 - 21
15' - 17'	20 - 21, 20 - 21

REMARKS / SOILS IDENTIFICATION

' - 3' Fill.
' - 8' Red-Brown silty clay.
Little M/F sand, Trace M/F gravel.
8' - 11' Red-Brown M/F sand, little silt.
11' - 20' Red-Brown silty clay, little M/F sand, trace M/F gravel.



GROUND WATER MONITORING WELL CERTIFICATION
FORM B - LOCATION CERTIFICATION

Name of Permittee: _____
Name of Facility: ALLIED BUILDING SUPPLY
Location: 101 W. ELIZABETH AVE. LINDEN, N.J.

NJPDES Number: NJ _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): N/A

This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74°-15'-12.6"
Latitude (one-tenth of a second): North 40°-37'-45.3"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 28.81
Owners Well Number (As shown on the application or plans): M.W.# 1

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

DOMINICK J. VENDITTO, III
PROFESSIONAL LAND SURVEYOR
PROFESSIONAL PLANNER
632 ASHWOOD AVENUE
ROSELLE PARK, NJ 07204

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

#30093
PROFESSIONAL LAND SURVEYOR'S LICENSE #

N.J. SEAL

bev/MJM/form.b

This well was not installed by Vectre.

GROUND WATER MONITORING WELL CERTIFICATION
FORM B - LOCATION CERTIFICATION

Name of Permittee:
Name of Facility: ALLIED BUILDING SUPPLY
Location: 101 W. ELIZABETH AVENUE, LINDEN, N.J.

NJPDES Number: NJ

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 26-35296

This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74°-15'-11.8"
Latitude (one-tenth of a second): North 40°-37'-45.3"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 30.29
Owners Well Number (As shown on the application or plans): M.W.#2

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

DOMINICK J. VENDITTO, III
PROFESSIONAL LAND SURVEYOR
PROFESSIONAL PLANNER
632 ASHWOOD AVENUE
ROSELLE PARK, N.J. 07204

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

#30093

PROFESSIONAL LAND SURVEYOR'S LICENSE #

SEAL

bev/MJM/form.b

GROUND WATER MONITORING WELL CERTIFICATION
FORM B - LOCATION CERTIFICATION

Name of Permittee: _____
Name of Facility: ALLIED BUILDING SUPPLY
Location: 101 W. ELIZABETH AVENUE, LINDEN, N.J.

NJPDES Number: NJ _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 26-35297

This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74°-15'-13.9"
Latitude (one-tenth of a second): North 40°-37'-44.9"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 27.98
Owners Well Number (As shown on the application or plans): M.W.#3

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

DOMINICK J. VENDITTO, III
PROFESSIONAL LAND SURVEYOR
PROFESSIONAL PLANNER
632 ASHWOOD AVENUE
ROSELLE PARK, NJ 07204

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

#30093

PROFESSIONAL LAND SURVEYOR'S LICENSE #

SEAL

bev/MJM/form.b

GROUND WATER MONITORING WELL CERTIFICATION
FORM B - LOCATION CERTIFICATION

Name of Permittee: _____
Name of Facility: ALLIED BUILDING SUPPLY
Location: 101 W. ELIZABETH AVE., LINDEN, N.J.

NJPDES Number: NJ _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831): 26-35298

This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second): West 74°-15'-13.5"
Latitude (one-tenth of a second): North 40°-37'-44.3"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 28.19
Owners Well Number (As shown on the application or plans): M.W. #4

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

DOMINICK J. VENDITTO, III
PROFESSIONAL LAND SURVEYOR
PROFESSIONAL PLANNER
632 ASHWOOD AVENUE
ROSELLE PARK, NJ 07204

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

#30093

PROFESSIONAL LAND SURVEYOR'S LICENSE #

SEAL

bev/MJM/form.b

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL
PROTECTION AND ENERGY
Bureau of Underground Storage Tanks
CN-028
401 East State Street
Trenton, NJ 08625

CHRISTINE TODD WHITMAN
Governor

ROBERT C. SHINN, JR.
Commissioner

AUG 12 1994

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Lori A. Connors
Bressler, Amery & Ross
Counselors at Law
P.O. Box 1980
Morristown, New Jersey 07962

Mr. Daniel Winters
101 West Elizabeth Avenue Corporation
581 Rahway Avenue
Union, New Jersey 07083

Re: Allied Building Supplies
101 West Elizabeth Avenue
Linden, Union County
Case Number 93-06-24-1425; UST Number 0129486

Dear Ms. Connors:

On June 24, 1993, the New Jersey Department of Environmental Protection (Department) received notification of a discharge of hazardous substances, regulated under the Underground Storage of Hazardous Substances Act (N.J.S.A. 58:10A-21 et seq), which occurred from the above referenced facility. On September 23, 1993 and October 7, 1993, the Department sent letters stating the requirements for the proper investigation and the initiation of corrective action at Allied Building Supply's facility. The Department received a report from Tri-State Environmental Consultants, Inc. dated May, 1993 a report from Sailer Environmental Incorporated dated August 11, 1993 and two reports from Vectre Corporation dated February, 1994 and May, 1994 for Allied Building Supply indicating that the following steps were taken in compliance with our requirements.

In June, 1993, a 2,000-gallon steel gasoline underground storage tank (UST) was removed by JBC Environmental and Tri-State Environmental Consultants. Holes were discovered in the tank and visually stained soils observed. Approximately 70 tons of soils were excavated and stockpiled on site. The NJDEP hotline was notified of the discharge. A 550-gallon heating oil UST was abandoned in place at the same time as the 2,000-gallon tank was removed. In July, 1993, seven soil samples were collected from the base and sidewalls of the gasoline tank excavation by Sailer Environmental. Xylene was found to exceed the soil cleanup criteria in two samples and a duplicate. The base sample reported 48 ppm xylenes and the sidewall sample reported 47 ppm xylenes with the sidewall duplicate reporting 194 ppm xylenes. In August, 1993, American Resource Consultants installed three borings around the excavation area and collected six soil samples. All samples were within soil cleanup criteria except sample 105-MW1-11 which exhibited 131 ppm xylenes. This boring was developed into a monitoring well (MW-1). In December, 1993, Vectre Corporation installed three additional groundwater monitoring wells, collected one confirmatory soil sample from the 2,000-gallon gasoline UST excavation and collected three soil samples from the 550-gallon fuel oil tank excavation as well as collecting one soil sample from each soil pile. All soil sample results were below soil cleanup criteria.

Four groundwater monitoring wells are located on site. MW-1 is adjacent to and upgradient of the 2,000-gallon gasoline UST excavation area and recorded elevated levels of BTEX in September, 1993 (7.8 ppm) and December, 1993 (18.150 ppm). MW-2, MW-3 and MW-4 were sampled in December, 1993 with results below the method detection limits for all parameters. December 7, 1993 groundwater data indicates that depth to groundwater is between nine feet and eleven feet and groundwater flow is in an easterly/southeasterly direction. Given the groundwater flow direction, no downgradient wells exist for MW-1 or the 2,000-gallon gasoline UST excavation. No free phase product was observed in the groundwater monitoring wells.

The Allied Building Supply facility is located at 101 West Elizabeth Avenue in a commercial section of Linden, New Jersey. The site is bordered to the northeast and southeast by the new Jersey Transit Parking Lots, to the northwest by Elizabeth Avenue and to the southwest by commercial properties. A well search of the area indicated ninety-three monitoring wells, seven industrial wells, one potable well, six piezometers, one recovery well and three domestic wells within a one mile radius of the site.

Pursuant to the Authority vested in the Commissioner of the New Jersey Department of Environmental Protection (Department) by the Underground Storage of Hazardous Substances Act (N.J.S.A. 58:10A-21 et seq.) and duly delegated to the Chief of the Bureau of Underground Storage Tanks, the above referenced Remedial Investigation Workplan, submitted on behalf of Allied Building Supply, is hereby approved by the Department as conditioned below:

I. Remedial Investigation

A. Soil

Allied Building Supply should indicate the linear distance between sample point GT-1 and former sample point 105-MW1-11.

B. Ground Water

Allied Building Supply shall install additional ground water monitoring wells to fully delineate the horizontal and vertical extent of ground water contamination. Contamination shall be delineated to the Ground Water Quality Standards, N.J.A.C. 7:9-6, unless otherwise approved by the Department. At a minimum, ground water monitoring wells shall be installed within the 2,000-gallon gasoline UST excavation area and downgradient of the 2,000-gallon gasoline UST excavation area given that MW-1 is upgradient of the excavation area and contains elevated levels of BTEX. If it is necessary to install wells off-site, Allied Building Supply shall provide documentation of written requests seeking access to install said monitoring wells on off-site properties within thirty (30) calendar days of receipt of this correspondence. Please be advised that N.J.S.A. 58:10B, a statute concerning site remediation, provides a cause of action for persons to obtain access to properties not owned by that person for the purpose of conducting remedial activities at that site. Please see the attached information on this provision of N.J.S.A. 58:10B for further information.

Allied Building Supply shall submit boring logs and the monitoring well construction details (Well Certification Forms A and B, enclosed) for all newly installed monitoring wells.

Allied Building Supply shall sample every monitoring well which does not contain free product and analyze the samples for volatile organics, methyl tertiary butyl ether (MTBE) and tertiary butyl alcohol (TBA) using EPA Method 624 calibrated for xylenes, with a library search (VOs) and for lead using EPA Method 200.7 (ICAP) or EPA 239.2 (Graphite Furnace) calibrated to achieve a method detection limit of 10 ppb. The SW-846 equivalent for this procedure is ICAP 3010/6010, sample prep 3050/6010 Furnace 3020/7421 sample prep 3050/2421.

For each sampling event, Allied Building Supply shall submit a table to include for each monitoring well: 1.) top of casing elevation; 2.) top of screen elevation; 3.) ground water elevation (corrected for free phase product if present); 4.) free phase product elevation (if present); and 5.) free phase product thickness (if present).

For each sampling event, Allied Building Supply shall construct a scaled isopleth map of free product thickness where free product exists, and scaled isopleth maps for dissolved product concentrations. Allied Building Supply shall submit the updated maps with each subsequent submittal.

Allied Building Supply shall construct and submit scaled, ground water table contour maps for each ground water sampling event.

C. Receptor Evaluation

The Department has no further requirements at this time.

II. Quality Assurance

All data submitted shall conform to the Reduced Laboratory Deliverables Format in accordance with the "Technical Requirements for Site Remediation", N.J.A.C. 7:26E (also see Enclosure #2), except where specifically indicated.

III. Other

A. Certification Requirements

It is important to note that effective April 25, 1992, all persons performing tank services must be certified per N.J.S.A. 58:10A-24.1-8. **All work related to any tank service must now be conducted by, or under the on-site immediate supervision of an individual certified in the activity being conducted.** All documents (permit applications, reports, proposals) submitted to BUST must be prepared and signed by a certified individual.

B. Field Activity Notification

Allied Building Supply shall notify the assigned BUST Case Manager at least 14 calendar days prior to implementation of all field activities. If Allied Building Supply fails to initiate sampling within 30 calendar days of the receipt of this letter, any requests for an extension of the required time frames may be denied.

C. Billing

On April 5, 1993, the UST Fee Rule (Amendments and New Rules at N.J.A.C. 7:14B) was proposed. This rule appeared in the February 22, 1994, New Jersey Register. Effective February 22, 1994, the Department will be billing you for the Department's oversight of all work conducted at your site. Documents submitted to the Department in accordance with the "Technical Requirements for Site Remediation" (N.J.A.C. 7:26E) will help reduce the time necessary for the Department oversight of your case. At this time, the Department intends to process bills on a semi-annual basis. Please consult the April 5, 1993 and February 22, 1994, State Registers for details. Copies can be obtained by contacting the Office of Administrative Law at (609) 588-6500. Your case manager should be contacted with any additional questions.

IV. Administrative Requirements

Based upon the above requirements and the data generated to date, Allied Building Supply is required to submit a RAW in accordance with N.J.A.C. 7:26E-6.2 and P.L. 1993, c.139 (S-1070). This document shall be submitted to this Bureau at the above address, within **ninety (90)** days upon receipt of this letter. The RAW shall detail all activities conducted to achieve compliance with the requirements listed in this letter (in the form of a Remedial Investigation Report (RIR) in accordance with N.J.A.C. 7:26E-4.9) and present a comprehensive remedial proposal for all soil and ground water contamination present as the result of the discharge(s) based upon all data collected to date. Please note that only one copy of the Quality Assurance/Quality Control Deliverables is needed. Guidance regarding the minimum requirements and presentation format for this document are provided below and in the enclosures.

It should be noted that if Allied Building Supply completes all of the above requirements and the data indicate that the remedial investigation has not been completed (i.e. contamination not completely delineated), Allied Building Supply shall submit a Remedial Investigation Workplan (RIW) in accordance with N.J.A.C. 7:26E-4.8 within the specified time frame. The RIW shall include a schedule of implementation of the remaining remedial investigation required and the submittal date of the RAW. Allied Building Supply also has the option of completing the remaining remedial investigation in accordance with N.J.A.C. 7:26E-4, followed by the submission of the RIR/RAW. If the latter option is selected, Allied Building Supply shall notify the Case Manager listed below, in writing, within two weeks prior to the specified time frame referenced above. This notification shall include a generic discussion of activities conducted to date and activities to be conducted, as well as a detailed schedule of implementation which includes the submission of the RIR/RAW.

The "Technical Requirements for Site Remediation" rules (N.J.A.C. 7:26E) appeared in the June 7, 1993, New Jersey Register and became effective on July 1, 1993. These rules contain the minimum technical requirements concerning the environmental investigation and remediation at contaminated sites or sites at which contamination is suspected. These rules are being used as the Department's primary technical document, replacing the Division of Responsible Party Site Remediation's Remedial Investigation Guide, the ECRA Cleanup Plan Guide, the Bureau of Underground Storage Tanks' (BUST) Scope of Work document (and appendices) and the BUST Technical Guidance Document.

It should be noted that technical requirements are included in subchapters 7, 8 and 9 of the regulations implementing the Underground Storage of Hazardous Substances Act (N.J.A.C. 7:14B-1-13 and 15). The responsible person(s) that are conducting an environmental investigation/remediation should be following the "Technical Requirements for Site Remediation" to accomplish the investigation. This will allow for consistent evaluation of any discharges and potential impacts.

V. Cleanup Criteria

The Department's most recent general guidance on contaminant cleanup criteria can be found in the April, 1994, edition of the Site Remediation Newsletter. It must be remembered, however, that the actual cleanup goal at a particular site is determined by the Department on a case-by-case basis and may be different than that in the above referenced newsletter. This variation may be due to many factors, including site specific human health and environmental exposure pathways, the presence of site contaminants not addressed in the newsletter, and site specific physical characteristics. In case specific situations, when cleanup criteria are modified from one previously established for that specific site, the Department will make every effort to expeditiously notify the responsible party. Please consult the Case Manager listed below to discuss any modifications which may impact your remedial actions.

If the person conducting a cleanup does not wish to remediate a contaminated site consistent with the newsletter, they shall submit a proposal to the Case Manager listed below that details the site specific circumstances and technical rationale for cleanup goals on a case-by-case basis.

Please note that the Ground Water Quality Standards (N.J.A.C. 7:9-6) have been adopted and appeared in the February 1, 1993, New Jersey Register. This rule adoption may impact requirements for ground water remediation and soil cleanup (i.e. where the soil may contribute contaminants to the ground water above the applicable standards) for a particular site and should be referenced and discussed with the Case Manager listed below.

VI. Remedial Action Workplan Submission

A. The Remedial Action Workplan Format (N.J.A.C. 7:26E-6)

To ensure a complete and timely review of the submittal, the RAW shall be a self-supporting document. As a guide to this process, the following elements shall be included in the formation of the plan:

1. Table of Contents

2. Introduction. Include site acreage, site use during the release, current site use, local land use, local topography, geology, and hydrogeology.

3. Summary of UST-Related Environmental Concerns. This shall include the results of all previous soil and ground water sampling in tabular form, including scaled site maps in the form of a Remedial Investigation Report in accordance with N.J.A.C. 7:26E-4.9. A detailed presentation of the items required (above) in this letter shall be included.

4. Effectiveness Analysis and Certification. This shall include an analysis and certification that the proposed remedial action meets the criteria contained in Section 35 (g) of P.L. 1993, c.139, including an analysis of long and short term effectiveness, implementability, timeliness, cost differential of permanent and nonpermanent remedies (if applicable), and community concerns. Please note that the Effectiveness Analysis and Certification supersedes the Remedial Alternative Analysis in N.J.A.C. 7:26E-5.

5. Summary of Proposed Remedial Actions. This shall include a detailed description of the remedial action and remedial technology(s) to be utilized for each area of concern for site cleanup, the media to be affected by each technology, scaled site maps detailing the areas where remedial action will be conducted (N.J.A.C. 7:26E-6.2(a)6), supporting technical information appropriate to the technology and volumes of each media to be remediated (including vertical and horizontal extent). The following technical information shall be included, where applicable to the remedial technology chosen:

   a. the hydraulic conductivity of the affected aquifer(s), including calculations;
   b. calculations and maps showing the predicted capture zones;
   c. calculations of the optimum pump rate and number of ground water and/or air withdraw points, or trench configuration required to control the plume;
   d. calculation of the ground water velocity prior to pumping;
   e. grain size analyses; and,
   f. soil total organic carbon content and pH.

   Also included shall be a map(s) and description of the ground water monitoring wells to be used to monitor the effectiveness of the remediation, both at the source and at down gradient compliance points.

6. Identification of the treatment and disposal methods to be employed for any ground water or soil to be removed.

7. Cleanup levels to be achieved. Be specific with regard to media and compounds.

8. Summary of any permits necessary to implement the cleanup. Please note that the Department will not approve a RAW which proposes to discharge to a publicly-owned treatment works (POTW) without the prior written consent of the POTW.

9. The RAW shall detail the specific activities that will be used to complete the proposed cleanup objectives.

10. A post-remedial sampling and monitoring plan for each media to be remediated.

11. A specific Schedule of Implementation of the RAW which includes milestones in the project in accordance with N.J.A.C. 7:26E-6.5(a).

12. A proposal for Quarterly Remedial Action Progress Reports for the duration of the cleanup in accordance with N.J.A.C. 7:26E-6.5(b) and (c).

13. Estimate of costs for the proposed remedial actions, which shall include:

a. capital costs;
b. operation and maintenance costs;
c. monitoring system costs;
d. laboratory costs;
e. engineering, legal and administrative costs;
f. contingency costs; and
g. summary of all remedial costs incurred to date (see below).

14. A summary of the **total** costs of the remedial actions conducted to date shall be submitted with any RAW or request for No Further Action. These costs shall be broken down as follows:

    a. tank removal and disposal costs;
    b. capital costs including monitoring systems and equipment;
    c. mobilization costs, operation and maintenance including labor, utilities and repairs;
    d. consulting and labor costs including engineering, environmental, legal and administrative costs;
    e. analytical/laboratory costs;
    f. sample collection costs; and
    g. disposal costs including transportation, waste transfer fees and facility tipping fees.

15. A quality assurance plan including proposed sampling and analytical methods pursuant to N.J.A.C. 7:26E-2.2.

16. A description of the soil and sediment erosion control and monitoring plan, and dust and odor control and monitoring plan, if applicable.

17. An administrative checklist is provided (Enclosure #1) and should be used as additional guidance when formulating the RAW.

B. Data Presentation

Summarized analytical results shall be provided in accordance with N.J.A.C. 7:26E-4.9. Please note that N.J.A.C. 7:26E-4.9 includes, but is not limited to, the requirement that compound specific data presentation is provided in tabular form. The Department recommends that Allied Building Supply refer to the attached "Guidelines for Data Presentation" for additional guidance in the preparation of its submittal (Enclosure #2). Allied Building Supply shall collect all samples in accordance with the sampling protocol outlined in the May 1992 edition of the "NJDEPE Field Sampling Procedures Manual".

C. Permit Applications

All appropriate permit applications shall be submitted either prior to or in concert with the RAW submission. Copies of all permit application cover letters shall be provided with the RAW. In addition, the Department has recently established the Office of Permit Information Assistance (OPIA). OPIA's responsibilities include providing permit information to the public and assisting permit applicants through the permit coordination process when a project requires permits from various programs. OPIA can be reached at (609) 984-0857.

As a reminder, a New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Ground Water (DGW) permit will be required for any remedial system which involves a direct discharge to ground water (re-injection, overland flow, etc.) and some on-site soil treatment technologies which include a discharge to ground water. Since the case manager will be processing the NJPDES-DGW permit, the NJPDES-DGW permit application shall be submitted directly to the BUST Case Manager listed below. The DGW Permit for re-injection will also act as the Treatment Works Approval for the site. However, a licensed operator is required for the treatment system in accordance with N.J.A.C. 7:10-13 et seq. Please note that if ground water remediation activities result in a discharge to surface water, Allied Building Supply shall also obtain a NJPDES Discharge to Surface Water Permit (DSW), Category B (Industrial/Commercial Surface Water Discharge) or Category B4B (General Ground Water Petroleum Products Clean-up (GPPC) Permit). Any

discharge to a POTW in excess of 25,000 gallons per day requires a NJPDES Significant Indirect User Permit (NJPDES-SIU), Category L (Indirect Discharge to POTW). If ground water will be treated prior to discharge to surface water or to a POTW, a Treatment Works Approval (TWA) shall also be obtained. Air discharges from any remedial systems also require permit applications to be submitted to the Bureau of New Source Review. Finally, surface or ground water withdrawal in excess of 100,000 gallons per day (or 10,000 gallons or more in critical aquifers) requires approval by the Department. For further information contact, the Bureau of Permit Management (NJPDES-DSW or SIU) at (609) 984-4428, the Bureau of Connection and Construction (TWA) at (609) 984-4429, the Bureau of New Source Review (Air Permits) at (609) 292-6716, or the Bureau of Water Allocation (ground water withdrawal) at (609) 292-2957.

If Allied Building Supply fails to submit the required report within the referenced due date, this case will be referred to the Bureau of Applicability and Compliance (BAC) for review. The Department may initiate enforcement action including, but not limited to, the assessment of penalties and revocation of tank operating registrations pursuant to N.J.S.A. 58:10A-21 et seq. and N.J.A.C. 7:14B-12. The Department reserves the right to implement all enforcement measures, including the right to revoke tank operating registrations and assess penalties from the original due date.

If the tank(s) at the referenced facility is/are regulated under the federal Hazardous and Solid Waste Amendments of 1984 and Allied Building Supply fails to comply with the above requirements, this case may be referred to the United States Environmental Protection Agency (USEPA) for violations of 40 CFR Part 280.

Please note, pursuant to N.J.S.A. 58:10A-21 et seq. and N.J.A.C. 7:14B et seq., the owner and operator of the regulated underground storage tanks are strictly liable for compliance with these requirements. Violators are liable for penalties of up to $50,000 per day for each day of continuing violation and revocation of tank registrations.

If you should have any questions regarding this matter, please contact Allan Motter, Case Manager, of the Bureau of Underground Storage Tanks at (609) 984-3156.

Sincerely,

Erick P. Kinsel

Erick P. Kinsel, C.P.G., Unit Supervisor
Bureau of Underground Storage Tanks

enclosures:
Enclosures 1 & 2
Off Site Access Document
Well Forms A & B

c: Linden Board of Health, w/o enclosures

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL
PROTECTION AND ENERGY
Bureau of Underground Storage Tanks
CN-028
401 East State Street
Trenton, NJ 08625

CHRISTINE TODD WHITMAN
Governor

ROBERT C. SHINN, JR.
Commissioner

DEC 8 1994

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Lori A. Connors
Bressler, Amery & Ross
Counselors at Law
P.O. Box 1980
Morristown, New Jersey 07962

Mr. Daniel Winters
101 West Elizabeth Avenue Corporation
581 Rahway Avenue
Union, New Jersey 07083

Re: Site Inspection/Well Installation
Allied Building Supplies
101 West Elizabeth Avenue
Linden, Union County
Case Number 93-06-24-1425; UST Number 0129486

Dear Ms. Connors and Mr. Winters:

On November 29, 1994, the New Jersey Department of Environmental Protection (Department), represented by Allan Motter, Case Manager, inspected the Allied Building Supplies site and observed the installation of two (2) additional monitoring wells. The following observations were made:

Drilling of well to the southeast of the main on site building (between property and Pennsylvania Railroad) was in progress when Mr. Motter arrived on site. Mr. Motter met with Doug Harm of Brinkerhoff Environmental Services, Inc. who is serving as Allied Building Supplies' consultant. Diamond Drilling Co. of Jackson, NJ steam cleaned the hollow stem augers and set the well at seventeen feet (17') in depth (with ten feet [10'] of screen); the new well is forty-five feet (45') from the eastern corner of the building on the southeastern side and is ten feet (10') from the building wall adjacent to the garage door. The boring for second monitoring well was started at thirty-one feet (31') from the northern corner of the building and five feet (5') from the wall within the gasoline tank excavation. Water was encountered at two feet (2') and well was screened from two to twelve feet (2' - 12').

Mr. Motter observed that MW-1 had been excavated during backfilling of the gasoline tank excavation and observed the concrete which had surrounded the standpipe and the excavated standpipe with a portion of the PVC casing still attached. Mr. Motter and Mr. Harm could not locate the previous position of MW-1. Mr. Motter and Mr. Harm proceeded to measure distances between buildings, excavations and monitoring wells. It was observed that MW-3 is approximately twenty-five feet (25') from the heating oil tank excavation.

Mr. Motter observed five (5) drums labelled: MW-1 soil 8/29/93; MW-1 Development Water 8/30/93; MW-1 Soil 8/29/93; MW-1 Soil 8/29/93; and SB-2 Soil 8/29/93 located on the concrete pad. These drums were filled with material. Five (5) empty or partially rubble filled drums were also observed scattered throughout the site.

Based upon the observations during the site investigation, the following deficiencies shall be addressed as required below. The results of the additional remedial investigations required shall be submitted as part of a Remedial Action Workplan (RAW), previously required by the Department's August 12, 1994 letter to Allied Building Supplies' representatives and due January 31, 1995.

Remedial Investigation

A. Monitoring Well MW-1

Allied Building Supplies shall either locate and restore monitoring well MW-1 or locate and properly abandon monitoring well MW-1 and re-install a replacement monitoring well MW-1A within ten feet (10') of the former MW-1 location. Allied Building Supplies shall submit boring logs and the monitoring well construction details (Well Certification Forms A and B, enclosed) for all newly installed monitoring wells. Allied Building Supplies shall submit a Well Abandonment Form for all abandoned monitoring wells.

B. Waste Disposal

Pursuant to N.J.A.C. 7:26-8.5, Allied Building Supplies shall determine if the drummed wastes are hazardous wastes. Allied Building Supplies shall provide any sample results and the rationale used for the categorization of all wastes generated by this investigation and/or cleanup to assure proper handling and disposal. Please be advised that improper waste treatment, storage or disposal of hazardous wastes is a violation of State and Federal Hazardous Waste Regulations. As a reminder, all non-hazardous waste must be removed from the site to an approved facility within six months after generation. Allied Building Supplies shall remove all hazardous waste to an approved facility within 90 days after generation. Interim storage of hazardous waste shall be in accordance with N.J.A.C. 7:26-9. The storage of hazardous waste in piles is strictly prohibited. Please be advised that all soils reuse plans must be prepared in accordance with the "Management of Excavated Soils" guidance document and shall receive prior approval from the Department before their implementation.

C. Heating Oil Tank and MW-3

Oversite of the 550-gallon fuel oil tank which was abandoned in place is being transferred to the Bureau of Field Operations, Case Assignment Section for reassignment. Please direct all correspondence to:

New Jersey Department of Environmental Protection
Bureau of Field Operations
Case Assignment Section
Attention: Mark Pederson
401 E. State Street, 4th Floor
CN 028
Trenton, NJ 08625

Enclosed find a Memorandum of Agreement (MOA) package which will allow Allied Building Supplies to address this area of concern under an MOA managed by the Bureau of Field Operations. It should be noted that the monitoring well installed to monitor the abandoned tank is located over twenty-five feet from the abandoned tank in a side gradient direction.

If you should have any questions regarding this matter, please contact Allan Motter, Case Manager, of the Bureau of Underground Storage Tanks at (609) 984-3156.

Sincerely,

Erick P. Kinsel

Erick P. Kinsel, C.P.G., Unit Supervisor
Bureau of Underground Storage Tanks

enclosures:
Well Forms A & B
Well Abandonment Form
MOA Package

c: Linden Board of Health, w/o enclosures
Mark Pederson, Bureau of Field Operations, Case Assignment Section

REMEDIAL ACTION WORKPLAN ADDENDUM

Allied Building Supplies
101 West Elizabeth Avenue
Linden, Union County, New Jersey

UST #0129486
Case #93-06-24-1425

Prepared for:

Mr. Daniel Winters
SELRITE Millwork Corporation
581 Rahway Avenue
Union, NJ 07083

February 23, 1995

BRINKERHOFF ENVIRONMENTAL SERVICES, INC.
2430 HIGHWAY 34
BUILDING A, FIRST FLOOR
MANASQUAN, NEW JERSEY 08736
Tel: (908)223-2225 Fax: (908) 223-3666

BES Job #94139A

REMEDIAL ACTION WORKPLAN ADDENDUM

Allied Building Supplies
101 West Elizabeth Avenue
Linden, Union County, New Jersey

UST #0129486
Case #93-06-24-1425

Prepared for:

Mr. Daniel Winters
SELRITE Millwork Corporation
581 Rahway Avenue
Union, NJ 07083

February 23, 1995

BES Job #94139A

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Exhibit I - Well Records, Form A and B

Exhibit II - Monitoring Well Sampling Data Form

Exhibit III - Laboratory Analytical Results

Remedial Action Workplan Addendum
Allied Building Supplies
101 West Elizabeth Avenue
Linden, Union County, New Jersey

UST #0129486
NJDEP Case #93-06-24-1425

February 23, 1995

1.0 Introduction

Brinkerhoff Environmental Services, Inc. (BES) was retained by SELRITE Millwork Corporation to prepare a Remedial Action Workplan (RAW) Addendum for Allied Building Supplies (Allied) in accordance with the August 12, 1994 NJDEP correspondence addressed to Mr. Daniel Winters of Allied. The site is located at 101 West Elizabeth Avenue, Linden, Union County (see Figure 1). The RAW Addendum included the installation of two (2) groundwater monitoring wells, groundwater sampling and laboratory analysis.

During previous site activities, the casing and upper two (2) feet of monitoring well MW-1 had been damaged. This well was repaired two weeks before sampling was performed.

The following report presents the results of the investigation, including a request for natural attenuation at this site.

2.0 Groundwater Investigation

2.1 Monitoring Well Installation and Repair

On November 30, 1994, two (2) four (4) inch PVC monitoring wells were installed at the site by Diamond Drilling Company, Inc. Monitoring well MW-5 was installed within the former UST excavation at the downgradient edge and MW-6 was installed downgradient of the former excavation (see Figure 2). Monitoring well records are included as Exhibit I of this report.

During previous site activities monitoring well MW-1 was damaged. On December 29, 1994, MW-1 was repaired by Diamond Drilling. The protective casing and upper two feet of solid PVC were repaired. With the exception of the upper two feet of the well, MW-1 was relatively free of debris. The well was purged to assure any debris in the well was removed.

Wells MW-1, MW-5 and MW-6 were surveyed to a site bench mark by a licensed surveyor. All six (6) wells are tied to the same benchmark. Certification Forms A and B are included in Exhibit I of this report.

2.2 Groundwater Sampling

On January 16, 1995, the six (6) monitoring wells located on the property were sampled by BES personnel in accordance with the May 1992 NJDEP *Field Sampling Procedures Manual*. The samples were collected within two feet of the static water level after purging the wells a minimum of three standing columns of water. The monitoring well samples were collected with a dedicated stainless steel and Teflon bailer which was laboratory cleansed, then transferred to sealed laboratory glassware suitable for volatile organic compounds and lead. Monitoring well data forms are included in Exhibit II of this report.

2.3 Groundwater Analytical Summary

The samples collected, designated MW-1 through MW-6 and a field and trip blank, were submitted to a New Jersey certified laboratory, Accredited Laboratories, Inc., for analysis. Samples were analyzed for volatile organic compounds with a forward library search (VO+10), MTBE, TBA, and lead. Laboratory analytical results are included as Exhibit III of this report and summarized in Table I, below.

TABLE I
Groundwater Sampling Results
Volatile Organic Compounds, MTBE, TBA and Lead
Allied Building Supply
January 16, 1995
(results in ppb)

Sample ID	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	TBA	Lead	TIC's
MW-1	~~35~~ 37	79	60	267	50U	50U	~~46~~ 12	~~189~~ 263
MW-2	5U	5U	5U	5/10U	50U	50U	10U	~~298~~ 8
MW-3	5U	5U	5U	5/10U	50U	50U	10U	ND
MW-4	5U	5U	5U	5/10U	50U	50U	10U	ND
MW-5	5U	5U	5U	5/10U	50U	50U	~~12~~ 46.1	ND
MW-6	5U	5U	5U	5/10U	50U	50U	15.8	ND
Field Blank	5U	5U	5U	5/10U	50U	50U	10U	ND
Trip Blank	5U	5U	5U	5/10U	50U	50U	-	ND
*NJDEP Standard	1	1,000	700	40	700	500	10	-

U-Not detected above instrument detection limit. Preceding number is detection limit; ND-Compound not detected; *NJDEP Class II-A Specific Groundwater Quality Criteria; Please note that MW-1 and MW-5 were inadvertently mislabeled during sampling activities. Corrections have been made on the attached laboratory data.

Volatile organic compounds and lead were detected in sample MW-1. Benzene was detected at a concentration of 35 parts per billion (ppb), total xylenes were detected at a concentration of 267 ppb, and lead was detected at a concentration of 46 ppb. Lead was also detected in samples MW-5 and MW-6 at concentrations of 12 ppb and 15 ppb, respectively. No other volatile organic compounds were detected, with the exception of trace levels of methlyene chloride and acetone, common laboratory contaminants.

Groundwater sampling results show a decrease in the level of petroleum related compounds in MW-1 since the previous sampling event conducted by Vectre, Inc. in December 1993. The December 1993 sampling event reported benzene at 350 ppb, toluene at 7,500 ppb, ethylbenzene at 1,600 ppb and xylenes at 2,230 ppb.

2.4 Site Hydrogeology

Subsurface soil consists of red clayey fine sand with some medium coarse sand pebbles and shale fragments to a depth of 17.5 feet below grade, the maximum depth of stratigraphic section drilled.

Depth to groundwater ranged from 2.17 feet in MW-5 to 12.43 feet in MW-6. The shallow depth of groundwater in MW-5, located within the former UST excavation, is likely due to perched water within the former tank field area. Groundwater flow direction is toward the northeast as shown on Figure 3 - Groundwater Contour Map. A small anomaly in flow direction is present at MW-5. This well is located within the former tank excavation and shows a false high in depth to groundwater, caused by water perched within the former excavation. Monitoring well data is presented in Table II, below.

TABLE II
Monitoring Well Data
Allied Building Supply
January 16, 1995
(results in feet)

	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
Casing Elevation	29.23	30.29	27.98	28.19	29.71	30.60
Well Depth	15.15	19.55	14.45	19.45	12.61	17.09
Depth to Screen	2.98	N/A	N/A	N/A	N/A	7.52
Depth to Groundwater	9.76	11.11	8.18	8.49	2.17	12.43
Product Thickness	0.0	0.0	0.0	0.0	0.0	0.0
Groundwater Elevation	19.47	19.18	19.80	19.70	27.54	18.17

3.0 Recommendations

BES conducted a remedial investigation at Allied Building Supplies, which included the installation and sampling of groundwater monitoring wells.

Groundwater sampling results showed gasoline related volatile organic compounds in only one (1) of the six (6) monitoring wells on-site. Benzene was detected at 35 ppb and xylenes were detected at 267 ppb in well MW-1, which is located on the immediate upgradient edge of the former tank excavation. Monitoring wells MW-2, MW-5 and MW-6, located downgradient to slightly side gradient of the former UST excavation, reported no detectable gasoline related volatile organics.

Lead was detected in three (3) monitoring wells at levels ranging from 12 ppb in MW-5, 15 ppb in MW-6 and 46 ppb in MW-1.

BES recommends natural attenuation be considered as a mechanism for remediation at this site. Laboratory analytical data and site specific geologic and hydrogeologic conditions favor natural attenuation. Only one (1) well has shown localized levels of gasoline related volatile organics and no gasoline related volatile organics were detected in downgradient wells. The abundant clay in subsurface sediment and the perched water present within the former tank excavation suggest a slow groundwater flow rate at this site. The combination of both a limited extent of impacted groundwater and a slow migration rate indicate natural attenuation will be effective in preventing any off-site migration of contaminants.

An in-depth discussion of natural attenuation as an appropriate remedial method for this site is set forth in the Remedial Action Workplan dated May 1994, which was previously submitted to your attention.

This report was prepared and is respectfully submitted by:
Brinkerhoff Environmental Services, Inc.

2/23/95
Doug Harm, P.G. Date
Senior Consultant/Certified Geologist
NJDEP Subsurface Evaluator No. 650

Suzanne Wiser 2/23/95
Suzanne Wiser Date
Environmental Scientist

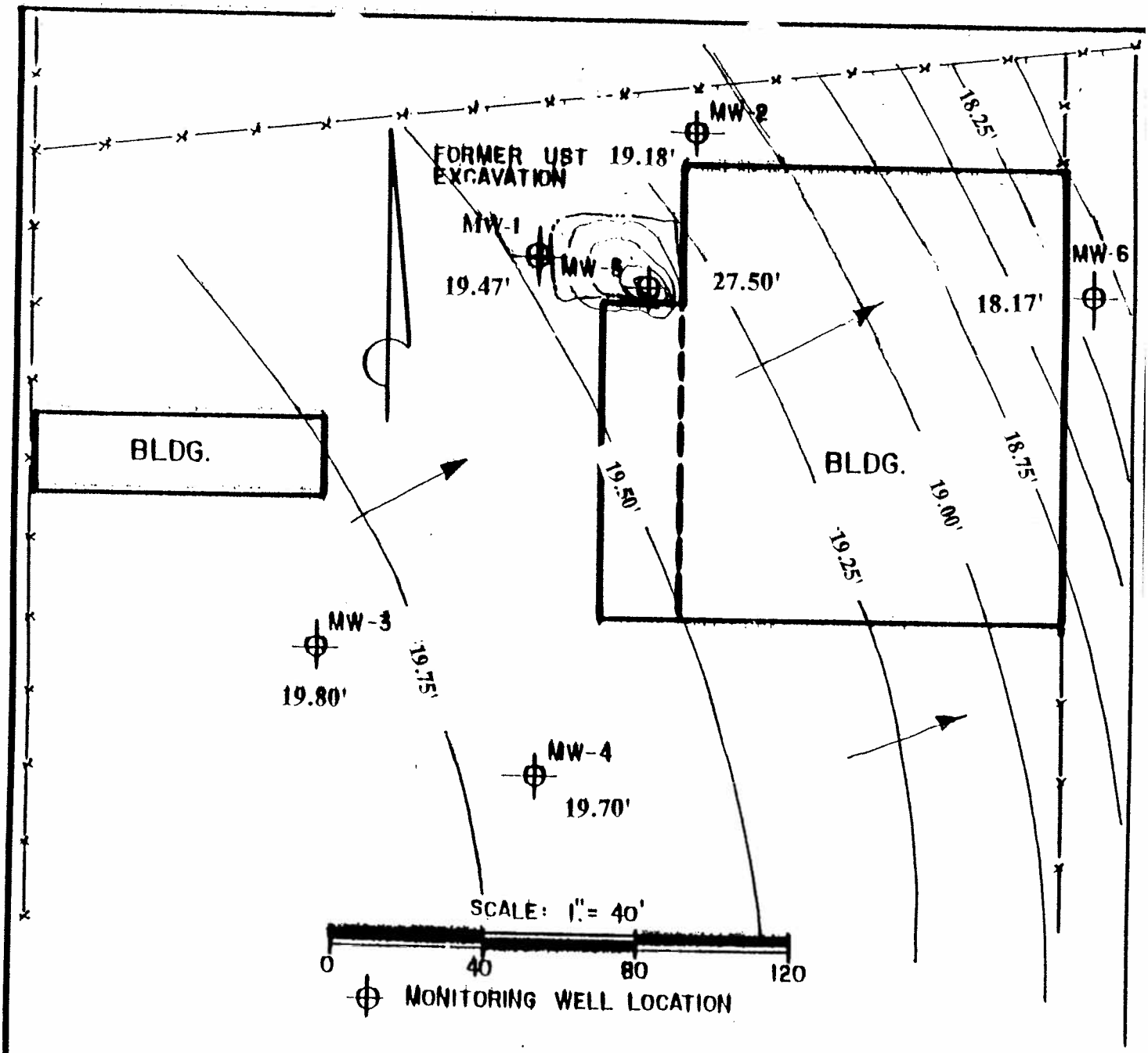


FIGURE 3

GROUNDWATER CONTOUR MAP
JANUARY 16, 1995

Allied Building Supply
101 West Elizabeth Ave.
Linden, New Jersey

Contour Interval = 0.25'

→ Groundwater Flow Direction

BRINKERHOFF ENVIRONMENTAL SERVICES, INC.
2430 HIGHWAY 34 - BLDG. A - 1st. FLOOR
MANASQUAN, NEW JERSEY, 08736

JOB NUMBER
BES NO. 94-139A

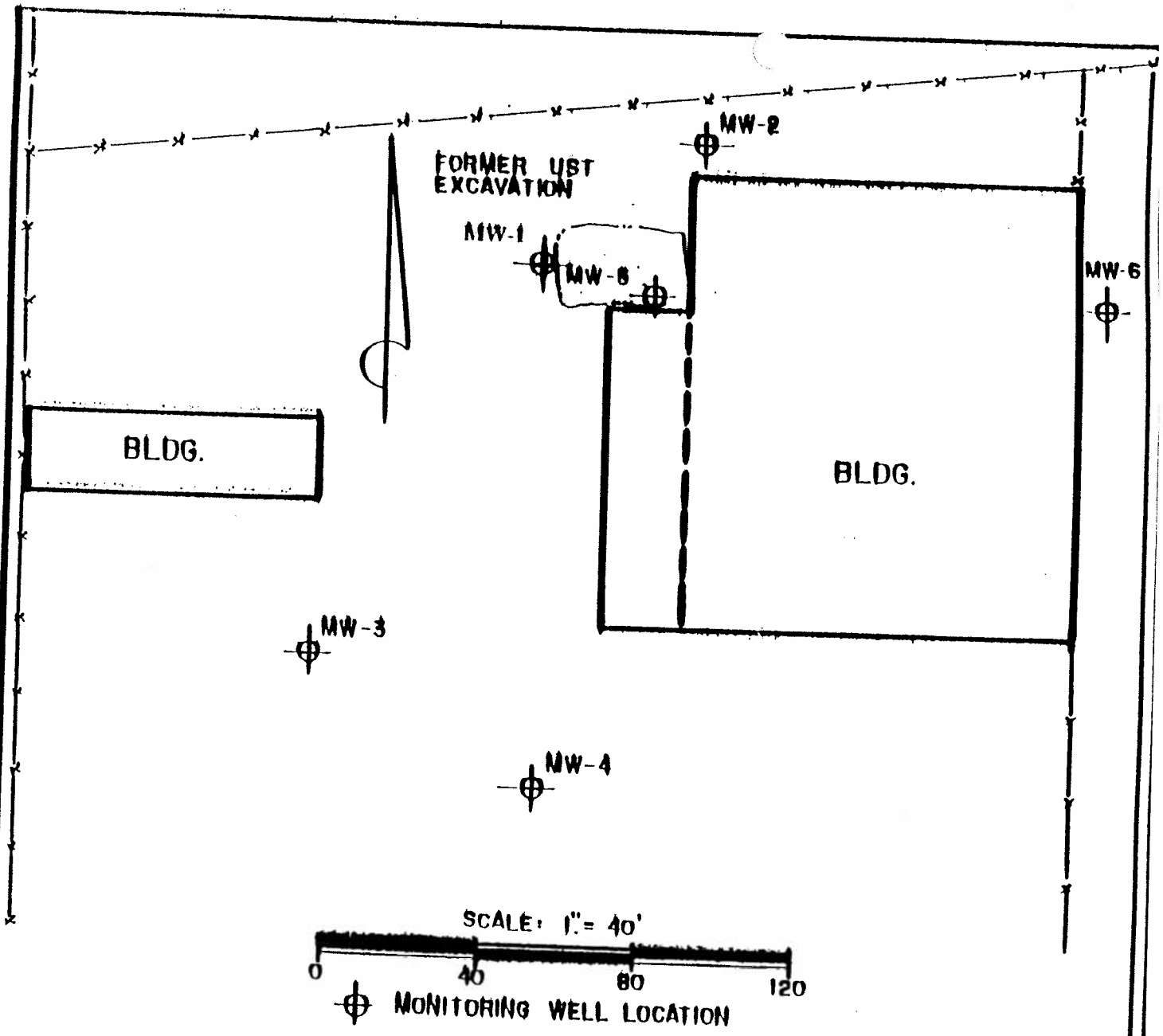


FIGURE 2

SITE PLAN MAP

Allied Building Supply
101 West Elizabeth Ave.
Linden, New Jersey

BRINKERHOFF ENVIRONMENTAL SERVICES, INC.
2430 HIGHWAY 34 - BLDG. A - 1st. FLOOR
MANASQUAN, NEW JERSEY, 08736

JOB NUMBER
BES NO. 94-139A

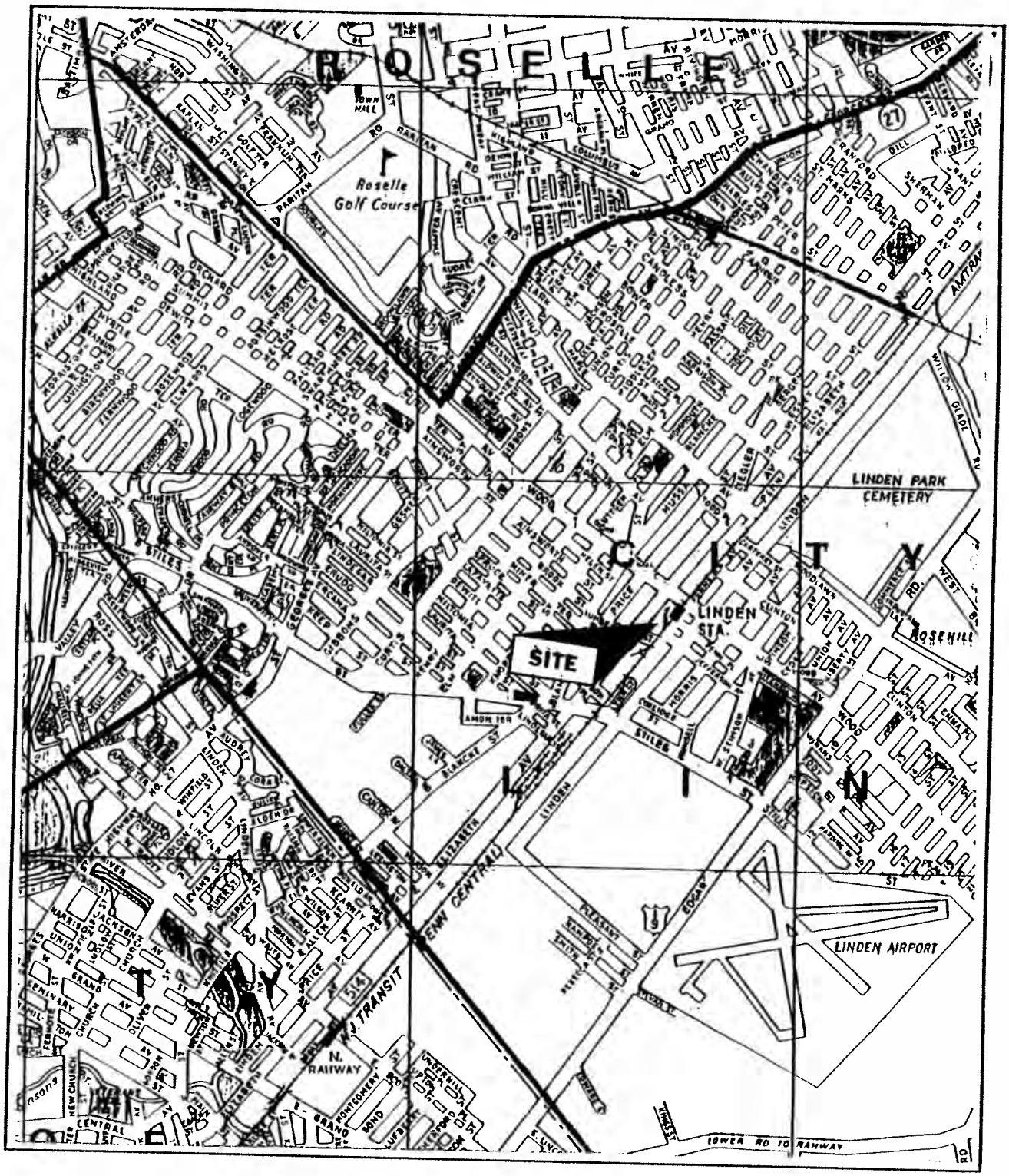


FIGURE 1

SITE LOCATION MAP

UNION COUNTY HAGSTROM

SCALE 1" = 2,000'

DWR-138 M
12/91

New Jersey Department of Environmental Protection and Energy
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 20 - 38051
Atlas Sheet Coordinates 28 J 31 : 322

OWNER IDENTIFICATION - Owner SELECTIVE BILLBOARD CORPORAT
Address 581 RAHWAY AVENUE P.O.BOX 387
City UNION State NJ Zip Code 07083

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW 5
County UNION Municipality LINDEN CITY Lot No. 10 Block No. 95.4
Address LOT 10, ELIZABETH AVE., LINDEN, NJ 07036

TYPE OF WELL (as per Well Permit Categories) MONITORING Date well completed 11/30/94
Regulatory Program Requiring Well UST Case I.D. # 93-08-24-1425
CONSULTING FIRM/FIELD SUPERVISOR (if applicable) BRINKERHOFF ENV. Tele. # 908-223-2225

WELL CONSTRUCTION

Total depth drilled 12.98 ft.
Well finished to 12.98 ft.
Borehole diameter:
Top 10 in.
Bottom 10 in.
Well was finished: ☐ above grade ☑ flush mounted
If finished above grade, casing height (stick up) above land surface _____ ft.
Was steel protective casing installed? ☐ Yes ☑ No

	Depth to Top (ft.) [From land surface]	Depth to Bottom (ft.)	Diameter (inches)	Type and Material
Inner Casing	NONE			
Outer Casing (Not Protective Casing)	.27	2.98	4	Sched. 40 PVC
Screen (Note slot size)	2.98	12.98	4	Sched. 40 PVC (.02)
Tail Piece	NONE			
Gravel Pack	2.00	12.98	10	MORIE #1
Annular Seal/Grout	0	2.00	10	NEAT CEMENT
Method of Grouting	PRESSURE			

Static water level after drilling 3 ft.
Water level was measured using TAPE
Well was developed for .5 hours at NA gpm
Method of development DIAPHRAGM PUMP
Was permanent pumping equipment installed? ☐ Yes ☑ No
Pump capacity _____ gpm
Pump type: _____
Drilling Method AUGER
Drilling Fluid NONE Type of Rig CME 55
Name of Driller M. J. BRINKERHOFF
Health and Safety Plan submitted? ☐ Yes ☑ No
Level of Protection used on site (circle one) None (D) C B A
N.J. License No. 12377
Name of Drilling Company DIAMOND DRILLING CO., INC.

GEOLOGIC LOG

(Copies of other geologic logs and/or geophysical logs should be attached.)

0'-12.98' Red clayey fine sand with some med., coarse sand and pebbles.

I certify that I have drilled the above-referenced well in accordance with all well permit requirements and all applicable State rules and regulations.

Driller's Signature _____ Date 11-30-94

COPIES: White & Green - DEPE Canary - Driller Pink - Owner Goldenrod - Health Dept.

DWR-138 M
12/91

New Jersey Department of Environmental Protection and Energy
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 26 - 38082
Atlas Sheet Coordinates 26 : 31 : 322

OWNER IDENTIFICATION - Owner SEQUA HILLSIDE CORPORAT
Address 581 RAHWAY AVENUE P.O BOX 387
City UNION State NJ Zip Code 07083

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW 6
County ~~UNION~~ Municipality ~~LINDEN CITY~~ Lot No. ~~16~~ Block No. ~~251~~
Address 1010 W. ELIZABETH AVE, LINDEN, NJ 07036

TYPE OF WELL (as per Well Permit Categories) ~~MONITORING~~ Date well completed 11/30/94
Regulatory Program Requiring Well UST Case I.D. # 93-06-24-1425
CONSULTING FIRM/FIELD SUPERVISOR (if applicable) BRINKERHOFF ENV. Tele. # 908-222-2225

WELL CONSTRUCTION

Total depth drilled 17.52 ft.
Well finished to 17.52 ft.
Borehole diameter:
Top 10 in.
Bottom 10 in.
Well was finished: ☐ above grade ☑ flush mounted
If finished above grade, casing height (stick up) above land surface _____ ft.
Was steel protective casing installed? ☐ Yes ☑ No

	Depth to Top (ft.) [From land surface]	Depth to Bottom (ft.)	Diameter (inches)	Type and Material
Inner Casing	NONE			
Outer Casing (Not Protective Casing)	.38	7.52	4	Sched.40 PVC.
Screen (Note slot size)	7.52	17.52	4	Sched.40 PVC(.02)
Tail Piece	NONE			
Gravel Pack	5.50	17.52	10	MORIE #1
Annular Seal/Grout	0	5.50	10	NEAT CEMENT
Method of Grouting	PRESSURE			

Static water level after drilling 12.50 ft.
Water level was measured using ELEC. PROBE
Well was developed for .5 hours at NA gpm
Method of development DIAPHRAGM PUMP
Was permanent pumping equipment installed? ☐ Yes ☑ No
Pump capacity _____ gpm
Pump type: _____
Drilling Method AUGER
Drilling Fluid NONE Type of Rig CME 55
Name of Driller M. A. BRINKERHOFF
Health and Safety Plan submitted? ☐ Yes ☑ No
Level of Protection used on site (circle one) None (D) C B A
N.J. License No. 1237
Name of Drilling Company DIEDRO DRILLING CO., INC.

GEOLOGIC LOG (Copies of other geologic logs and/or geophysical logs should be attached.)

0'-5' Brown clay loam
5'-17.52' Red clayey Fine sd with some med., Coarse SAND AND PEBBLES.

I certify that I have drilled the above-referenced well in accordance with all well permit requirements and all applicable State rules and regulations.

Driller's Signature _____ Date 11-30-94

COPIES: White & Green - DEPE Canary - Driller Pink - Owner Goldenrod - Health Dept.

DIAMOND 9206387 P.02

DWR-133M (7/92) SERIAL # 38757

Mail to

Water Allocation
CN 029
Trenton, N.J. 08625

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
TRENTON, NJ

Permit No.

MONITORING WELL PERMIT

VALID ONLY AFTER APPROVAL BY THE D.E.P.E.

COORD #:

Owner SELRITE Millwork Corporation
Address 581 Rahway Avenue P.O. Box 387
Union, NJ 07083
Name of Facility Allied Building Supply
Address 101 West Elizabeth Avenue
Linden, NJ 07036

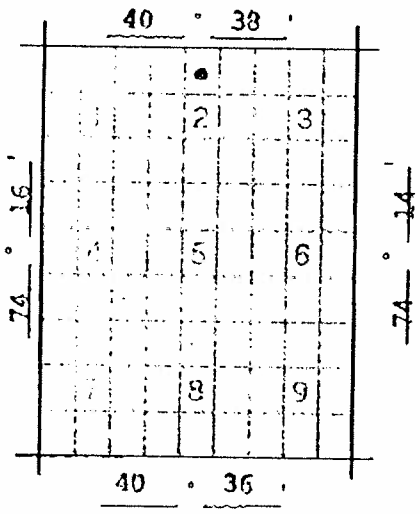
Driller Diamond Drilling Company
Address 339 South Stump Tavern Road
Jackson, NJ 08527

Diameter of Well(s)	4 Inches	Proposed Depth of Well(s)	20 Feet
# of Wells Applied for (max. 10)	2	Will pumping equipment be installed? YES ☐ NO ☒	
Type of Well (see reverse)	Monitoring	If Yes, give pump capacity	

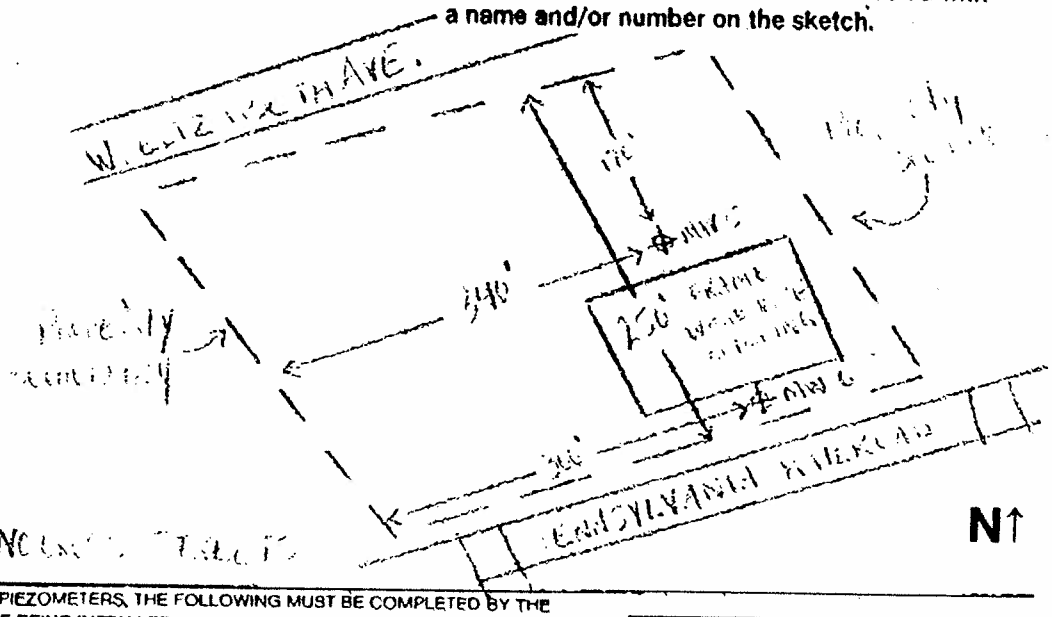
LOCATION OF WELL(S)

Lot #	Block #	Municipality	County
10	254	Linden	Union

State Atlas Map No. 26



Draw sketch of well(s) nearest roads, buildings, etc. with marked distances in feet. Each well MUST be labeled with a name and/or number on the sketch.



FOR MONITORING WELLS, RECOVERY WELLS, OR PIEZOMETERS, THE FOLLOWING MUST BE COMPLETED BY THE APPLICANT. PLEASE INDICATE WHY THE WELLS ARE BEING INSTALLED:

- ☐ Spill Fund Case
- ☐ ECRA Case
- ☐ CERCLA (Superfund) Site
- ☐ RCRA Site
- ☒ Underground Storage Tank
- ☐ NJPDES Municipal Discharge Permit
- ☐ NJPDES Industrial Discharge Permit
- ☐ Water and Hazardous Waste Enforcement Case
- ☐ Water Supply Aquifer Test Observation Well
- ☐ Other (explain)

Case I.D. Number
93-06-24-1425

This Space for Approval Stamp

NOV 16 1994

WATER ALLOCATION

FOR D.E.P.E. USE
☐ Issuance of this permit is subject to the conditions attached. (see next page)
☐ For monitoring purposes only
☒ The well(s) may not be completed with more than 25 feet of total screen or uncased borehole.

SEE REVERSE SIDE FOR IMPORTANT PROVISIONS AND REGULATIONS PERTAINING TO THIS PERMIT.

In compliance with N.J.S.A. 58:4A-14, application is made for a permit to drill a well as described above.

Date November 10, 1994

Signature of Driller [signature] License # 31496

Signature of Owner [signature]

COPIES: Water Allocation — White and Pink; Health Dept. — Yellow; Owner — Blue; Driller — White

MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION

(One form must be completed for each well)

Name of Owner: Selrite Millwork Corp.
Name of Facility: Allied Building Supply
Location: 101 West Elizabeth Ave., Linden, NJ
UST Registration No.: 0129486 BUST case No.: 93 . 06 . 24 . 1425

CERTIFICATION

Well Permit Number:	2 6 . 3 8 8 5 1 .
Owner's Well Number (As shown on the applicationor plans):	MW-5
Well Completion Date:	11/30/94
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	0.00
Total Depth of Well to the nearest 1/2 foot:	12.98
Depth to Top of Screen (or Top of Open Hole) From Top of Casing (one-hundredth of a foot):	2.98
Screen Length (or length of open hole) in feet:	10'
Screen or Slot Size:	020
Screen or Slot Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter (inches):	4"
Static Water Level From Top of Casing at the Time of Installation (one-hundredth of a foot):	2.61
Yield (gallons per minute):	1-2 GPM
Development Technique (specify):	pump
Length of Time Well is Developed/ Pumped or Bailed:	Hours 30 Minutes
Lithologic Log:	Attach

Authentication

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Doug Harm
Name (Type or Print)

Signature

P.G. 238 State of PA
Certification or License No.

Seal

Certification by Executive Officer or Duly Authorized Representative

Name (Type or Print)

Signature

Title

Date

MONITORING WELL CERTIFICATION - FORM A - AS-BUILT CERTIFICATION

(One form must be completed for each well)

Name of Owner: Selrite Millwork Corp.
Name of Facility: Allied Building Supply
Location: 101 West Elizabeth Ave., Linden, NJ
UST Registration No.: 0129486 BUST case No.: 93 - 06 - 24 - 1425

CERTIFICATION

Well Permit Number:	2 6 - 3 8 8 5 2 -
Owner's Well Number (As shown on the applicationor plans):	MW-6
Well Completion Date:	11/30/94
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):	0.00
Total Depth of Well to the nearest 1/2 foot:	17.52
Depth to Top of Screen (or Top of Open Hole) From Top of Casing (one-hundredth of a foot):	7.52
Screen Length (or length of open hole) in feet:	10'
Screen or Slot Size:	020
Screen or Slot Material:	PVC
Casing Material: (PVC, Steel or Other-Specify):	PVC
Casing Diameter (inches):	4"
Static Water Level From Top of Casing at the Time of Installation (one-hundredth of a foot):	12.43
Yield (gallons per minute):	1-2 GPM
Development Technique (specify):	pump
Length of Time Well is Developed/ Pumped or Bailed:	Hours 30 Minutes
Lithologic Log:	Attach

Authentication

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Doug Harm
Name (Type or Print)

Signature

P.G. 238 State of PA
Certification or License No.

Seal

Certification by Executive Officer or Duly Authorized Representative

Name (Type or Print)

Signature

Title

Date

Ground Water Monitoring Well Certification
Form B - Location Certification

Name of Permittee: _____
Name of Facility: ALLIED BUILDING SUPPLY
Location: 101 W. ELIZABETH AVENUE, LINDEN, N.J.
LOT 10, BLOCK 254, TAX MAP
NJPDES Number: NJ _____

Land Surveyor's Certification

Well Permit Number (as assigned by NJDEP's Water Allocation Section, 609-984-6831): _____

This number must be permanently affixed to the well casing

Longitude (one tenth of a second): West 74°-15'-12.6"
Latitude (one tenth of a second): North 40°-37'-45.3"
Elevation of Top of Casing (cap off) (one hundredth of a foot): Elev 29.23
Owners Well Number (as shown on the application of plans):

M.W. # 1

HOR. BASED ON NAD 1927
VERT. BASED ON USGS 1929

Authentication

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility if fine and imprisonment.

Professional Land Surveyor's Signature

DOMINICK J. VENDITTO, III
PROFESSIONAL LAND SURVEYOR
Professional Land Surveyor's Name
632 ASHWOOD AVENUE
ROSELLE PARK, NJ 07204

30093
Professional Land Surveyor's License #

Surveyor's Seal
NJPLS # 30093

Ground Water Monitoring Well Certification
Form B - Location Certification

Name of Permittee: _____
Name of Facility: ALLIED BUILDING SUPPLY
Location: 101 W. ELIZABETH AVE, LINDEN, N.J.
LOT 10, BLOCK 254, TAX MAP
NJPDES Number: NJ _____

Land Surveyor's Certification

Well Permit Number (as assigned by NJDEP's Water Allocation Section, 609-984-6831): _____

This number must be permanently affixed to the well casing

Longitude (one tenth of a second): West 74°-15'-12.3"
Latitude (one tenth of a second): North 40°-37'-45.1"
Elevation of Top of Casing (cap off) (one hundredth of a foot): Elev 29.71
Owners Well Number (as shown on the application of plans): M.W.#5

HOR. BASED ON NAD 1927
VERT. BASED ON USCG 1929

Authentication

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility if fine and imprisonment.

Professional Land Surveyor's Signature

DOMINICK J. VENDITTO, III
PROFESSIONAL LAND SURVEYOR
PROFESSIONAL PLANNER
632 ASHWOOD AVENUE
ROSELLE PARK, NJ 07204

Professional Land Surveyor's Name

30093

Professional Land Surveyor's License #

Surveyor's Seal

NJPLS 30093

Ground Water Monitoring Well Certification
Form B - Location Certification

Name of Permittee: _____

Name of Facility: ALLIED BUILDING SUPPLY

Location: 101 N. ELIZABETH AVE., LINDEN, N.J.
LOT 10, BLOCK 254, TAX MAP

NJPDES Number: NJ _____

Land Surveyor's Certification

Well Permit Number (as assigned by NJDEP's Water Allocation Section, 609-984-6831): _____

This number must be permanently affixed to the well casing

Longitude (one tenth of a second): West 74°-15'-11.2"

Latitude (one tenth of a second): North 40°-37-44.3"

Elevation of Top of Casing (cap off) (one hundredth of a foot): Elev 30.60

Owners Well Number (as shown on the application of plans): M.W. # 6

Hor. BASED ON NAD 1927
VERT BASED ON USGS 1929

Authentication

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility if fine and imprisonment.

Professional Land Surveyor's Signature

DOMINICK J. VENDITTO, III
PROFESSIONAL LAND SURVEYOR
PROFESSIONAL PLANNER
632 ASHWOOD AVENUE
ROSELLE PARK, NJ 07204

Professional Land Surveyor's Name

30093

Professional Land Surveyor's License #

Surveyor's Seal

NJPLS 30093

REMEDIAL ACTION REPORT

Allied Building Supplies
101 West Elizabeth Avenue
Linden, Union County, New Jersey

UST #0129486
NJDEP Case # 93-06-24-1425

February 27, 1996

Prepared for:
SELRITE Millwork Corp.
P.O. Box 387
Union, NJ 07083

BRINKERHOFF ENVIRONMENTAL SERVICES, INC.
2430 HIGHWAY 34
BUILDING A, FIRST FLOOR
MANASQUAN, NEW JERSEY 08736
Tel: (908)223-2225 Fax: (908) 223-3666

BES Job # 94193A

REMEDIAL ACTION REPORT

Allied Building Supplies
101 West Elizabeth Avenue
Linden, Union County, New Jersey

UST #0129486
NJDEP Case # 93-06-24-1425

February 27, 1996

Prepared for:
SELRITE Millwork Corp.
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Union, NJ 07083

BES Job # 94193A

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Exhibit I - Soil Disposal Manifest
Exhibit II - Laboratory Analytical Results (Soil Sampling - January 24, 1996)
Exhibit III - Monitoring Well Sampling Data Forms
Exhibit IV - Laboratory Analytical Results (Ground Water Sampling - December 21, 1995)
Exhibit V - Slug Test Data (Wells MW-2 & MW-4)
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Remedial Action Report
Allied Building Supplies
101 West Elizabeth Avenue
Linden, Union County, New Jersey
UST #0129486
NJDEP Case #93-06-24-1425

February 27, 1996

1.0 TECHNICAL OVERVIEW

The Allied Building Supplies (Allied) site is located at 101 West Elizabeth Avenue in the City of Linden, Union County, New Jersey (see Figure 1). A Remedial Action Workplan (RAW) was submitted by Vectre Corporation for the Allied site in May of 1994. The RAW proposed natural remediation/attenuation as the remedial alternative for the site.

In January of 1995, Brinkerhoff Environmental Services, Inc. (BES) was retained by SELRITE Millwork Corporation to conduct a site investigation for the Allied site. The remedial investigation was conducted to provide supportive data to the May 1994 RAW, and included the installation of two (2) ground water monitoring wells (MW-5 & MW-6), and collection and analysis of ground water samples. Figure 2 is a site map depicting well locations relative to property boundaries and structures.

Following the investigation, BES prepared a Remedial Action Workplan Addendum (RAWA) dated February 23, 1995, summarizing well installation, ground water sampling and results. Elevated levels of lead were detected in Wells MW-1, MW-5, and MW-6, and elevated levels of benzene and xylenes were detected in Well MW-1, during the January 6, 1995 ground water sampling event. Hydrogeological data collected during the investigation indicated a ground water mound was present in the area of the former gasoline underground storage tank (UST) excavation area surrounding Well MW-5 (see Figure 3).

The following Remedial Action Report (RAR) addresses outstanding issues regarding the Allied investigation, including recommendations for Case Closure through natural attenuation and designation of a Classification Exception Area (CEA). Activities conducted as part of this RAR are discussed below.

Previous soil sampling and analysis indicated elevated levels of xylenes remained in the soil surrounding the former gasoline UST excavation. BES supervised excavation of soil in the area of the elevated xylene samples, collected postexcavation soil samples, and disposed of contaminated soil removed from the excavation.

Four (4) on-site ground water monitoring wells were resampled using the "Low Flow" sampling methodology to reduce turbidity and sediment within the samples. A Ground water contour map was prepared for the sampling event. To assess aquifer characteristics necessary for calculating

contaminant transportation and degradation rates, rising head slug tests were conducted on Wells MW-2 and MW-6.

Activities associated with this RAR were conducted in accordance with the Technical Requirements for Site Remediation, N.J.A.C. 7:26E. Sampling was performed in accordance with May 1992 NJDEP *Field Sampling Procedures Manual.* Cleanup Standards were based on the Soil Cleanup Criteria, revised on February 3, 1994 and Ground Water Quality Standards, N.J.A.C. 7:9-6.

2.0 SOIL REMEDIATION

Since previous soil sampling results indicated elevated levels of xylenes remained in the soil along the southern perimeter of the former gasoline UST excavation, BES proposed to excavate and dispose of additional soil in this area. Previous soil sampling results are summarized in Table 1, below, and depicted on Figure 4.

Table 1
Previous Soil Sampling Results
(Results in ppm)

Sample #	Xylenes	*NJDEP
105-T1-01 [1]	**47**	10
105-T1-D [1]	**194**	10
105-T1-05 [1]	**48**	10
105MW1-11 [2]	**131**	10

*NJDEP - NJDEP Impact to Ground Water Soil Cleanup Criteria; [1]Samples collected by Sailer Environmental in July 1993; [2]Samples collected by American Resources Consultants, Inc. and reported in September 1993.

On January 24, 1996, under the supervision of BES, Disposal Systems Inc. excavated additional soil in the area of the former gasoline UST and as depicted in Figure 4. Approximately 15 tons of soil were removed from the area, and disposed of through Soil Remediation of Philadelphia. A soil disposal manifest is included in Exhibit I of this report.

Soil types encountered during the excavation included a brown to red-brown sandy silt loam and gravel fill material (within the former excavation area) and a red silty clay loam native soil (outside the former excavation area). At a depth of 10 feet below grade, soil lithology changed from a red silty clay loam to a fine sandy loam. Soil was excavated to a depth of 12.5 feet below grade. Samples were collected at 10.5 feet below grade, where soil was moist to wet, but not saturated. Soils were completely saturated at 11 feet below grade. Ground water was encountered at 10.5 feet below grade during excavation.

Three (3) postexcavation soil samples (EXS-1, EXS-2 and EXS-3) were collected from the west and south sidewalls of the excavation, as depicted on Figure 4. Postexcavation soil sampling results are summarized in Table 2 below, and presented in Exhibit II of this report.

The excavated soil was field screened using an Hnu photoionization detector. Readings ranged from 150 to 200 meter units for the soil excavated. Headspace readings on split samples collected at the location of soil samples ranged from five (5) to 25-meter units (see Table 2).

Table 2
Post-Excavation Soil Sampling Results
January 24, 1996
(Results in ppm)

Sample #	Depth	Hnu Readings	Xylenes	*NJDEP
EXS-1	10.5'	5 - 10	<0.1	10
EXS-2	10.5'	< 5	ND	10
EXS-3	10.5'	20 - 25	<0.1	10

Hnu Readings are reported in meter units; ND - Denotes compound was not detected above the method detection limit; *NJDEP Impact to Ground Water Soil Cleanup Criteria.

Postexcavation soil sampling results indicate xylene concentrations are below NJDEP Impact to Ground Water Soil Cleanup Criteria.

3.0 GROUND WATER INVESTIGATION

3.1 Ground Water Monitoring, Sampling & Analysis

On December 21, 1995, four (4) of the six (6) on-site monitoring wells, MW-1, MW-2, MW-5 and MW-6, were sampled by BES personnel. Samples were collected within two (2) feet of the static water level after purging the wells a minimum of three (3) standing columns of water using the NJDEP approved "Low Flow" purging methodology for metals in ground water. Ground water samples were collected using dedicated bailers, then transferred to laboratory-cleansed glassware suitable for volatile organic compounds and lead. Monitoring well sampling data forms, detailing well gauging information, are included in Exhibit III of this report.

3.2 Ground Water Analytical Results

Samples MW-1, MW-2, MW-5 and MW-6, including a field and trip blank, were analyzed by a New Jersey certified laboratory, Accredited Laboratories, Inc. Samples were analyzed for volatile organic compounds with a forward library search (VO+10) calibrated for xylenes, methyl tertiary butyl-ether (MTBE), tertiary butyl-alcohol (TBA), and lead. Laboratory analytical results are summarized in Table 3 below, and presented in Exhibit IV of this report.

Table 3
Ground Water Sampling Results
Volatile Organic Compounds, MTBE, TBA and Lead
December 21, 1995
(Results in ppb)

Compound	MW-1	MW-2	MW-5	MW-6	*NJDEP Standard
Benzene	**120**	ND	ND	ND	1
Toluene	**4400**	ND	ND	ND	1000
Ethylbenzene	**3200**	ND	ND	ND	700
Xylenes	**6400**	ND	3.5	ND	~~40~~ (1000)
MTBE	ND	ND	ND	ND	~~700~~ (70)
TBA	ND	ND	ND	ND	500
Lead	**12.6**	ND	ND	ND	10

ND - Denotes compound was not detected above the method detection limit *NJDEP Class II-A Ground Water Quality Standards.

Benzene, toluene, ethylbenzene, xylenes (BTEX) and lead were detected in Sample MW-1, at concentrations above the NJDEP Class II-A Ground Water Quality Standards (GWQS). Xylenes were detected in Sample MW-5 at 3.5 parts per billion (ppb), below the NJDEP Class II-A GWQS of 40 ppb.

Historical ground water sampling results indicate a general decreasing trend in the level of petroleum-related volatile organic compounds in MW-1 since the initial sampling event conducted by Vectre, Inc. in December 1993. Table 4 is a summary of historical Ground Water Data.

Table 4
Historical Ground Water Sampling Results
Wells MW-1, MW-5 & MW-6
(Results in ppb)

	MW-1			MW-5			MW-6			*NJDEP
Compound	12/93	1/95	12/95	12/93	1/95	12/95	12/93	1/95	12/95	
Benzene	**350**	35	**120**	NI	ND	ND	NI	ND	ND	1
Toluene	**7500**	79	**4400**	NI	ND	ND	NI	ND	ND	1000
Ethylbenzene	**1600**	60	**3200**	NI	ND	ND	NI	ND	ND	700
Xylenes	**8700**	267	**6400**	NI	ND	3.5	NI	ND	ND	~~40~~ (1000)
Lead	NA	46	12.6	NI	12	ND	NI	15	ND	10

NA - Denotes sample was not analyzed for compound; NI - Denotes well was not yet installed; ND - Denotes compound was not detected above the method detection limit; *NJDEP - NJDEP Class II-A Ground Water Quality Standards.

From January of 1995 to December of 1995, lead concentrations have decreased from 46 ppb to 12.6 ppb in Well MW-1, and from 12 ppb and 15 ppb to nondetect in Wells MW-5 and MW-6, respectively. The decrease in lead concentrations is most likely due to implementation of the "Low Flow" sampling methodology for metals in ground water. The nondetectable levels reported

in MW-5 and MW-6, after using the low flow purging method, indicated that the lead previously detected was likely the result of suspended solids and not impacted ground water.

Previous sampling for volatile organic compounds and lead reported nondetectable levels in Wells MW-2, MW-3, and MW-4.

The reason for the increase in sampling results from January 1995 and December 1995 may be the result of the use of the slow purge sampling method, which would cause less volatilization of organic compounds during purging and sample collection.

3.3 Well Search

A well search was conducted by Vectre Corporation as part of the May 1994 RAW. The search included all domestic, industrial, potable and monitoring wells within a one (1) mile radius of Allied. The search identified three (3) domestic wells, seven (7) industrial wells, one (1) potable well, six (6) piezometers, one (1) recovery well and 93 monitoring wells within one (1) mile of the site. The depth of the domestic wells and potable well are greater than 100 feet and the wells do not draw water from the shallow water table aquifer. A canvass of the area revealed no wells located within 500 feet of the site. Basements were not identified immediately downgradient of the site.

3.4 Aquifer Characteristics & Classification Exception Area Application

On December 21, 1995, prior to well purging and sampling, the six (6) on-site ground water monitoring wells were gauged. Monitoring well gauging data is presented in Table 4, below.

Table 5
Monitoring Well Gauging Data
December 21, 1995
(Results in feet)

Monitoring Well	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
Headspace Reading	60	0	0	0	0	0
Casing Elevation	29.23	30.29	27.98	28.19	29.71	30.60
Well Depth	12.61	19.55	14.45	19.45	15.15	17.09
Depth to Screen	2.98	N/A	N/A	N/A	N/A	7.52
Depth to Ground Water	9.59	10.72	7.93	7.73	2.05	11.89
Product Thickness	0.00	0.00	0.00	0.00	0.00	0.00
Ground Water Elevation	19.64	19.57	20.05	20.46	27.66	18.71

N/A - Data not available.

Depth to ground water ranged from 2.05 feet in Well MW-5 to 11.89 feet in Well MW-6 during the December 21, 1995 sampling event. Ground water flow is toward the north to north-northeast, as depicted on Figure 5 - Ground Water Contour Map. This flow direction represents a

increased precipitation during the past 60 days. The ground water flow direction in January 1995 was toward the northeast. A small anomaly in flow direction is present surrounding Well MW-5, located within the former gasoline UST excavation, and may be due to mounded water within the former tank field area.

3.4.1 Hydraulic Conductivity

To evaluate hydraulic conductivity, BES field personnel conducted aquifer "slug" testing on Wells MW-2 and MW-6. A volume of water was removed from each well using a dedicated stainless steel bailer while monitoring changes in static water level over time using a Hermit Data Logger. A quantitative hydrogeologic assessment of the data was performed using the AQTESOLV ground water modeling program. The slug test data was analyzed using the Bouwer and Rice method for unconfined aquifers. Hydraulic conductivity and ground water and pollutant transport rates were calculated using the slug test data and AQTESOLV modeling calculations. Slug test data is included in Exhibit V of this report.

3.4.2 Ground Water Velocity

The rate of ground water movement in the area of concern was determined using the ground water velocity equation derived from a combination of Darcy's law and the velocity equation of hydraulics. Ground water velocity was then expressed as:

$$Vs = K \times i/ne$$

Where:

Vs = seepage velocity
K = hydraulic conductivity (calculated from slug test data)
i = hydraulic gradient (calculated from ground water flow data)
ne = effective porosity (assumed at 20%)
x = multiplication symbol

Ground water velocity in the area of concern was then calculated:

$$Vs = 0.0002592 \text{ ft/min} \times 0.01 \text{ ft/ft} / 0.20 \qquad 1.296 \times 10^{-4} \text{ cm/sec}$$
$$Vs = 0.000013 \text{ ft/min}$$

Assuming a porosity of 20%, and using a calculated hydraulic gradient of 0.01 feet per foot obtained from the most recent ground water contour map, ground water velocity is determined to be 6.83 feet per year.

3.4.3 Pollutant Transport Rate

Applying a pollutant transport rate calculation to the ground water velocity rate, calculated above, the following retardation factor is derived:

$$Rd = 1 + (KOC \times foc \times pb/ne)$$

Where:

Rd = retardation factor
KOC = soil sorption coefficient (63 - standard benzene coefficient)
foc = fraction of organic carbon (assumed at 0.005)
pb = bulk density (assumed at 1.5 g/ml.)
ne = effective porosity (assumed at 20%)

The retardation factor is then calculated:

$$Rd = 1 + (63 \times 0.005 \times 1.5/0.20)$$
$$Rd = 3.36$$

The pollutant (benzene) transport rate is then calculated as follows:

$$Vpt = V/Rd$$
$$Vpt = 6.83 \text{ ft/yr.}/3.36$$

Using this formula, assuming a bulk density of 1.5 grams per milliliter, a fraction of organic carbon content of 0.5%, and a porosity of 20%, the benzene transport rate is calculated to be approximately 2.03 ft/yr. This slow contaminant transport rate explains why gasoline related volatile compounds have not been detected in Well MW-2, located down gradient of the former UST's.

Based on the benzene transport rate calculated above, an average benzene half-life of 200 days, and an initial benzene concentration of 350 ppb, dissolved benzene concentrations are expected to naturally degrade to 1.0 ppb within approximately 4.6 years and 9.3 feet downgradient of Well MW-1. A CEA designation is requested, using natural attenuation as the method of remediation, for a duration of five (5) years and 20 feet downgradient of Well MW-1, as depicted on Figure 6 - Classification Exception Area Designation Map.

4.0 CONCLUSIONS AND RECOMMENDATIONS

BES conducted a remedial investigation at Allied Building Supplies, located at 101 West Elizabeth Avenue in the City of Linden, Union County, New Jersey. The investigation included additional soil removal in the former gasoline UST excavation area, disposal of contaminated soil removed from the excavation, collection and analysis of postexcavation soil samples, and collection and analysis of ground water samples from Wells MW-1, MW-2, MW-5 and MW-6.

4.1 January 24, 1996 Postexcavation Soil Sampling

Postexcavation soil sampling results reported xylenes below Impact to Ground Water Soil Cleanup Criteria in the area of the former gasoline UST excavation area. Less than one-tenth (0.1) of one part per million (ppm) of xylenes were detected in two (2) of the three (3) soil samples (EXS-1 & EXS-3). Xylenes were not detected above the method detection limit in sample EXS-2. Therefore, No Further Action (NFA) is requested with regard to soils in the subject area.

4.2 December 21, 1995 Ground Water Sampling

Benzene, toluene, ethylbenzene, xylenes, and lead were detected in Well MW-1 at concentrations above the NJDEP Class II-A GWQS. Xylenes were detected in Well MW-5 at 3.5 ppb, below the NJDEP Class II-A GWQS of 40 ppb. Lead was not detected above the method detection limit in samples MW-2 and MW-6.

Historical ground water sampling results indicate a decreasing trend in BTEX compounds detected in Well MW-1. Lead concentrations have decreased from 46 ppb to 12.6 ppb in Well MW-1, and from 12 ppb and 15 ppb to nondetect in Wells MW-5 and MW-6, respectively, when the slow purge methodology is applied to sampling protocol. The decrease in lead using the slow purge methodology suggests that the elevated lead levels were the result of suspended solids and not impacted ground water. Lead levels have decreased in MW-1 to just over the GWQS for lead of 10 ppb (sample reported lead at 12.6 ppb).

4.3 Recommendations

BES recommends natural attenuation be considered as a mechanism for remediation and case closure at this site. Laboratory analytical data and site specific geologic and hydrogeologic conditions favor natural attenuation. Only one (1) well, MW-1, showed elevated levels of gasoline-related volatile organics. Abundant clay content in subsurface sediments, and the mounded water present within the former tank excavation, suggest a slow ground water flow rate at this site, which has been verified through evaluation of aquifer slug test data. The combination of a limited extent of impacted ground water, a slow migration rate, the presence of a low permeability soil type, the removal of the source, and the lack of receptors in the area suggest natural attenuation will be an effective option for this site.

Based on the benzene transport rate calculated above, an average benzene half-life of 200 days, and an initial benzene concentration of 350 ppb, dissolved benzene concentrations are expected to naturally degrade to 1.0 ppb within approximately 4.6 years and 9.3 feet downgradient of Well MW-1. A CEA designation is requested, using natural attenuation as the method of remediation, for a duration of five (5) years and 20 feet downgradient of Well MW-1, as depicted on Figure 6 - Classification Exception Area Designation Map.

Regarding the slightly elevated levels of lead detected in MW-1, BES is proposing that the CEA include the lead detected in this well. The level of lead present in MW-1 was just slightly over the GWQS for lead of 10 ppb (sample reported lead at 12.6 ppb). It is BES' opinion that the lead level in MW-1 should decrease further over time and that lead will not migrate beyond the proposed CEA boundary at a level over the GWQS.

A five (5) year CEA should allow for the variations in subsurface conditions, which affect the natural remediation process, and provide adequate time for natural remediation to occur. Completed CEA and Well Restriction Forms are attached in Exhibit VI.

A well search conducted by Vectre Corporation as part of the May 1994 RAW identified three (3) domestic wells, seven (7) industrial wells, one (1) potable well, six (6) piezometers, one (1) recovery well and 93 monitoring wells within a one (1) mile radius of the site. A canvass of the area did not reveal wells within 500 feet of the site. Basements were not identified within the immediate area of the site.

BES is proposing no additional sampling and analysis for the subject site. Based on the slow contaminant transport rate, lack of receptors in the area and lack of migration to date, BES is proposing implementation of the CEA for five (5) years. After five (5) years, the CEA can be removed with one (1) confirmation sample collected in the former excavation area.

This report was prepared and is respectfully submitted by:
Brinkerhoff Environmental Services, Inc.

2/27/96

Doug Harm, P.G. Date
Principal Consultant/Hydrogeologist
NJDEP Subsurface Evaluator No. 10556

2/27/96

William A. Melnicki Date
Environmental Scientist
NJDEP Subsurface Evaluator No. 14705

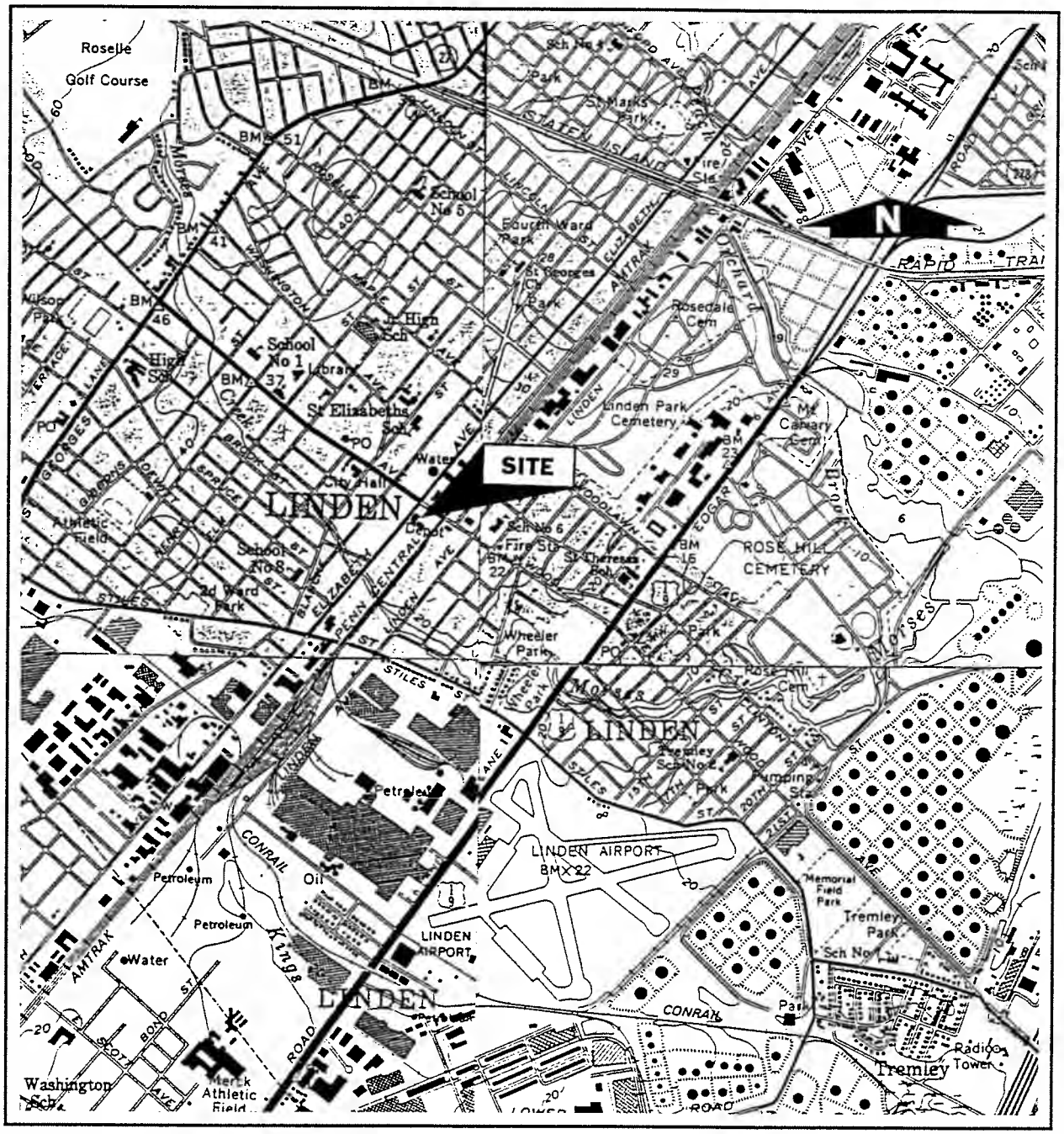


Figure 1 - **Site Location Map (U.S.G.S. Topo)**
Allied Building Supplies
101 West Elizabeth Avenue
City of Linden, Union County, N.J.
Case ID # 93-06-24-1425, UST # 0129486

Scale: 1" = 2000'

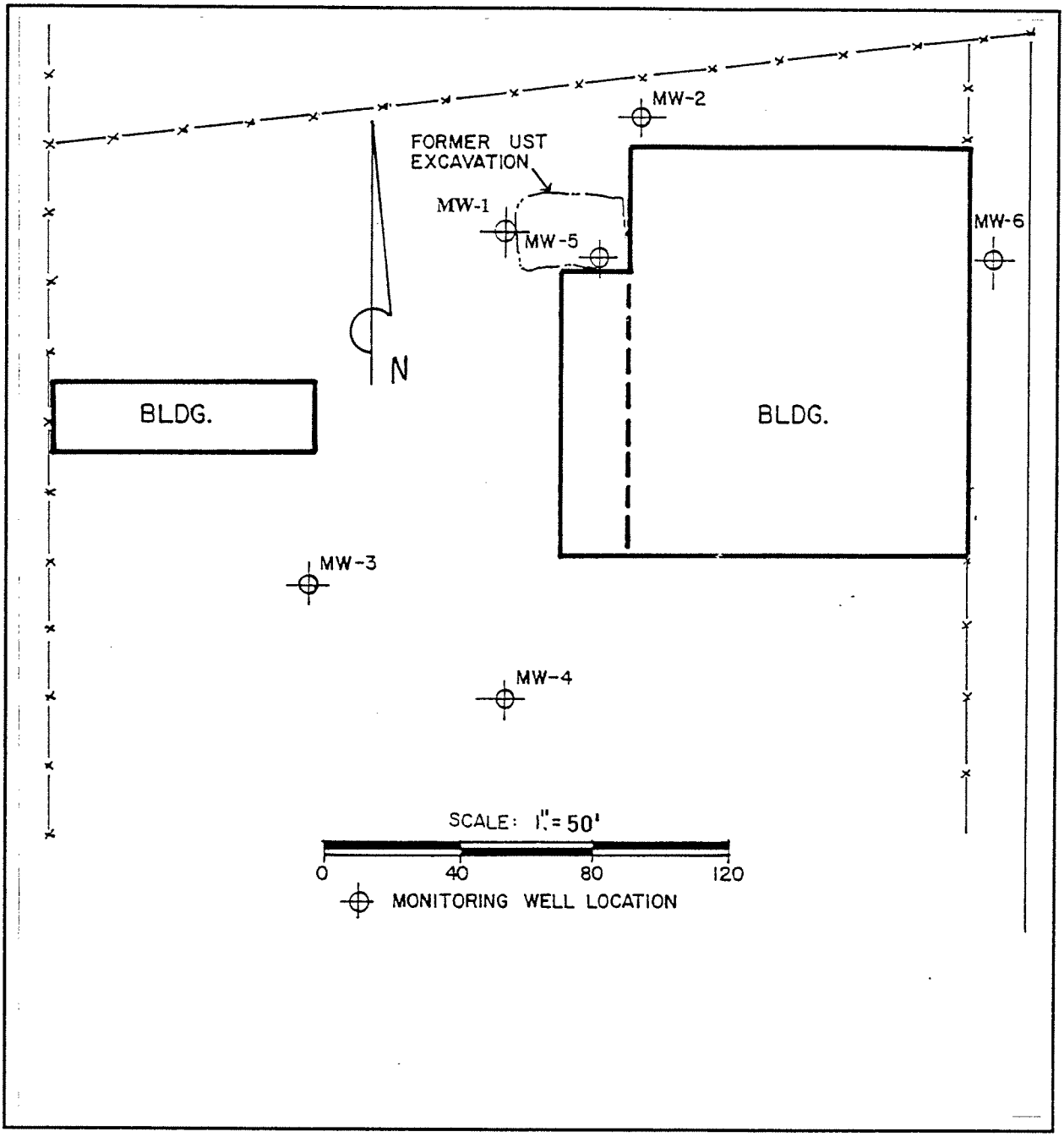


Figure 2 - **Site Map**
Allied Building Supplies
101 West Elizabeth Avenue
City of Linden, Union County, N.J.
Case ID # 93-06-24-1425, UST # 0129486

Scale: 1" = 50'

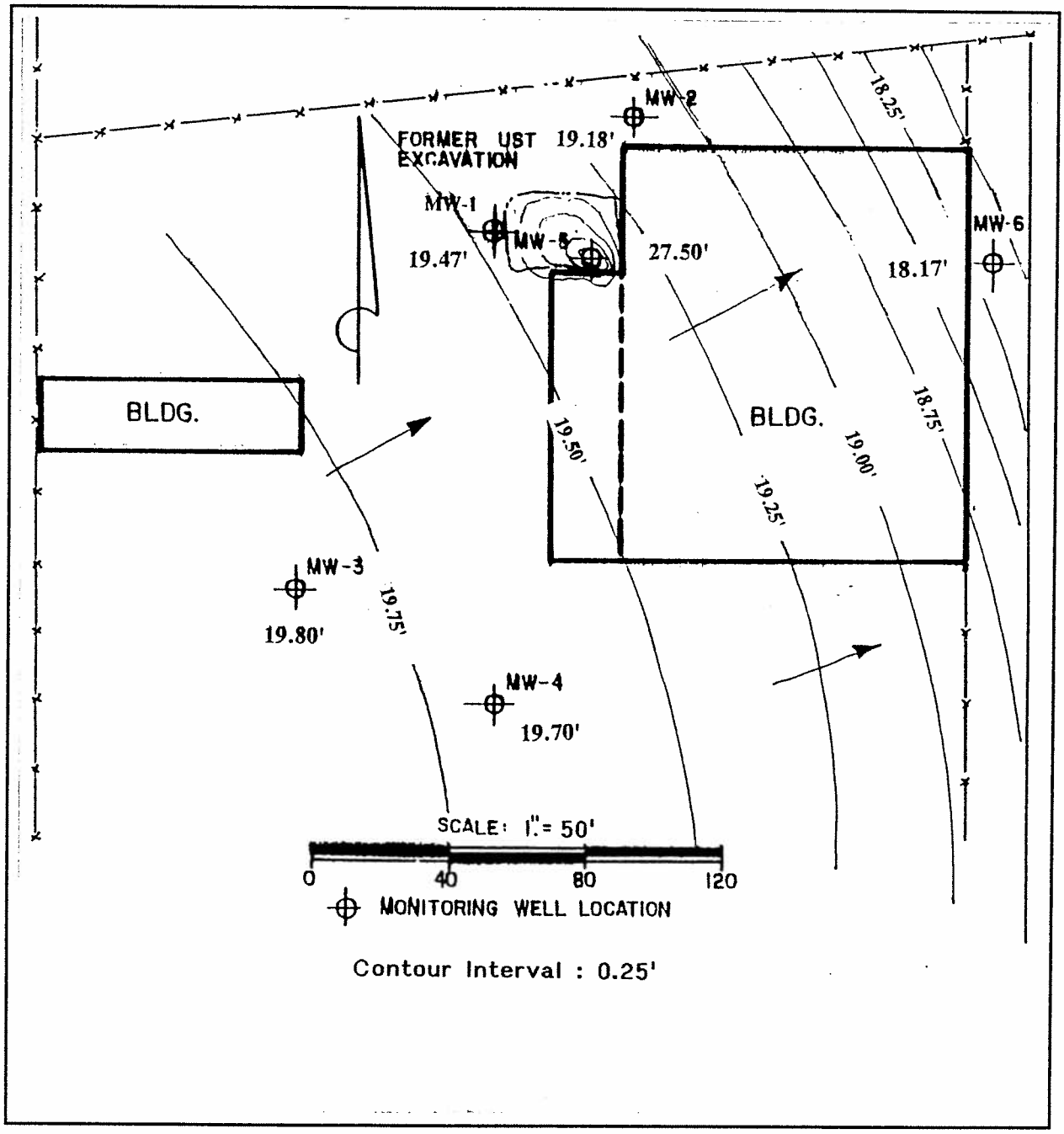


Figure 3 - **Ground Water Contour Map**
Allied Building Supplies
101 West Elizabeth Avenue
City of Linden, Union County, N.J.
Case ID # 93-06-24-1425, UST # 0129486
Data Collected January 16, 1995 **Scale: 1" = 50'**

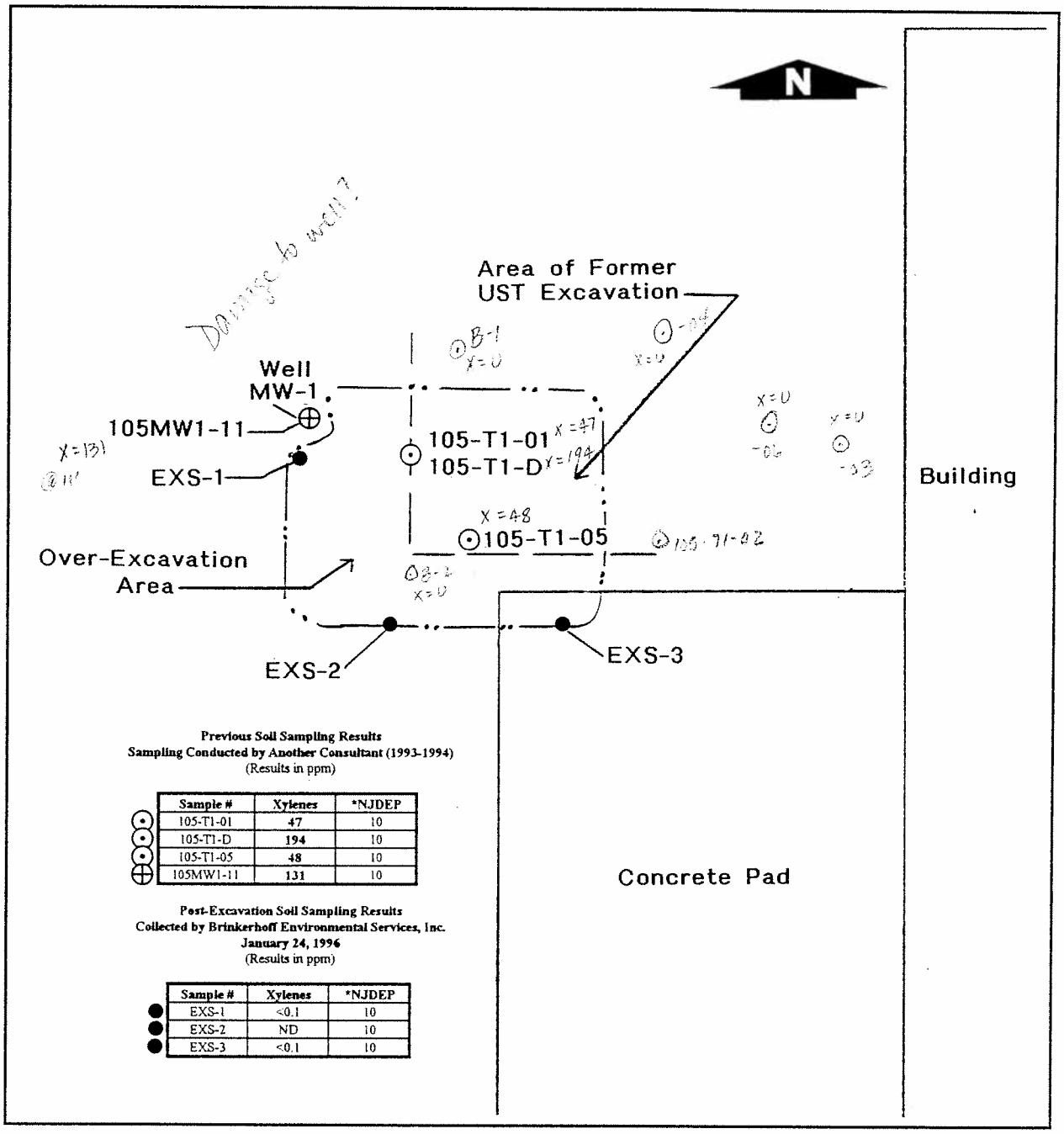


Figure 4 - Soil Sampling Map
Allied Building Supplies
101 West Elizabeth Avenue
City of Linden, Union County, N.J.
Case ID # 93-06-24-1425, UST # 0129486

Scale: 1" = 10'

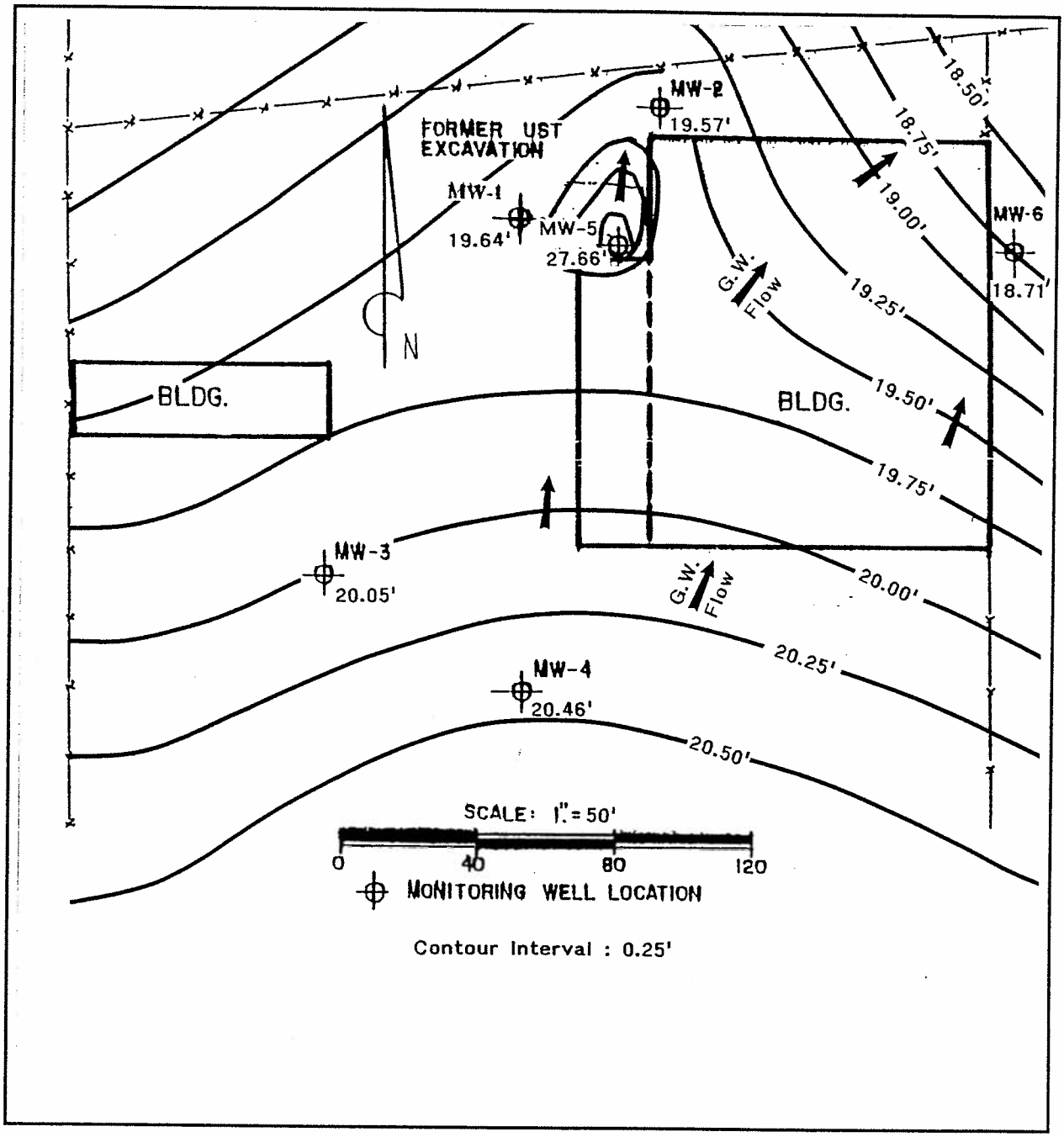


Figure 5 - **Ground Water Contour Map**
Allied Building Supplies
101 West Elizabeth Avenue
City of Linden, Union County, N.J.
Case ID # 93-06-24-1425, UST # 0129486
Data Collected December 21, 1995 **Scale: 1" = 50'**

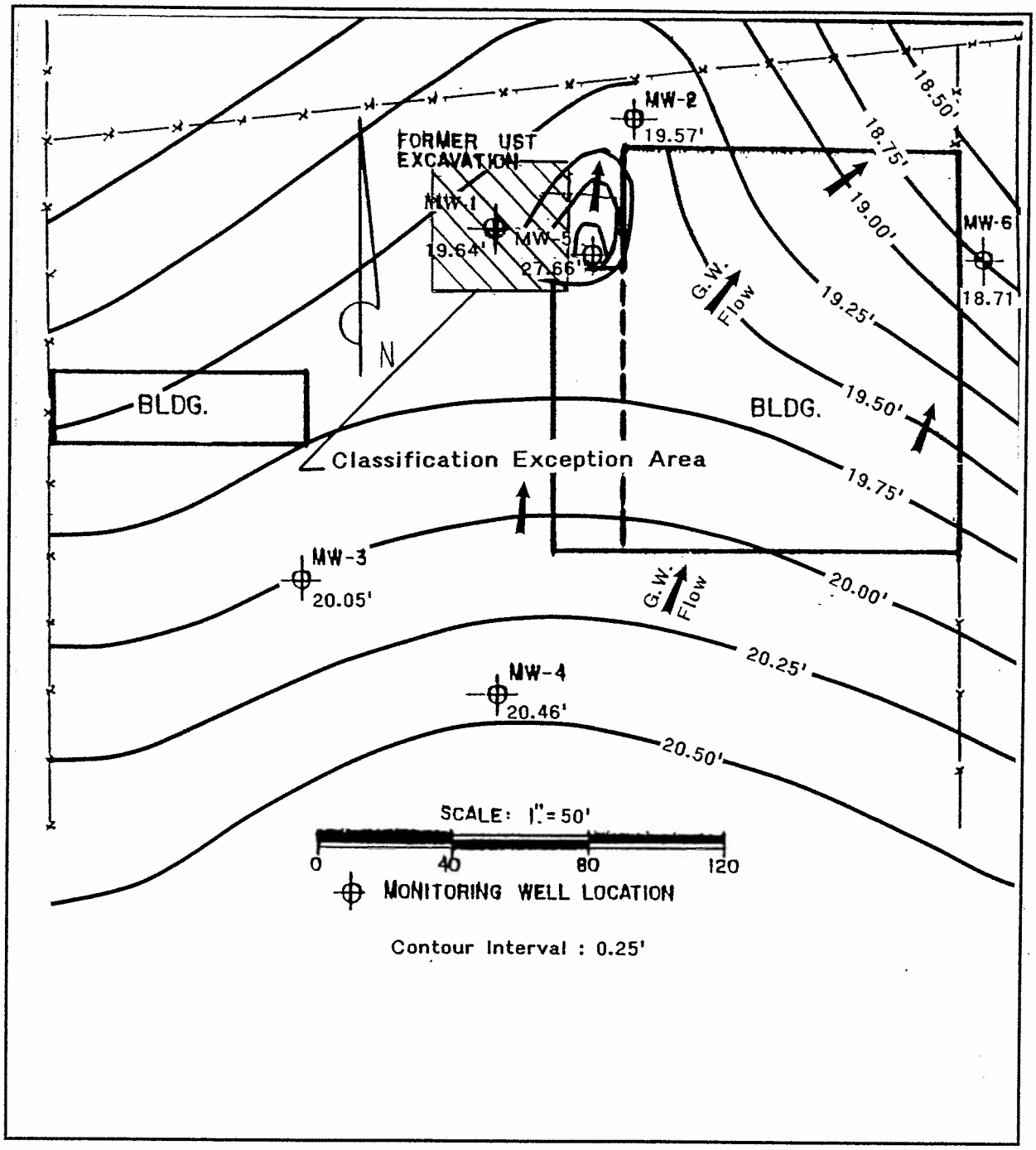


Figure 6 - **Classification Exception Area**
Allied Building Supplies
101 West Elizabeth Avenue
City of Linden, Union County, N.J.
Case ID # 93-06-24-1425, UST # 0129486
Scale 1" = 50'

COMPLIANCE
MANAGEMENT
INCORPORATED

February 11, 1997

Mr. William Brown
State of New Jersey
Department of Environmental Protection
Bureau of Underground Storage Tanks
CN 028
Trenton, NJ 08625

Re: Remedial Action Evaluation Report, February 1997
Allied Building Supply, 101 West Elizabeth Avenue
Linden, Union County, Case No. 93-06-24-1425

Dear Mr. Brown:

On December 18, 1996, representatives from Compliance Management Incorporated collected ground water samples from Monitoring Wells MW-1, MW-2, MW-5, and MW-6 located at the above-referenced site. A summary of the analytical results are attached along with the laboratory reduced deliverables package. Also, attached is a ground water contour map generated from data collected during this sampling event.

As you will note, the contaminants in the ground water are stable or decreasing. Based upon this data, we propose to submit to the Department, in the near future, a remedial action work plan addendum for no further action with the establishment of a classification exception area (CEA) for the contaminants remaining above the ground water quality criteria. As has been previously discussed with the Bureau of Underground Storage Tanks, the current owner of the property, New Jersey Transit (NJT) has expressed a willingness to accept such a finding for the property by the Department consistent with the terms of the contract of property sale between my client and NJT.

We believe that our intention to submit a proposal for no further action with a CEA is reasonable based upon the demonstrated removal of all sources of contamination from the site, the existence of a localized plume distribution, a low ground water seepage and contaminant migration velocities, and highly degradable plume concentrations. Furthermore, NJT has recently demolished the building and other improvement on the property and is in the process

364 PARSIPPANY ROAD
PARSIPPANY, NJ 07054
TEL 201-428-6050
FAX 201-428-6052

of constructing a parking structure on site. It is reasonable to assume that these demolition and construction activities, as well as future use pattern, may render the monitor wells damaged, useless or inaccessible by my client.

In the worst case, the presence of a large number of motor vehicles on site for construction and parking present a significant risk of a discharge of hazardous substances entering the monitor wells should they not be abandoned properly and in the near future. Our intended proposal for a finding of no further action with a classification exception area is consistent with the planned use of the property, the lack of receptors, and the chemical and physical characteristics described above.

We believe that we have met the threshold criteria for such a finding by the Department. We recognize that in order to make this determination, the Department will require the establishment of a CEA. Upon your concurrence, we will prepare the necessary documentation for your review in accordance with the Department's final guidance for CEAs.

It will take approximately 60 days from the date of your concurrence for our data collection, preparation, and submission of this additional documentation. Your expeditious response will allow us to proceed with this effort in a timely manner. Please advise accordingly.

If you have any questions, please contact either Mr. Karl Delaney at 609-268-8007 or myself at 201-428-6050.

Sincerely,

COMPLIANCE MANAGEMENT INC.

James Guider, P.E.

James Guider, P.E.

enc.

cc: Mr. Karl Delaney, w/attachments
Mr. Dan Winters, w/attachments

REMEDIAL ACTION EVALUATION REPORT

at the

Allied Building Supply Site

101 West Elizabeth Avenue
Linden, New Jersey
Union County

UST # 0129486
CASE # 93-06-24-1425

Prepared By:

Compliance Management Incorporated
364 Parsippany Road
Suite 10B
Parsippany, New Jersey 07054

201-428-6050

February, 1997

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Appendix I, Monitoring Well Data
Appendix II, Disposal Documentation
Appendix III, NJDEP letter, dated May 28, 1996
Appendix IV, 2 Part Certification
Appendix V, Laboratory Data

SCOPE OF WORK

Compliance Management Incorporated was retained by Selrite Millwork Corporation to prepare a Remedial Action Evaluation Report (RAER) for Allied Building Supply (Allied) in accordance with NJDEP letter, dated May 28, 1996 (Appendix III). The site is located at 101 West Elizabeth, Linden, Union County, NJ (Figures 1 & 2). This report discusses the remediation performed, ground water sampling, laboratory analysis and results. The two part certification is included in Appendix IV.

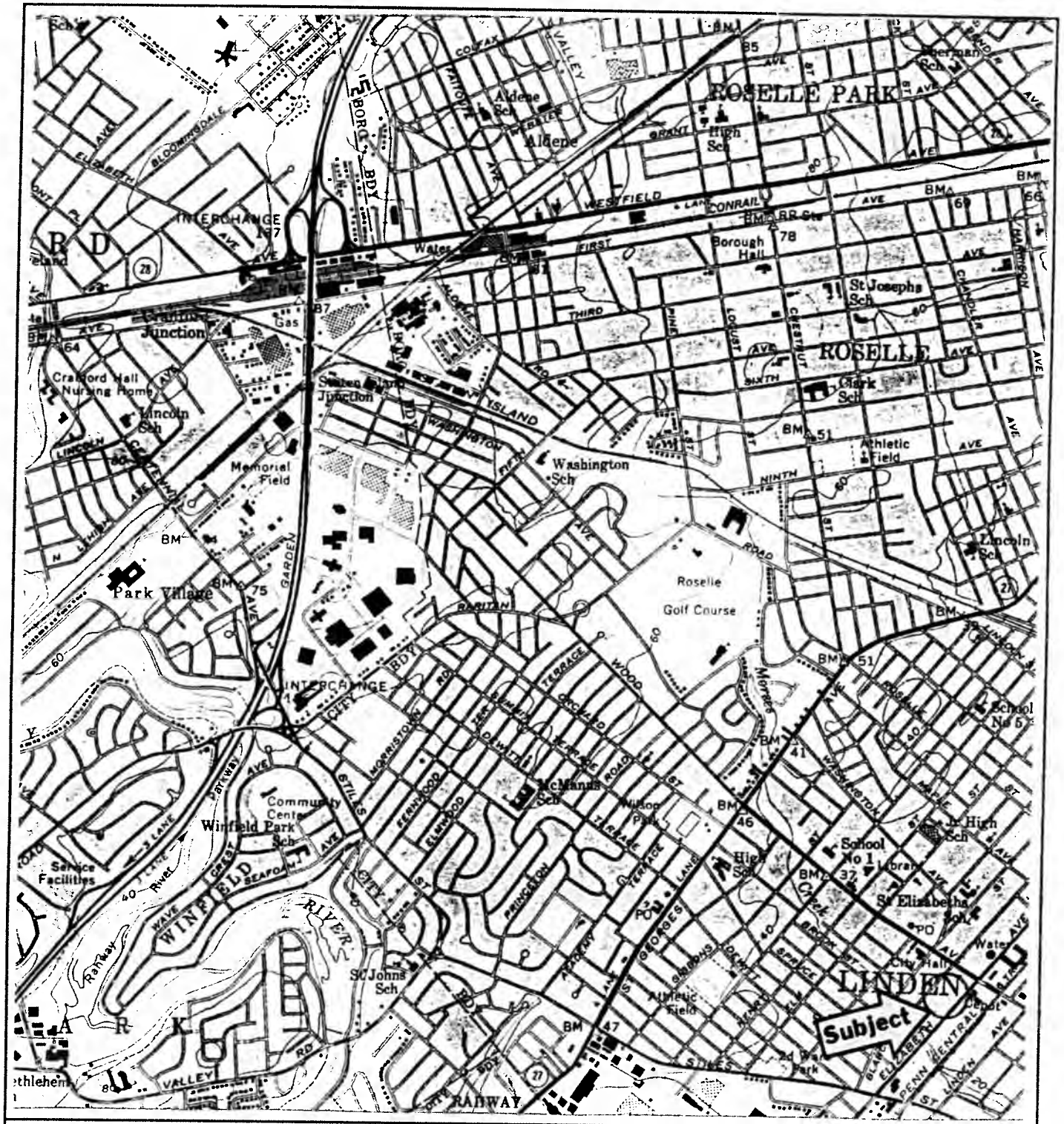
REMEDIAL ACTIVITIES

On November 18, 1996, monitoring well, MW-1 was purged for approximately 7 hours by utilizing a vacuum truck (vac truck). Approximately 700 gallons of ground water were removed from the well. The water was contained in a tanker compartment and transported to the S & M Waste Oil Facility for disposal as a petroleum mixture liquid, non-RCRA regulated waste. The load was assigned non-hazardous waste manifest # 5631 (Appendix II).

GROUND WATER SAMPLING

On December 18, 1996 four monitoring wells located on the subject property were sampled by CMI in accordance with the May 1992 NJDEP *Field Sampling Procedures Manual*. The samples were collected within two feet of the water level after purging the wells of three times the volume of the water column of each well. The monitoring well samples were collected with a decontaminated, dedicated Teflon bailer, then transferred to laboratory prepared containers suitable for volatile organic compounds and lead. Monitoring well data forms are included in Appendix I of this report.

Ground water samples were obtained from MW-1, MW-2, MW-5, and MW-6. A field blank was also collected as part of this sampling event, and a trip blank was provided by the laboratory. The samples were submitted to W.A.T.E.R Works Laboratory, New Jersey certification # 07673, for analysis. Samples were analyzed for benzene, toluene, ethylbenzene, total xylenes, and lead. Laboratory analytical results are included in Appendix V of this report and summarized in Table I below.



SOURCE:

TOPOGRAPHY TAKEN FROM
ROSELLE, NJ
U.S.G.S. QUADRANGLE
7.5 MIN. SERIES

SCALE: 1" = 2,000'

FIGURE 1

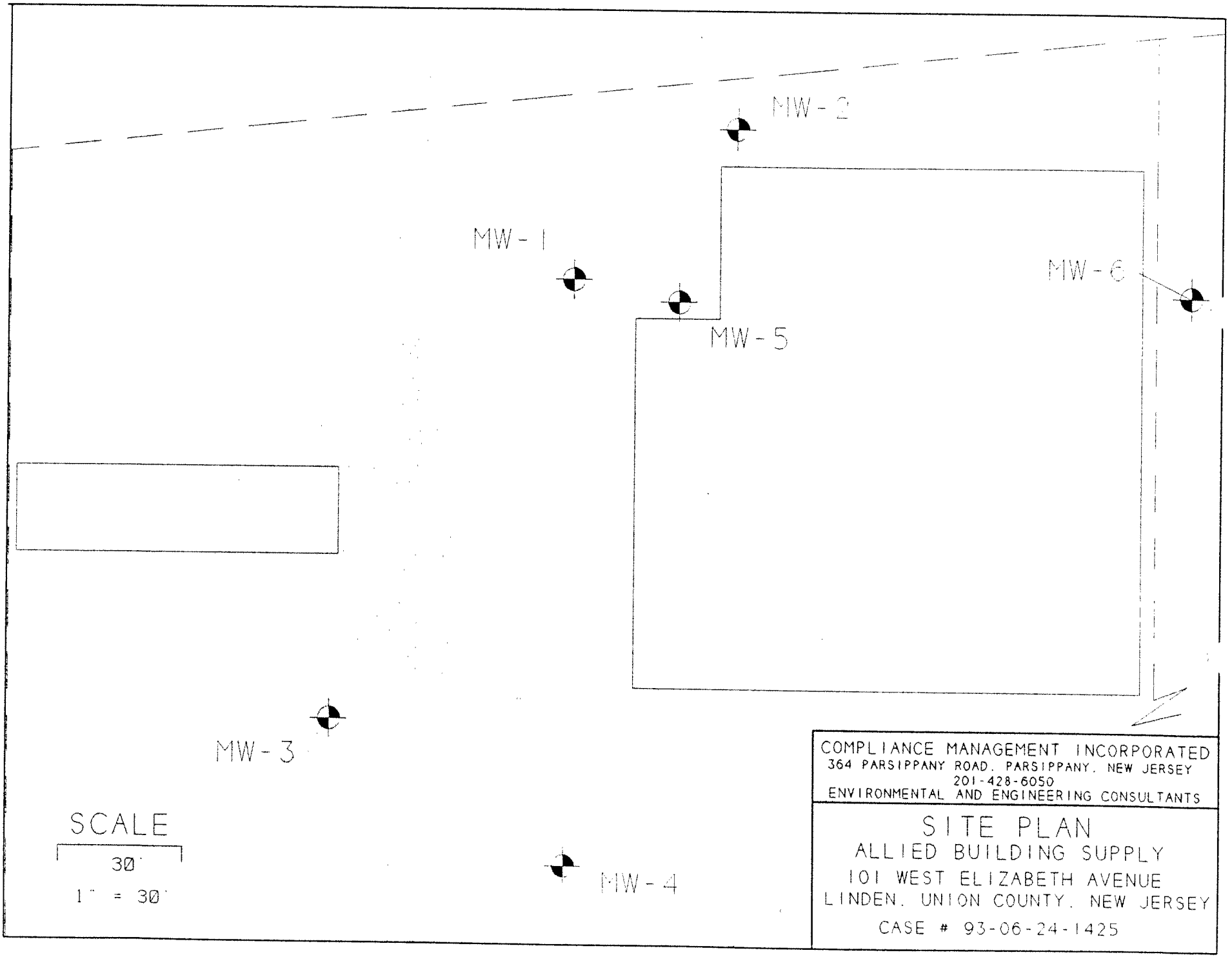
NORTH

COMPLIANCE MANAGEMENT, INC.
364 PARSIPPANY ROAD, PARSIPPANY, NEW JERSEY
201-428-6050
ENVIRONMENTAL & ENGINEERING CONSULTANTS

SITE LOCATION MAP

ALLIED BUILDING SUPPLIES
101 W. ELIZABETH AVENUE
LINDEN, UNION COUNTY

CASE # 93-06-24-1425



COMPLIANCE MANAGEMENT INCORPORATED
364 PARSIPPANY ROAD, PARSIPPANY, NEW JERSEY
201-428-6050
ENVIRONMENTAL AND ENGINEERING CONSULTANTS

SITE PLAN

ALLIED BUILDING SUPPLY
101 WEST ELIZABETH AVENUE
LINDEN, UNION COUNTY, NEW JERSEY

CASE # 93-06-24-1425

TABLE I
Ground Water Sampling Results
December 18, 1996
(results in $\mu g/\ell$)

Sample ID	Benzene	Toluene	Ethylbenzene	Total Xylenes	Lead
MW-1	ND (20)	3,500	2,200	8,000	0.12
MW-2	ND (1)	ND (2)	ND (1)	ND (2)	0.01
MW-5	ND (1)	ND (2)	ND (1)	ND (2)	0.16
MW-6	ND (1)	ND (2)	ND (1)	ND (2)	0.08
Field Blank	ND (1)	ND (2)	ND (1)	ND (2)	NS
Trip Blank	ND (1)	ND (2)	ND (1)	ND (2)	NS
NJDEP Standard	1	1,000	700	40	10

ND = Compound not detected
( ) = MDL, Method Detection Limit
$\mu g/\ell$ = micrograms per liter
NS = not sampled

Toluene, ethylbenzene, total xylenes, and lead were detected in MW-1. With the exception of lead, all of these compounds were above NJDEP criteria. Lead was also detected in MW-2, MW-5, and MW-6, but below the NJDEP criteria. No other target substances were found in any of the wells.

Benzene was not detected this sampling event. Toluene, total xylenes, and lead have all decreased in concentration since the last sampling event.

SITE HYDROLOGY

Depth to ground water ranged from 1.22 feet in MW-5 to 10.89 feet in MW-6. Ground water flow direction is toward the northeast as shown on the ground water contour map (Figure 3).

A small anomaly in flow direction is present at MW-5. This well is located within the

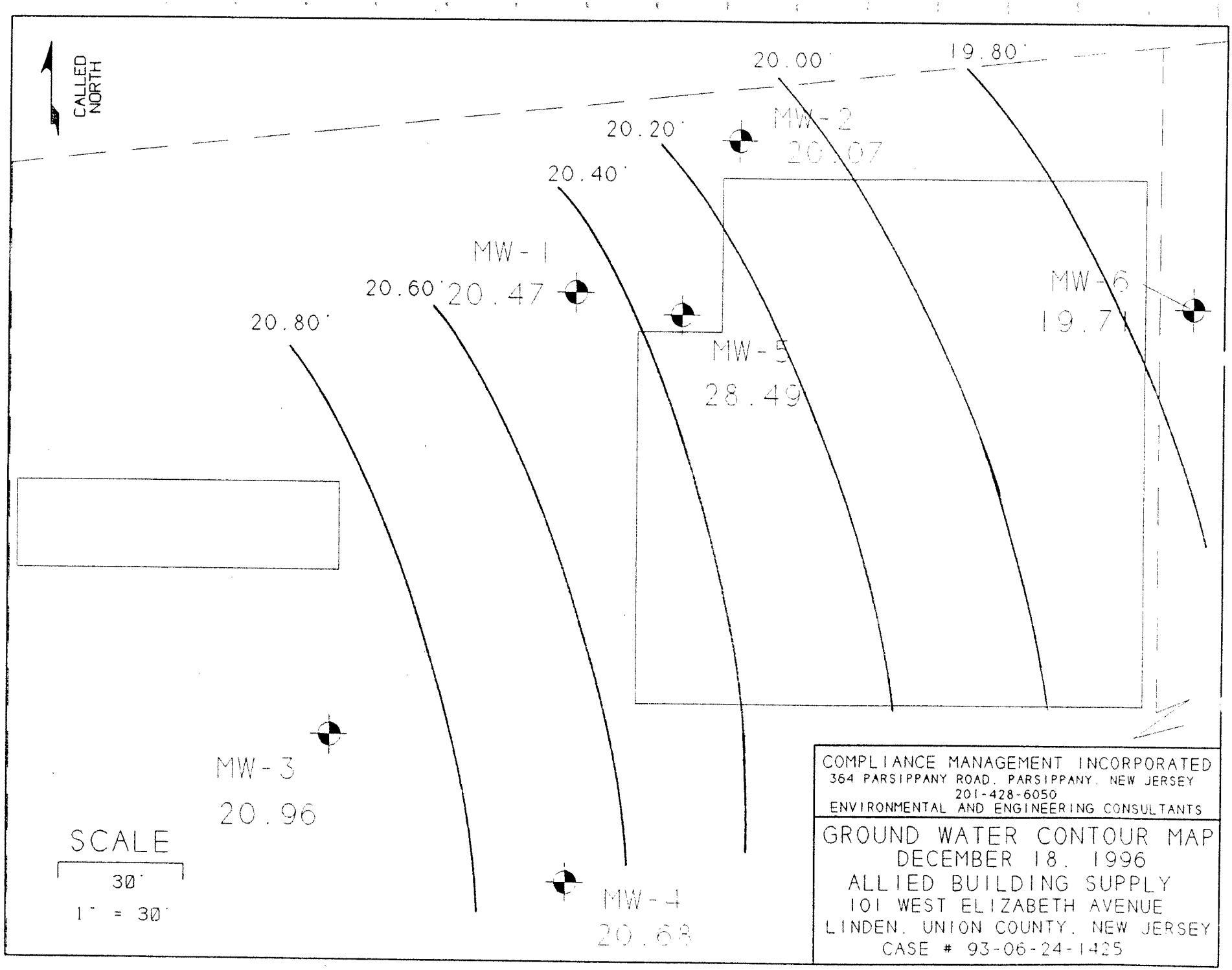
former tank excavation and shows an artificially elevated ground water level. We believe this is due to water perched within the former excavation. Monitoring well data are presented in Table II.

TABLE II
Monitoring Well Data
December 18, 1996
(results in feet)

	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
Casing Elevation	29.23	30.29	27.98	28.19	29.71	30.60
Well Depth	15.15	19.55	14.45	19.45	12.61	17.09
Depth to Ground Water	8.76	10.22	7.02	7.51	1.22	10.89
Product Thickness	0.0	0.0	0.0	0.0	0.0	0.0
Ground water Elevation	20.47	20.07	20.96	20.68	28.49	19.71

SUMMARY

Ground water sampling results showed gasoline related volatile organic compounds (BTEX) in only one of the four monitoring wells sampled. This concurred with previous sampling by others (Table III). This continues to demonstrate a highly localized contaminant plume. Benzene was not detected at this sampling event. Although ethylbenzene levels increased since the last sampling event, all other contaminants had decreased in MW-1. Monitoring well MW-1 is located on the immediate upgradient edge of the former tank excavation. Monitoring wells MW-2, MW-5, and MW-6, which are located downgradient to slightly side-gradient of the former UST excavation did not have any reportable levels of BTEX. Lead was found to be below the NJDEP criteria in all wells.



COMPLIANCE MANAGEMENT INCORPORATED
364 PARSIPPANY ROAD, PARSIPPANY, NEW JERSEY
201-428-6050
ENVIRONMENTAL AND ENGINEERING CONSULTANTS

GROUND WATER CONTOUR MAP
DECEMBER 18, 1996
ALLIED BUILDING SUPPLY
101 WEST ELIZABETH AVENUE
LINDEN, UNION COUNTY, NEW JERSEY
CASE # 93-06-24-1425

TABLE III
Historical Ground Water Sampling Results
Wells MW-1, MW-2, MW-5 & MW-6
(results in $\mu g/\ell$)

Compound	Date	MW-1	MW-2	MW-5	MW-6	NJDEP Std.
Benzene	12/93	350	NA	NI	NI	1
	1/95	35	NA	ND	ND	
	12/95	120	NA	ND	ND	
	3/96	37	NA	NS	NS	
	7/96	46	NA	NS	ND	
	12/96	ND	ND	ND	ND	MDL 20
Toluene	12/93	7,500	NA	NI	NI	1,000
	1/95	79	NA	ND	ND	
	12/95	4,400	NA	ND	ND	
	3/96	4,600	NA	NS	NS	
	7/96	4,200	NA	NS	ND	
	12/96	3,500	ND	ND	ND	
Ethylbenzene	12/93	1,600	NA	NI	NI	700
	1/95	60	NA	ND	ND	
	12/95	3,200	NA	ND	ND	
	3/96	1,300	NA	NS	NS	
	7/96	1,800	NA	NS	ND	
	12/96	2,200	ND	ND	ND	
Total Xylenes	12/93	8,700	NA	NI	NI	40
	1/95	267	NA	ND	ND	
	12/95	6,400	NA	3.5	ND	
	3/96	7,800	NA	NS	NS	
	7/96	10,000	NA	NS	ND	
	12/96	8,000	ND	ND	ND	
Lead	12/93	NA	NA	NI	NI	10
	1/95	46	NA	12	15	
	12/95	12.6	NA	ND	ND	
	3/96	14.1	NA	NS	NS	
	7/96	11	NA	NS	ND	
	12/96	0.12	ND	0.16	0.08	

NA = data not available
ND = none detected above the method detection limit
NI = well was not yet installed
NS = not sampled
$\mu g/\ell$ = micrograms per liter

CONCLUSIONS/RECOMMENDATIONS

1. The sources of contamination, the leaking UST and surrounding soils, have been removed.
2. Concentrations of volatile organic compounds (BTEX) associated with gasoline are generally decreasing, most probably due to natural attenuation.
3. The plume of contamination has not spread to adjacent monitoring wells.
4. The utilization of the vac truck to purge MW-1 appears to have expedited the rate of decrease of the target compounds.
5. We recommend that natural attenuation be continued as the primary remedial measure.
6. We recommend that analysis for lead be removed from any future sampling events.

MATRIX Engineering, LLC.
170 Highway 35, Red Bank, NJ 07701 Phone: (732) 747-9111 Fax: (732) 741-5553

WB

August 13, 1998

NJDEP
Bureau of Underground Storage Tanks
CN433
401 East State Street
Trenton, NJ 08625

Re: Allied Building Supplies
101 West Elizabeth Avenue
Linden, NJ
Case No. 93-06-24-1425

NJDEP
INDUSTRIAL SITE
EVALUATION ELEMENT
CN028
TRENTON, NJ
AUG 17 1998

Dear Sir:

Enclosed please find the results of laboratory analyses performed on groundwater samples collected from the monitoring wells located at the Allied Building Supply site on Elizabeth Avenue, Linden, NJ. Table 1 presents the field analyzed well parameters for each of the wells for the May, 1998 sampling episode. Table 2 presents the summary of the historical data for these wells.

The historical data indicates that the BTEX concentration at the source well, MW#1, is declining. Also, the data confirms that the contaminant plume has not migrated to the downgradient wells (MW#2 and MW#6). The analyses for lead at MW#1 has shown two excursions during the December, 1996 and May, 1998 sampling episodes. The sampling technique for the July, 1998 sampling episode was modified to use the trickle flow method. Using this sampling methodology, the lead content was measured to be only 6.18 µg/liter. Based on this result and the earlier historical analyses, the lead results measured during the December, 1996 and May, 1998 sampling episodes are believed to be due to the sampling methodology.

The owner of the property is interested in establishing a Classification Exception Area (CEA) for this site. If additional information is required, please advise. Thank you for your consideration.

Very truly yours,

J. David Calvert, PE, CSP

cc: Dan Winters - cover letter only

TABLE 1
Allied Building Supply Site
Field Determined Well Parameters
Measured Before Purging
5/7/98

Monitor Well	Casing Elevation (feet)	Depth To Water (feet)	Depth To Product (feet)	Water Elevation (feet)	Product Thickness (feet)	Adjusted Water Elevation (feet)	Dissolved Oxygen (ppm)	pH (SU)	Conductivity (uS)
MW-#1	29.23	8.83	N/A	20.40	0.00	–	1.3	6.9	413
MW-#2	30.29	10.20	N/A	20.09	0.00	–	0.6	5.8	391
MW-#3	27.98	7.84	N/A	20.14	0.00	–	1.8	6.2	487
MW-#4	28.19	7.22	N/A	20.97	0.00	–	1.0	5.9	220
MW-#5	29.71	1.89	N/A	27.82	0.00	–	2.0	6.8	394
MW-#6	30.60	11.33	N/A	19.27	0.00	–	2.5	6.7	648

Casing elevations based on data from Compliance Management Inc. report dated February, 1997
N/A = Not Applicable

Matrix Engineering, Inc.
170 Hwy 35
Red Bank, NJ 07701
732-747-9111

TABLE 2
SUMMARY OF LABORATORY ANALYSES
ug/l

		Intern. Hydronics		Brinkerhoff/ Accredited			Brinkerhoff/ GTEL	Compliance/ Water Works	Matrix/ AllService	Matrix/ AllService	
MW#1		SEP. 93	DEC. 93	JAN. 95	DEC. 95	MAR. 96	JUL. 96	DEC. 96	MAY 98	JULY 98	MAY 98 TOTAL BTEX
	LEAD	71	NA	46	12.6	14.1	11	124.6	375	6.18	
	BENZENE	280	350	35	120	37	46	<20	8	NA	
	TOLUENE	3000	7500	79	4400	4600	4200	3500	1020	NA	
	ETHYLBENZENE	620	1600	60	3200	1300	1800	2200	1220	NA	
	TOTAL XYLENES	3900	8700	267	6400	7800	10000	8000	2720	NA	4968
MW#2		SEP. 93	DEC. 93	JAN. 95	DEC. 95	MAR. 96	JUL. 96	DEC. 96	MAY 98	JULY 98	MAY 98 TOTAL BTEX
	LEAD	NS	NA	<10	<10	NA	NS	14.7	8	NA	
	BENZENE	NS	NA	<5	NA	NA	NS	<1	<0.1	NA	
	TOLUENE	NS	NA	<5	NA	NA	NS	<2	<0.1	NA	
	ETHYLBENZENE	NS	NA	<5	NA	NA	NS	<1	<0.2	NA	
	TOTAL XYLENES	NS	NA	<10	NA	NA	NS	<3	<0.2	NA	ND
MW#5		SEP. 93	DEC. 93	JAN. 95	DEC. 95	MAR. 96	JUL. 96	DEC. 96	MAY 98	JULY 98	MAY 98 TOTAL BTEX
	LEAD	NS	NI	12	<10	NS	NS	159.1	45	NA	
	BENZENE	NS	NI	<5	<0.4	NS	NS	<1	<0.1	NA	
	TOLUENE	NS	NI	<5	<0.5	NS	NS	<2	<0.1	NA	
	ETHYLBENZENE	NS	NI	<5	<1	NS	NS	<1	<0.2	NA	
	TOTAL XYLENES	NS	NI	<10	3.5	NS	NS	<3	<0.2	NA	ND
MW#6		SEP. 93	DEC. 93	JAN. 95	DEC. 95	MAR. 96	JUL. 96	DEC. 96	MAY 98	JULY 98	MAY 98 TOTAL BTEX
	LEAD	NS	NI	15	<10	NS	<4	24.4	7	NA	
	BENZENE	NS	NI	<5	<0.4	NS	ND	<1	<0.1	NA	
	TOLUENE	NS	NI	<5	<0.5	NS	ND	<2	<0.1	NA	
	ETHYLBENZENE	NS	NI	<5	<1	NS	ND	<1	<0.2	NA	
	TOTAL XYLENES	NS	NI	<10	<4.9	NS	ND	<3	<0.2	NA	ND

Data for sampling rounds from December , 1993 to December, 1996 based on data presented by Compliance Management Inc.
Sampling for lead analysis in July, 1998 accomplished by trickle flow.
Lead analyses for May, 1998 and December, 1996 presumed to be due to particulate contamination.
Lead data presented by Compliance Management Inc. may not be accurate based on NJDEP comments in letter dated March 26, 1997.

Matrix Engineering, Inc.
170 Hwy 35
Red Bank, NJ 07701
732-747-9111

1:56 PM, 8/7/98

MATRIX Engineering, Inc.
170 Highway 35, Red Bank, NJ 07701 Phone: (732) 747-9111 Fax: (732) 741-5553

August 26, 1998

Mr. William Brown
NJDEP - BUST
PO Box 433
401 East State Street
Trenton, NJ 08625

Re: Allied Building Supply
101 West Elizabeth Avenue
Linden, NJ
Case No. 93-06-24-1425

Dear Sir:

Presented herein is an application for a Classification Exception Area for the property located at 101 West Elizabeth Avenue, Linden, NJ. Attached are analytical data, calculations and drawings to support this application. These attachments include historical analytical data on the monitoring wells on this site, a drawing which displays the historical groundwater gradient on the site, and the results of the modeling calculations to predict the fate and transport of BTEX at this site. The data and modeling predict a very slow rate of transport of the contaminants and does not predict that potential receptors will be impacted.

This site had a discharge from an underground gasoline storage tank and/or piping prior to 1993. A total of six groundwater monitoring wells have been installed on or near this site as part of the site investigation. Through the eight rounds of sampling which has occurred over the past five years, only MW#1 has indicated contaminants at levels above the applicable Groundwater Quality Standards. Furthermore, the level of these contaminants have been significantly reduced over this period through natural processes.

It has been reported that a well search was previously performed in support of the management of this case and the results were submitted to the NJDEP. This well search indicated no downgradient wells to be within ¼ miles of the site.

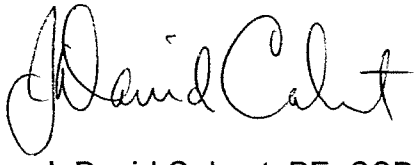
The direction of groundwater flow is indicated to be toward the east. The closest potential receptor in this direction is the storm sewer collection system which is located in the parking lot for the Linden Rail Station. This system is approximately 75 feet from the property line of this site.

The native soils at this site are have been characterized as a silty clay during well installations. Based on this characterization, the hydraulic conductivity at this site has been estimated to be approximately 3E-3 ft/day. Groundwater elevations have been measured in the various monitoring wells during each sampling episode. These data indicate that the groundwater gradient is approximately 0.005 ft/ft (See Figure 1). The porosity of the silty clay soils has been estimated to be <0.5. Based on the foregoing data, the actual groundwater flow rate is calculated to be 3E-5 ft/day. At this flow rate, the plume is predicted to be essentially stagnant. Even using other more conservative assumptions, the maximum distance for the migration of the BTEX plume is predicted to be less than 15 feet from the source located at or near MW#1. Therefore, the plume is predicted not to impact receptors and is predicted not to travel beyond the limits of the property boundary.

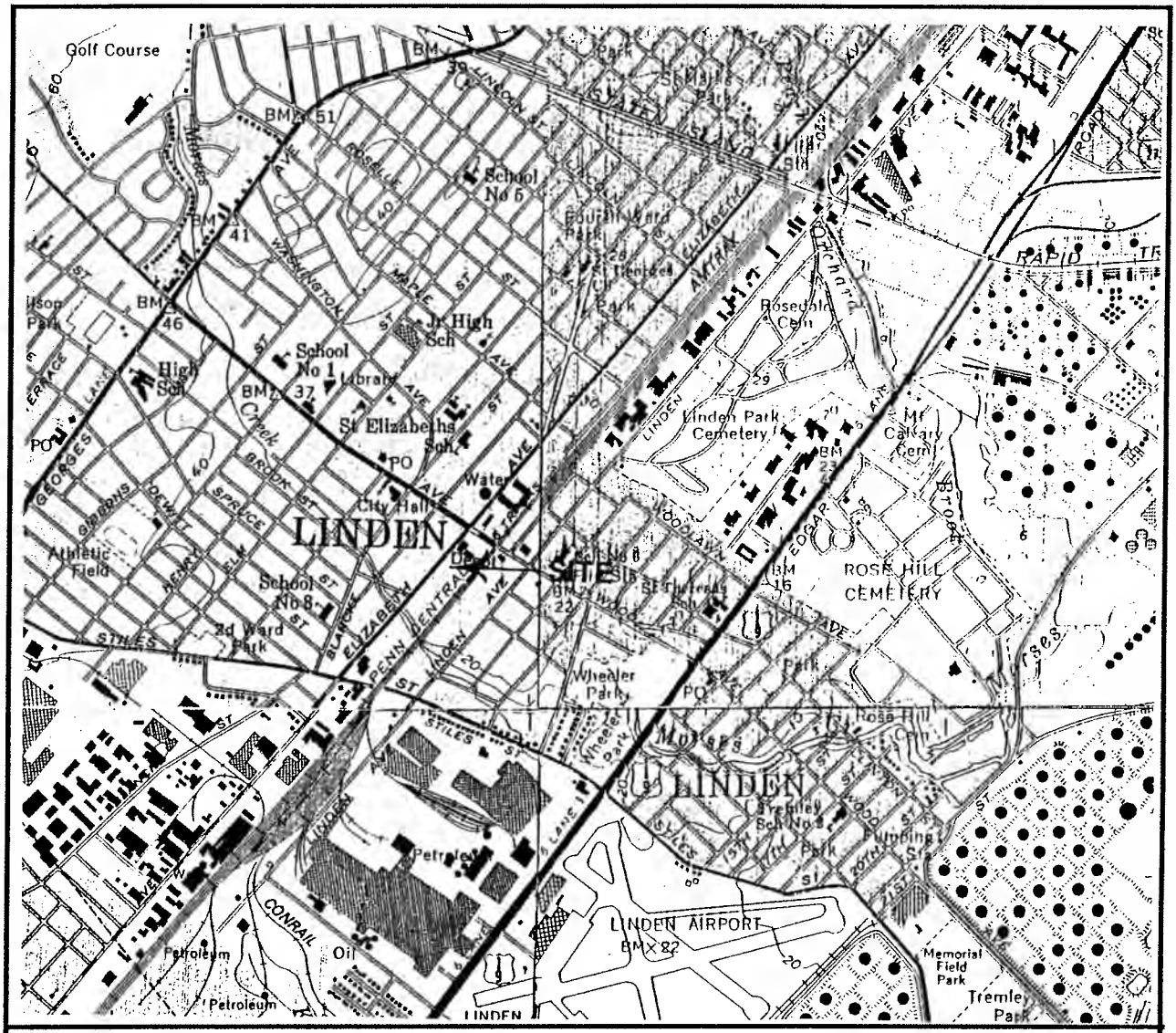
Based on these analyses, a Classification Exception Area is proposed for this site to the limits of the property boundaries.

Thank you for your consideration. If you have any questions on this matter, please contact me at your convenience.

Very truly yours,



J. David Calvert, PE, CSP
For Matrix Engineering, Inc.



Drawing from USGS Maps
Roselle Quadrangle
Elizabeth Quadrangle
Perth Amboy Quadrangle
Arthur Kill Quadrangle

Allied Building Supply
101 W. Elizabeth Avenue
Linden
Union
New Jersey

Scale 1:24000

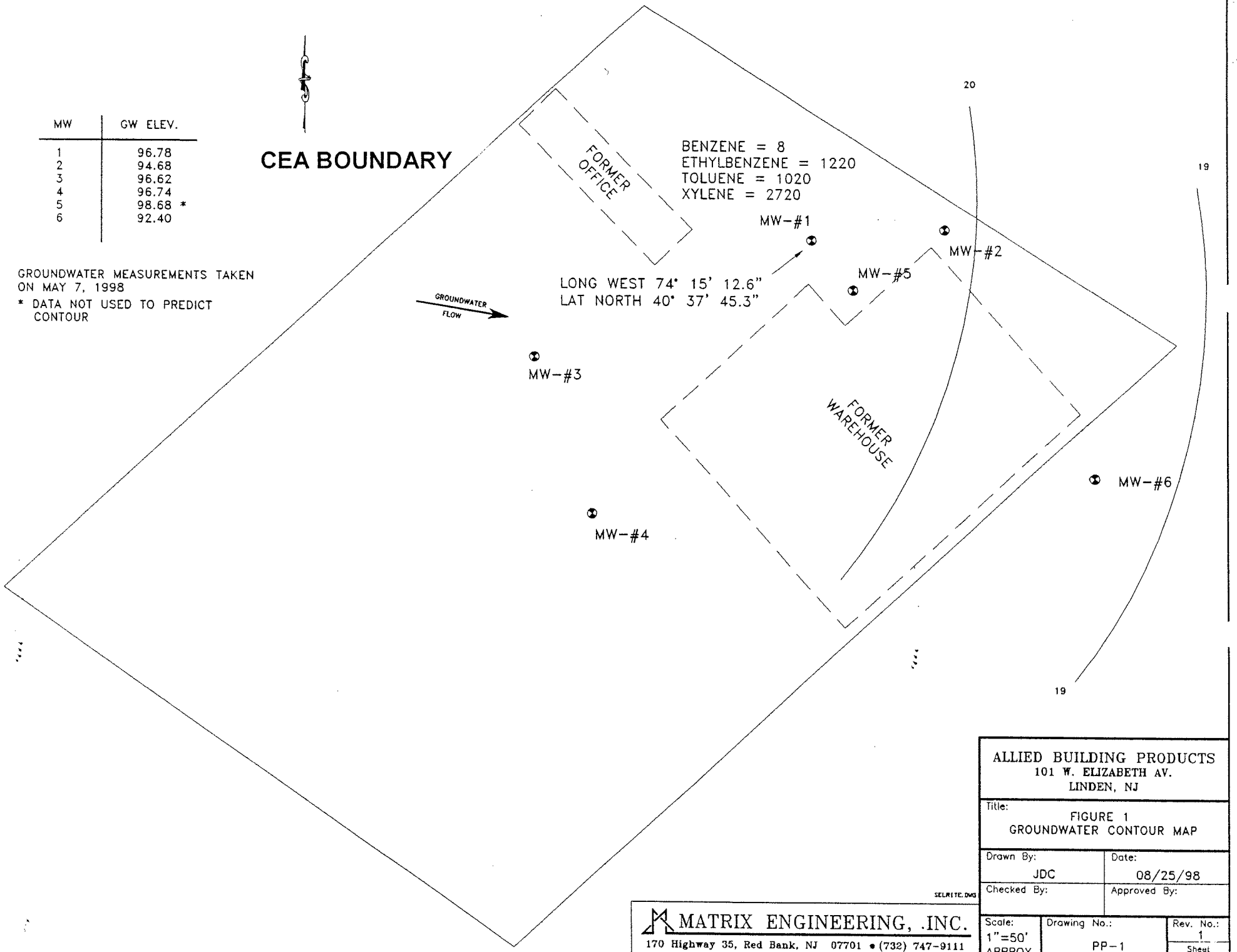
Matrix Engineering, Inc.
170 Highway 35
Red Bank, NJ 07701
Tel. (732) 747-9111 Fax (732) 741-5553

Figure 2
USGS
August 26, 1998

MW	GW ELEV.
1	96.78
2	94.68
3	96.62
4	96.74
5	98.68 *
6	92.40

GROUNDWATER MEASUREMENTS TAKEN ON MAY 7, 1998

* DATA NOT USED TO PREDICT CONTOUR



ALLIED BUILDING PRODUCTS
101 W. ELIZABETH AV.
LINDEN, NJ

Title: FIGURE 1
GROUNDWATER CONTOUR MAP

Drawn By:	Date:
JDC	08/25/98
Checked By:	Approved By:

SELRITE.DWG

MATRIX ENGINEERING, .INC.
170 Highway 35, Red Bank, NJ 07701 • (732) 747-9111

Scale:	Drawing No.:	Rev. No.:
1"=50' APPROX.	PP-1	1

Sheet 1 of 1

TABLE 1
Allied Building Supply Site
Field Determined Well Parameters
Measured Before Purging
5/7/98

Monitor Well	Casing Elevation (feet)	Depth To Water (feet)	Depth To Product (feet)	Water Elevation (feet)	Product Thickness (feet)	Adjusted Water Elevation (feet)	Dissolved Oxygen (ppm)	pH (SU)	Conductivity (uS)
MW-#1	29.23	8.83	N/A	20.40	0.00	–	1.3	6.9	413
MW-#2	30.29	10.20	N/A	20.09	0.00	–	0.6	5.8	391
MW-#3	27.98	7.84	N/A	20.14	0.00	–	1.8	6.2	487
MW-#4	28.19	7.22	N/A	20.97	0.00	–	1.0	5.9	220
MW-#5	29.71	1.89	N/A	27.82	0.00	–	2.0	6.8	394
MW-#6	30.60	11.33	N/A	19.27	0.00	–	2.5	6.7	648

Casing elevations based on data from Compliance Management Inc. report dated February, 1997
N/A = Not Applicable

Matrix Engineering, Inc.
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Red Bank, NJ 07701
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TABLE 2
SUMMARY OF LABORATORY ANALYSES
ug/l

		Intern. Hydronics		Brinkerhoff/ Accredited			Brinkerhoff/ GTEL	Compliance/ Water Works	Matrix/ AllService	Matrix/ AllService	
MW#1		SEP. 93	DEC. 93	JAN. 95	DEC. 95	MAR. 96	JUL. 96	DEC. 96	MAY 98	JULY 98	MAY 98 TOTAL BTEX
	LEAD	71	NA	46	12.6	14.1	11	124.6	375	6.18	
	BENZENE	280	350	35	120	37	46	<20	8	NA	
	TOLUENE	3000	7500	79	4400	4600	4200	3500	1020	NA	
	ETHYLBENZENE	620	1600	60	3200	1300	1800	2200	1220	NA	
	TOTAL XYLENES	3900	8700	267	6400	7800	10000	8000	2720	NA	4968
MW#2		SEP. 93	DEC. 93	JAN. 95	DEC. 95	MAR. 96	JUL. 96	DEC. 96	MAY 98	JULY 98	MAY 98 TOTAL BTEX
	LEAD	NS	NA	<10	<10	NA	NS	14.7	8	NA	
	BENZENE	NS	NA	<5	NA	NA	NS	<1	<0.1	NA	
	TOLUENE	NS	NA	<5	NA	NA	NS	<2	<0.1	NA	
	ETHYLBENZENE	NS	NA	<5	NA	NA	NS	<1	<0.2	NA	
	TOTAL XYLENES	NS	NA	<10	NA	NA	NS	<3	<0.2	NA	ND
MW#5		SEP. 93	DEC. 93	JAN. 95	DEC. 95	MAR. 96	JUL. 96	DEC. 96	MAY 98	JULY 98	MAY 98 TOTAL BTEX
	LEAD	NS	NI	12	<10	NS	NS	159.1	45	NA	
	BENZENE	NS	NI	<5	<0.4	NS	NS	<1	<0.1	NA	
	TOLUENE	NS	NI	<5	<0.5	NS	NS	<2	<0.1	NA	
	ETHYLBENZENE	NS	NI	<5	<1	NS	NS	<1	<0.2	NA	
	TOTAL XYLENES	NS	NI	<10	3.5	NS	NS	<3	<0.2	NA	ND
MW#6		SEP. 93	DEC. 93	JAN. 95	DEC. 95	MAR. 96	JUL. 96	DEC. 96	MAY 98	JULY 98	MAY 98 TOTAL BTEX
	LEAD	NS	NI	15	<10	NS	<4	24.4	7	NA	
	BENZENE	NS	NI	<5	<0.4	NS	ND	<1	<0.1	NA	
	TOLUENE	NS	NI	<5	<0.5	NS	ND	<2	<0.1	NA	
	ETHYLBENZENE	NS	NI	<5	<1	NS	ND	<1	<0.2	NA	
	TOTAL XYLENES	NS	NI	<10	<4.9	NS	ND	<3	<0.2	NA	ND

Data for sampling rounds from December , 1993 to December, 1996 based on data presented by Compliance Management Inc.
Sampling for lead analysis in July, 1998 accomplished by trickle flow.
Lead analyses for May, 1998 and December, 1996 presumed to be due to particulate contamination.
Lead data presented by Compliance Management Inc. may not be accurate based on NJDEP comments in letter dated March 26, 1997.

Matrix Engineering, Inc.
170 Hwy 35
Red Bank, NJ 07701
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2:04 PM, 8/24/98

Benzene

CEA Calculations

Hydraulic Conductivity (K)	0.003	ft/day	Vs = K*I/ne
Hydraulic Gradient (I)	0.005263	ft/ft	Vs = 3.16E-05 ft/day
Effective Porosity (ne)	0.5	dimensionless	
Bulk Density of Formation (pb)	1.4	g/cc	Rd = 1+(Kd*pb/ne)
Soil Sorption Coef. (Koc)	63	ml/g	Rd = 1.882
Fraction Organic Carbon (foc)	0.005		
Seepage Velocity (Vs)	3.16E-05	ft/day	Vpt = Vs/Rd
Retardation Factor (Rd)	1.882		Vpt = 0.000 ft/day
Pollutant Transport Rate (Vpt)	1.68E-05	ft/day	
Sample Location	MW-1		
Compound of Concern	Benzene		t1/2 = 0.693*dt/ln(C/Co)
Site Calculated Half-Life (t1/2)	291	days	t1/2 = 291 days
Initial Concentration (Co)	350	ug/l	
Second Concentration (C)	8	ug/l	Alternate t1/2
Time Interval (dt)	1585	days	t1/2 = 291 days
Most Recent Concentration	8		
GWQS	1		
Calculated Half-Life	291	days	
Time to Reach GWQS	872	days	
Time to Reach GWQS	2	yrs	D = Vpt*t
Length of Transport (D)	0	feet	D = 0 feet
Most Recent Concentration	8		
GWQS	1		
Alternate Half-Life	291	days	
Time to Reach GWQS	873	days	
Time to Reach GWQS	2.39	yrs	D = Vpt*t
Length of Transport (D)	0	feet	D = 0 feet

Matrix Engineering, Inc.
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Toluene

CEA Calculations

Hydraulic Conductivity (K)	0.003	ft/day	Vs = K*I/ne
Hydraulic Gradient (I)	0.005263	ft/ft	Vs = 0.000 ft/day
Effective Porosity (ne)	0.5	dimensionless	
Bulk Density of Formation (pb)	1.4	g/cc	Rd = 1+(Kd*pb/ne)
Soil Sorption Coef. (Koc)	63	ml/g	Rd = 1.882
Fraction Organic Carbon (foc)	0.005		
Seepage Velocity (Vs)	3.16E-05	ft/day	Vpt = Vs/Rd
Retardation Factor (Rd)	1.882		Vpt = 1.68E-05 ft/day
Pollutant Transport Rate (Vpt)	1.68E-05	ft/day	
Sample Location	MW-1		
Compound of Concern	Toluene		t1/2 = 0.693*dt/ln(C/Co)
Site Calculated Half-Life (t1/2)	559	days	t1/2 = 559 days
Initial Concentration (Co)	7500	ug/l	
Second Concentration (C)	1020	ug/l	Alternate t1/2
Time Interval (dt)	1610	days	t1/2 = 291 days
Most Recent Concentration	1020		
GWQS	1000		
Calculated Half-Life	559	days	
Time to Reach GWQS	16	days	
Time to Reach GWQS	0	yrs	D = Vpt*t
Length of Transport (D)	0	feet	D = 0 feet
Most Recent Concentration	1020		
GWQS	1000		
Alternate Half-Life	291	days	
Time to Reach GWQS	8	days	
Time to Reach GWQS	0.02	yrs	D = Vpt*t
Length of Transport (D)	0	feet	D = 0 feet

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Ethylbenzene

CEA Calculations

Hydraulic Conductivity (K)	0.003	ft/day	Vs = K*I/ne
Hydraulic Gradient (I)	0.005263	ft/ft	Vs = 0.000 ft/day
Effective Porosity (ne)	0.5	dimensionless	
Bulk Density of Formation (pb)	1.4	g/cc	Rd = 1+(Kd*pb/ne)
Soil Sorption Coef. (Koc)	63	ml/g	Rd = 1.882
Fraction Organic Carbon (foc)	0.005		
Seepage Velocity (Vs)	3.16E-05	ft/day	Vpt = Vs/Rd
Retardation Factor (Rd)	1.882		Vpt = 1.68E-05 ft/day
Pollutant Transport Rate (Vpt)	1.68E-05	ft/day	
Sample Location	MW-1		
Compound of Concern	Ethylbenz		t1/2 = 0.693*dt/ln(C/Co)
Site Calculated Half-Life (t1/2)	632	days	t1/2 = 632 days
Initial Concentration (Co)	3200	ug/l	
Second Concentration (C)	1220	ug/l	Alternate t1/2
Time Interval (dt)	880	days	t1/2 = 291 days
Most Recent Concentration	1220		
GWQS	700		
Calculated Half-Life	632	days	
Time to Reach GWQS	507	days	
Time to Reach GWQS	1	yrs	D = Vpt*t
Length of Transport (D)	0	feet	D = 0 feet
Most Recent Concentration	1220		
GWQS	700		
Alternate Half-Life	291	days	
Time to Reach GWQS	233	days	
Time to Reach GWQS	0.64	yrs	D = Vpt*t
Length of Transport (D)	0	feet	D = 0 feet

Matrix Engineering, Inc.
170 Highway 35
Red Bank, NJ 07701
732-747-9111

Xylene

CEA Calculations

Hydraulic Conductivity (K)	0.003 ft/day	Vs = K*I/ne	
Hydraulic Gradient (I)	0.005263 ft/ft	Vs =	0.000 ft/day
Effective Porosity (ne)	0.5 dimensionless		
Bulk Density of Formation (pb)	1.4 g/cc	Rd = 1+(Kd*pb/ne)	
Soil Sorption Coef. (Koc)	63 ml/g	Rd =	1.882
Fraction Organic Carbon (foc)	0.005		
Seepage Velocity (Vs)	3.16E-05 ft/day	Vpt = Vs/Rd	
Retardation Factor (Rd)	1.882	Vpt =	1.68E-05 ft/day
Pollutant Transport Rate (Vpt)	1.68E-05 ft/day		
Sample Location	MW-1		
Compound of Concern	Xylene	t1/2 = 0.693*dt/ln(C/Co)	
Site Calculated Half-Life (t1/2)	357 days	t1/2 =	357 days
Initial Concentration (Co)	10000 ug/l		
Second Concentration (C)	2720 ug/l	Alternate t1/2	
Time Interval (dt)	670 days	t1/2 =	291 days
Most Recent Concentration	2720		
GWQS	1000		
Calculated Half-Life	357 days		
Time to Reach GWQS	515 days		
Time to Reach GWQS	1 yrs	D = Vpt*t	
Length of Transport (D)	0 feet	D =	0 feet
Most Recent Concentration	2720		
GWQS	1000		
Alternate Half-Life	291 days		
Time to Reach GWQS	420 days		
Time to Reach GWQS	1.15 yrs	D = Vpt*t	
Length of Transport (D)	0 feet	D =	0 feet

Matrix Engineering, Inc.
170 Highway 35
Red Bank, NJ 07701
732-747-9111

Xylene (2)

CEA Calculations

Hydraulic Conductivity (K)	0.003	ft/day	Vs = K*I/ne
Hydraulic Gradient (I)	0.005263	ft/ft	Vs = 0.000 ft/day
Effective Porosity (ne)	0.5	dimensionless	
Bulk Density of Formation (pb)	1.4	g/cc	Rd = 1+(Kd*pb/ne)
Soil Sorption Coef. (Koc)	63	ml/g	Rd = 1.882
Fraction Organic Carbon (foc)	0.005		
Seepage Velocity (Vs)	3.16E-05	ft/day	Vpt = Vs/Rd
Retardation Factor (Rd)	1.882		Vpt = 1.68E-05 ft/day
Pollutant Transport Rate (Vpt)	1.68E-05	ft/day	
Sample Location	MW-1		
Compound of Concern	Xylene		t1/2 = 0.693*dt/ln(C/Co)
Site Calculated Half-Life (t1/2)	960	days	t1/2 = 960 days
Initial Concentration (Co)	8700	ug/l	
Second Concentration (C)	2720	ug/l	Alternate t1/2
Time Interval (dt)	1610	days	t1/2 = 291 days
Most Recent Concentration	2720		
GWQS	1000		
Calculated Half-Life	960	days	
Time to Reach GWQS	1386	days	
Time to Reach GWQS	4	yrs	D = Vpt*t
Length of Transport (D)	0	feet	D = 0 feet
Most Recent Concentration	2720		
GWQS	1000		
Alternate Half-Life	291	days	
Time to Reach GWQS	420	days	
Time to Reach GWQS	1.15	yrs	D = Vpt*t
Length of Transport (D)	0	feet	D = 0 feet

Matrix Engineering, Inc.
170 Highway 35
Red Bank, NJ 07701
732-747-9111

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection

Bureau of Underground Storage Tanks
P.O. Box 433
401 East State Street
Trenton, N.J. 08625-0433
Fax (609)633-1454

Robert C. Shinn, Jr.
Commissioner

Mr. Daniel Winters
PO Box 387
~~581 Rahway Avenue~~
Union, NJ 07083-0387

Re: Area of Concern: 2,000 Gallon Gasoline Underground Storage Tank
Limited Restricted Use
No Further Action Letter and Covenant Not to Sue
Allied Building Supplies
101 West Elizabeth Avenue
Block 254 Lot 10
Linden, Union County
Case #93-06-24-1425
UST #0129486
KCSL # NJL600081798
Closure #C93-2092.

NOV 16 1998

Dear Mr. Winters:

Pursuant to N.J.S.A. 58:10B-13.1 and N.J.A.C. 7:26C, the New Jersey Department of Environmental Protection (Department) makes a determination that no further action is necessary for the remediation of the area of concern as specifically referenced above, except as noted below, so long as Allied Building Supplies did not withhold any information from the Department. This action is based upon information in the Department's case file and Allied Building Supplies' final certified report dated August 26, 1998. In issuing this No Further Action Determination and Covenant Not to Sue, the Department has relied upon the certified representations and information provided to the Department.

By issuance of this No Further Action Determination, the Department acknowledges the completion of a Remedial Investigation and Remedial Action pursuant to the Technical Requirements for Site Remediation (N.J.A.C. 7:26E) for the 2,000 gallon Gasoline Underground Storage Tank and no other areas.

NO FURTHER ACTION CONDITIONS

As a condition of this No Further Action Determination Allied Building Supplies as well as each subsequent owner, lessee and operator (collectively "Successors") shall comply with each of the following:

Name and Address Changes

Pursuant to N.J.S.A. 58:10B-12, Allied Building Supplies and the Successors shall inform the Department in writing whenever its name or address changes, within 14 calendar days after the change.

Well Sealing

Pursuant to N.J.S.A. 58:4A, Allied Building Supplies and the Successors shall properly seal all monitoring wells installed as part of a remediation that will no longer be used for ground water monitoring. A certified and licensed well driller shall seal the wells in accordance with the requirements of N.J.A.C. 7:9-9. The well abandonment forms shall be completed and submitted to the Bureau of Water Allocation. Please call (609) 984-6831 for forms and information.

Monitoring of Compliance

Pursuant to N.J.S.A. 58:10B-13.1, Allied Building Supplies and the Successors shall conduct monitoring for compliance and effectiveness of the institutional control specified in this document and submit a certification to the Department biennially in writing that the institutional control is being properly maintained and continues to be protective of public health and safety and the environment. Any such certification shall include the information relied upon to determine that no changes have occurred.

CLASSIFICATION EXCEPTION AREA (CEA)
AND WELL RESTRICTION AREA (WRA)

Because concentrations of contaminants remain above the Ground Water Quality Standards, N.J.A.C. 7:9-6 et seq., a CEA and WRA are required, at this time, as institutional controls.

This CEA and WRA are based, in part, on the aquifer and contaminant data and evaluations provided in the above referenced report and/or case file. The CEA and WRA is the area defined by the property boundary and identified on the enclosed map. Any special conditions or restrictions for water use within the WRA will be administered by the Department's Bureau of Water Allocation.

This CEA and WRA apply to benzene, toluene, ethylbenzene and xylenes only. All other constituent standards apply within the CEA. All constituent standards (N.J.A.C. 7:9-6) apply at the designated boundary. All designated ground water uses within this area are suspended for the duration of the CEA. Pursuant to N.J.A.C. 7:9-6.4, "designated use" means a present or potential use of ground water within a ground water classification area as determined by N.J.A.C. 7:9-6.5. Pursuant to N.J.A.C. 7:9-6.5, this area is presently designated as Class II-A. The primary designated use for Class II-A ground water is potable water; secondary uses include agricultural and industrial water.

The duration of the CEA and WRA is set at three years from the date of this letter. This is greater than the predicted duration for contaminant degradation in the above referenced report. The Ground Water Quality Standards that apply to the compounds of concern are: benzene 1 ppb; toluene 1000 ppb; ethylbenzene 700 ppb and xylenes 1000 ppb. Should concentrations of contaminants reach their respective criteria prior to the CEA and WRA expiration date as demonstrated through ground water sampling, the Department will consider any requests to terminate the CEA and WRA. However, the expiration of the three year period prior to contaminant concentrations reaching the Ground Water Quality Standards would not constitute approval to utilize the ground water for its designated purposes. Compliance with the Ground Water Quality Standards may be determined by Allied Building Supplies by demonstrating that the Ground Water Quality Standards have been met for the referenced constituent(s) through ground water sampling from monitoring well: MW-1. Please note that Allied Building Supplies has the option of maintaining these wells for sampling purposes or sealing these wells and utilizing an acceptable method of ground water sampling to demonstrate compliance with the Ground Water Quality Standards. Compliance may be determined by Allied Building Supplies at the termination of the CEA and WRA or sooner. The Department's evaluation of the ground water sampling results, to determine compliance with the Ground Water Quality Standards, would be through a Memorandum of Agreement (MOA) or other oversight document, executed between Allied Building Supplies and the Department.

COVENANT NOT TO SUE

The Department issues this Covenant Not to Sue pursuant to N.J.S.A. 58:10B-13.1. That statute requires a covenant not to sue with each no further action letter. However, in accordance with N.J.S.A. 58:10B-13.1, nothing in this Covenant shall benefit any person who is liable, pursuant to the Spill Compensation and Control Act (Spill Act), N.J.S.A. 58:10-23.11, for cleanup and removal costs and the Department makes no representation by the issuance of this Covenant, either express or implied, as to the Spill Act liability of any person.

The Department covenants, except as provided in the preceding paragraph, that it will not bring any civil action against the following:

(a) the person who undertook the remediation;
(b) subsequent owners of the subject property;
(c) subsequent lessees of the subject property; and
(d) subsequent operators at the subject property,

for the purposes of requiring remediation to address contamination which existed prior to the date of the final certified report for the area of concern specifically referenced above, or payment of cleanup and removal costs for such additional remediation.

Any person who may benefit from this Covenant is barred from making a claim against the Spill Compensation Fund, N.J.S.A. 58:10-23.11i, and the Sanitary Landfill Facility Contingency Fund, N.J.S.A. 13:1E-105, for any costs or damages relating to the remediation covered by this Covenant. All other claims against these funds will be controlled by the corresponding statutes and their implementing regulations.

Allied Building Supplies, and each subsequent owner, lessee and operator, during that person's ownership, tenancy or operation, shall maintain those controls and conduct periodic compliance monitoring in the manner the Department requires.

Pursuant to N.J.S.A. 58:10B-13.1d, this Covenant does not relieve any person from the obligation to comply in the future with laws and regulations. The Department reserves its right to take all appropriate enforcement for any failure to do so.

The Department may revoke this Covenant at any time after providing notice upon its determination that either:

(a) any person with the legal obligation to comply with any condition in this No Further Action Letter has failed to do so; or
(b) any person with the legal obligation to maintain or monitor any engineering or institutional control has failed to do so.

This Covenant Not to Sue, which the Department has executed in duplicate, shall take effect immediately once the person who undertook the remediation has signed and dated the Covenant Not to Sue in the lines supplied below and the Department has received one copy of this document with original signatures of the Department and the person who undertook the remediation.

Name: Daniel Winters

Signature:_____

Title:_____

Dated:_____

NEW JERSEY DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Name: Kevin F. Kratina

Signature:_____

Title: Chief, Bureau of Underground Storage Tanks

Dated: NOV 16 1998

NOTICES

Bureau of Field Operation's Case Assignment

This No Further Action Determination specifically does not address the 550 gallon fuel oil underground storage tank. Allied Building Supply was notified of the case transfer to the Bureau of Field Operation's Case Assignment Section by letter on December 8, 1994.

Pursuant to the Procedures for Department Oversight of the Remediation of Contaminated Sites (N.J.A.C. 7:26C) you may have an opportunity to remediate the site, or portion of the site, on a voluntary basis under a Memorandum of Agreement (application enclosed) or otherwise. Please direct all correspondence to:

New Jersey Department of Environmental Protection
Bureau of Field Operations
Case Assignment Section
Attention: Section Chief
401 East State Street - 5th Floor
P.O. Box 434
Trenton, NJ 08625-0434

Direct Billing

Please be advised that pursuant to the Procedures for Department Oversight of the Remediation of Contaminated Sites (N.J.A.C. 7:26C et seq.) Allied Building Supplies is required to reimburse the Department for oversight of the remediation. The Department will be issuing a bill within the next four months.

Thank you for your attention to these matters. If you have any questions, please contact Bill Brown, Case Manager at (609) 777-1386.

Sincerely,

Kevin F. Kratina, Chief
Bureau of Underground Storage Tanks

enclosures: Memorandum Of Agreement Package
CEA USGS Quad and Site Location Map

c: Kevin Kratina, BUST
Board of Health, Linden
Municipal Clerk, Linden (CEA)
CEHA Agency, Union County
Case Manager
Section Chief, (BFO\CAS)
County Planning Board (CEA)
NJDEP-Bureau of Water Allocation
NJDEP-John Defina, Bureau of Planning & Systems (CEA)
NJDEP-Environmental Claims Administration (CEA)

0129486

Decrease

BUREAU OF UNDERGROUND STORAGE TANKS

REGISTRATION AND BILLING UNIT

Request for Fee Adjustment

UST #: 0129486

Facility Name: Allied Building Supply Co

Facility Address: _____

_____

Owner's Name: _____

_____

_____

Reason for Adj. Balance due is $0. Tank was removed prior to certificate expiration.

_____

Person Authorizing Change: Patricia Wilson **Date:** 8/18/94

Date Entered into System: M 8/30/94

Additional Comments:

06/26/91

Staff

Let's protect our earth

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY

INVOICE NO.
940094590

ACQ 322-94.

NEW JERSEY UNDERGROUND STORAGE TANK PROGRAM REGISTRATION INVOICE

Complete 8.18.94

called 8.15.94 8.18.94

UST No.	Category	Tanks
0129486	ACF	1

Billing Date	Due Date	Amount Due
02/15/94	03/14/94	$ 100.00

KEEP THIS PORTION FOR YOUR RECORDS

PLEASE NOTE: Pursuant to N.J.A.C. 7:14-8:10, you may be liable for penalties of up to $50,000 for non-payment of fees. Any penalty incurred may be recovered in a summary proceeding, N.J.S.A. 58:10A-10.

TYPE OF NOTICE	REGISTRATION PERIOD	FACILITY: BILLED	COUNTY
FINAL BILLING	04/01/94 - 03/31/95	ALLIED BUILDING SUPPLY CO 101 W ELIZABETH AVE LINDEN, NJ 07036	UNION

MESSAGES:

*** SEE FEE SCHEDULE ON BACK ***

THIS IS YOUR FINAL NOTICE
WE HAVE NOT RECEIVED PAYMENT AS OF THIS DATE. IF YOU HAVE MAILED YOUR PAYMENT PLEASE DISREGARD THIS NOTICE. RECEIPT OF YOUR CANCELLED CHECK AND YOUR REGISTRATION CERTIFICATE WILL INDICATE PAYMENT OF YOUR FEE. THANK YOU.

REMINDER:

- Return the BOTTOM PORTION of this INVOICE with your PAYMENT
- Sign and return the **Annual Certification Questionaire** Form.
- Mark any changes in the Facility's status on the **ANNUAL CERTIFICATION REGISTRATION QUESTIONAIRE** **BLACK BAR** Form and return with your Payment.
  Note: If there are no changes, do not return the Form.
- **Return the required Forms and Payment via the enclosed envelope.**

Send Billing Inquiries to:

NJDEPE
Division of Responsible Party Site Remediation
Bureau of Underground Storage Tanks
CN 028
Trenton, NJ 08625-0028

or contact directly at:

(609)-984-3156

INVOICE NO.
940094590

DEP51F 3 92

Let's protect our earth

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY

INVOICE NO.
940094590

NEW JERSEY UNDERGROUND STORAGE TANK PROGRAM REGISTRATION INVOICE

UST No.	Category	Tanks
0129486	ACF	1

Billing Date	Due Date	Amount Due
02/15/94	03/14/94	$ 100.00

If there are changes to your Mailing Name or Address, check this box ☐ and print the change on the back of this invoice.

DO NOT FOLD, BEND OR MARK

Enter the Amount of your Payment $ -0-

RETURN THIS PORTION with your check made payable to:

TREASURER - STATE OF NEW JERSEY

and mail to:

NJDEPE
BUREAU OF REVENUE
CN 417
TRENTON, NJ 08625-0417

DANIEL WINTERS

51

PO BOX 387
UNION NJ 07083-0387

10101010101010100001020904080611111100001000000098194009459025 17

FEE SCHEDULE CATEGORIES

ANNUAL CERTIFICATION FEE (ACF)

1-5 TANKS $100.00

EACH ADDITIONAL tank add $15.00 per tank to the $100.00 base fee.

Example: Eight (8) tanks would be:

1-5 tanks	$100.00
6,7,8, tanks	+ 45.00
Total Amount Due	$145.00

INITIAL REGISTRATION FEE (IRF)

$100.00 per Facility

DEP518 3 92

CHANGE OF MAILING ADDRESS INFORMATION PLEASE PRINT

Business or Company Name : _____

Care/Attention of : _____

Delivery Address (Indicate One) : A) PO Box _____ No. B) Rural Route _____ No. Box _____ No.

C) Street Address _____ No. _____ Name

D) Mail Stop _____

Other : (Optional) Bldg Name/Number _____ Floor Number _____

Room Name/Number _____ Suite Name/Number _____

Postal City: _____ State: _____ Zip Code: _____

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
DIVISION OF RESPONSIBLE PARTY SITE REMEDIATION
BUREAU OF APPLICABILITY AND COMPLIANCE
Registration and Billing Section
CN 028
Trenton, N.J. 08625-0028
1-800-722-TANK

For State Use Only

	YES	NO
Ck.		
A/C		
Inv.		
R/F		
Sp. Hnd.		
Staff		

Annual Certification Questionnaire

Compliance with this Annual Certification will meet all requirements of State Law P.L. 1986, c. 102, The Underground Storage of Hazardous Substances Act (N.J.S.A. 58:10A-21) and the Underground Storage Tank Regulations (N.J.A.C. 7:14B-1 through 15).

IMPORTANT INFORMATION

FEE: The Fee Schedule is printed on the reverse side of the billing invoice. Please make your payment instrument payble to: "Treasurer", State of New Jersey. Use of the enclosed return envelope will expedite processing.

PENALTY: Failure by onwer or operator of a regulated underground storage tank to comply with any requirement of the State UST Act or regulations may result in the penalties set forth in N.J..S.A. 58:10A-10.

EMERGENCY: If a discharge or spill occurs, the NJDEPE Hotline at (609) 292-7172 must be called IMMEDIATELY - 24 hours a day.

UPGRADE EXEMPTION: Residential heating oil underground storage tanks are exempt from all upgrade requirements.

DATES TO KNOW (critical deadlines)

December 22, 1989 - All federally regulated tank systems installed before 1965 (or of unknown age) must have installed leak detection.
December 22, 1990 - All federally regulated tank systems installed between 1965-1969 must have installed leak detection.
December 22, 1991 - All federally regulated tank systems installed between 1969-1974 must have installed leak detection.
December 22, 1992 - All federallly regulated tank systems installed between 1974-1979 must have installed leak detection.
December 22, 1993 - All regulated tanks must install cathodic protection, monitoring systems and, spill/overfill protection (non-residential heating oil tanks exluded).
August 6, 1994 - All non-residential heating oil tanks installed prior to August 6, 1974 must install cathodic protection, monitoring systems, and spill/overfill protection.
August 6, 1995 - All non-residential heating oil tanks installed on or after August 6, 1974 must install cathodic protection, monitoring systems, and spill/overfill protection.
December 22, 1998 - All regulated hazardous waste substance systems must have secondary containment (petroleum products and waste oil tank systems excluded).

SECTION A

REGISTRATION & BILLING

Have there been any changes to this facility's registration status during the last twelve months that have not been reported to this office? * ☐ YES ☐ NO

If YES, please check the appropriate type of change(s) below and complete the enclosed REGISTRATION QUESTIONNAIRE (black bar on face of the form) with NEW information ONLY. Then, complete the remainder of this form and submit to this office.

_____ Company Name and Address
_____ Facility Location
_____ Operator
_____ Contact Person
_____ Type of Product(s) Stored
_____ Spills, accidents, leaks or releases
_____ Substantial Modificattion(s)

PLEASE USE REGISTRATION FORM WITH BLACK BAR AT THE TOP FOR REPORTING THIS INFORMATION

* TANKS WERE REMOVED IN ACCORDANCE WITH AN UNDERGROUND STORAGE TANK CLOSURE PLAN DATED MAY 1993

X Other (please specify) TANKS REMOVED, Property Sold

If NO, please complete the remainder of this form and return to this office.

SECTION B

N/A **MONITORING SYSTEMS**

1. Does this facility have a secondary containment system which was installed before the effective date of the UST Technical regulations? ☐ YES ☐ NO
   If Yes, does the secondary containment system comply with all provisions of these regulations? ☐ YES ☐ NO
2. Does this facility have a monitoring system which is in compliance with N.J.A.C. 7:14B-4.5(e) (for systems installed prior to the effective date of these regulations) or N.J.A.C. 7:14B-6 (for systems installed after the effective date of these regulations)? ☐ YES ☐ NO
   If No, please be aware that the facility must meet the appropriate deadline. (See Dates to Know at top of this page).
3. Does this facility have an UST system installed prior to 1965 or of unknown age? ☐ YES ☐ NO
   If Yes, has the facility installed a leak detection system that complies with all provisions of the Federal UST Technical Regulations 40 CFR 280.40? ☐ YES ☐ NO
   If No, were the closure procedures completed as required by the Federal UST Technical Regulations 40 CFR 280.71, 72? ☐ YES ☐ NO

N/A

SECTION C **RECORDKEEPING/COMPLIANCE**

Please answer all the questions in this Section on a facility basis. Any one tank not in compliance requires a "NO" answer for the entire facility.

1. Does this facility have cathodic protection systems? ☐ YES ☐ NO
   If Yes, are the systems properly operated and maintained as required by the UST Technical Regulations Subchapter 6? ☐ YES ☐ NO
2. Are the performance claims and documentation of monitoring systems maintained by the owner or operator as required by Subchapter 6.6? ☐ YES ☐ NO
3. Are the proper monitoring, testing, sampling, repair and inventory records kept on-site as required by Subchapter 6.6? ☐ YES ☐ NO
4. Is the proper Release Response Plan kept on-site per Subchapter 5.5? ☐ YES ☐ NO
5. Does the facility have spill and overfill protection systems per Subchapter 5.2(a) (5)? ☐ YES ☐ NO
   If yes, are they properly operated and maintained as required by the UST Technical Regulations? ☐ YES ☐ NO
6. Have all Fill Ports been permanently marked as per API #1637 as stated in Subchapter 4.5(h)? ☐ YES ☐ NO

N/A

SECTION D **FINANCIAL RESPONSIBILITY**

All facilities are required to obtain financial responsibility assurance by the deadlines listed in Subchapter 14. Please list the appropriate financial information below:

_____ Type

_____ Carrier/Issuing agency

__/__/__ Date Effective

_____ Policy Number

$_____ Amount

CERTIFICATIONS

Who must sign?

CERTIFICATION NO. 1:

Must be signed by the highest ranking individual at the facility with overall responsibility

CERTIFICATION NO. 2:

Must be signed as follows
: For corporations, by the vice president or higher
: For sole proprietorships, by the proprietor
: For partnerships, by the general partner
: For government or public agency, by the principal executive officer or ranking official

NOTE: IF THE PERSON SIGNING CERTIFICATION No. 2 IS THE SAME AS THE PERSON SIGNING CERTIFICATION No. 1, THEN CERTIFICATION No. 1 ONLY NEEDS TO BE SIGNED. (If different persons are required to sign No. 1 and No. 2, then they must do so.)

No. 1

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, incaccurate or incomplete information, including fines and/or imprisonment."

(Signature)

DANIEL WINTERS

(Typed/Printed Name)

PRES

(Title)

3/8/94

(Date Signed)

No. 2

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this transmittal and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including the possibility of fines and/or imprisonment."

(Signature)

(Typed/Printed Name)

(Title)

(Date Signed)

0129486

(UST Number)

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
DIVISION OF RESPONSIBLE PARTY SITE REMEDIATION
CN 028
Trenton, N.J. 08625-0028

FOR STATE USE ONLY

UST # _____

	YES	NO
CK. IN.	☐	☒
AMT.	☐	☐
AUTH.	☐	☐
SP. ROUTE	☐	☐
SITE PLN.	☐	☐
SIGN.	☐	☐

COMCODE ☐☐☐☐

*** ANNUAL CERTIFICATION ***

UNDERGROUND STORAGE TANK REGISTRATION QUESTIONNAIRE

Bureau of Applicability and Compliance
Registration and Billing Section

Use this form ONLY when submitting corrections/changes to registration at Annual Certification

General Facility Information

1. Facility Name: ALLIED BUILDING SUPPLY CO.
2. Facility Location: 1011 WEST ELIZABETH AVE. (NUMBER AND STREET)
   LINDEN (CITY OR MUNICIPALITY)
   UNION (COUNTY) NJ (STATE) 07036 (ZIP CODE)
   92154 (BLOCK) 0011.0 (LOT)
3. Owner's mailing address: P.O. Box 1387 (NUMBER AND STREET)
   UNION (CITY OR MUNICIPALITY)
   UNION (COUNTY) NJ (STATE) 07083 (ZIP CODE)
4. Owner's name: DANIEL WINTERS
5. Contact person (Facility Operator): DANIEL WINTERS (PERSON OR TITLE)
6. Contact telephone number: 908 (AREA CODE) 964 (CHANGE) 1555 (NUMBER)
7. Total number of facility underground storage tanks: 0 (Complete Questions 12 thru 32 for each tank)
8. Total facility underground storage tank capacity (gallons):
9. Status of owner: (mark one) A. ☐ CURRENT B. ☒ FORMER
10. Type of owner (mark one) A. ☐ State B. ☒ Commercial C. ☐ Local D. ☐ Federal E. ☐ Charitable or Public School F. ☐ Residence G. ☐ Ownership Uncertain
11a. Two copies of a site plan are submitted with this registration A. ☐ YES B. ☐ NO N/A

Submit two (2) copies of SITE PLAN showing facility or property boundary, buildings and the location of ALL underground storage tanks. EITHER, an existing engineering site plan, if available, OR a neat and legible hand-drawn sketch of the site may be submitted. In either case the site plan or sketch MUST show the location and distances that tanks, buildings, and dispensers are from the facility's property boundary. Include all tanks that are: E (existing/in use), P (empty), M (emergency), A (abandoned), C (other). Each underground tank on the site plan or sketch shall be numbered in accordance with the instructions for question 12. The number assigned to a tank on the site plan or sketch MUST match and be identical to the tank identification number assigned to that tank on this form.

INCLUDE FACILITY NAME, OWNER'S NAME, FACILITY ADDRESS AND TELEPHONE NUMBER ON ALL SITE PLANS.

11b. Do you have financial responsibility assurance? ☐ YES ☐ NO N/A

(Type) _____ (Company/Carrier) _____

(Policy Number) _____ (Expiration Date) _____

UST NO. 0129486

ALL underground tanks, including those taken out of operation (UNLESS THE TANK WAS REMOVED FROM THE GROUND) must be included in this registration. All in-ground tanks shall be reported as underground tanks on this questionnaire regardless of their current status; Existing, E; Empty, P; Emergency, M; Abandoned, A; or Other, C.

SPECIFIC TANK INFORMATION

	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
12. Tank Identification number					
13. CAS number (hazardous substances only)					
14. Tank age (years)					
15. Tank size (gallons)					
16. Tank contents (MARK ONE X)					
A. Leaded gasoline	☐	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (please specify)					
N. Motor oil	☐	☐	☐	☐	☐
P. Lubricating Oil	☐	☐	☐	☐	☐
Q. Sewage	☐	☐	☐	☐	☐
R. Sewage sludge	☐	☐	☐	☐	☐
S. Hazardous waste (specify ID number)					
T. Industrial wastewater	☐	☐	☐	☐	☐
U. Mineral spirits	☐	☐	☐	☐	☐
V. Mixtures (please specify)					
W. Emergency spill tank (specify substance)					
X. Other petroleum products (please specify)					
Y. Other (please specify)					

17. Tank and piping construction (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Bare steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Carbon steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Galvanized steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Coated steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Iron (cast or ductile)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Cathodically protected steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Fiberglass-coated steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Other metallic (please specify)										
J. Fiberglass-reinforced plastic	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Other non-metallic (please specify)										
L. Other (please specify)										

18. Tank and piping structure (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Single wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Double wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Manway in tank	☐		☐		☐		☐		☐	

19. Internal tank and piping lining (MARK ONE X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. YES (please specify type of material)										
B. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. 0129486

MA

Tank I D. No.	TANK NO.		TANK NO.		TANK NO.		TANK NO.		TANK NO.	
20. Tank and piping lining installed (MARK ONE X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. At purchase of tank	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Retrofitted	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Secondary containment (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Liner	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Vault	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Double wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Other (please specify)										
22. External type/application of cathodic protection (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Sacrificial anode	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Impressed current	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Other (please specify)										
23. Monitoring/detection method (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Automatic sampling	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Manual sampling	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Ground water monitoring	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. System in secondary containment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. System outside backfill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. System within piping (piping leak detector)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. System within backfill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Type of monitoring/detection system (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Continuous	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Event activated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Audio	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Visual	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. In-tank (automatic) monitoring gauge	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Pressure/vacuum loss sensor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Liquid filled annular space	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Liquid sensor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
J. Vapor sniff wells	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Other (please specify)										
L. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25. Tank/piping tested (any type) (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Yes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Test positive (MARK IF LEAK WAS DISCOVERED)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Leak/spill occurrence (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Within the past 1 year	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Within the past 1 to 5 years	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. More than 5 years ago	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. No Records	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

NIP

UST NO. 0129486

Tank I D. No.	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
27. Tank status (MARK ONE X)					
A. In-use	☐	☐	☐	☐	☐
† B. Empty less than 12 months	☐	☐	☐	☐	☐
† C. Empty 12 months or more	☐	☐	☐	☐	☐
† D. Emergency spill tank (sump)	☐	☐	☐	☐	☐
† E. Abandoned, in place, filled and sealed	☐	☐	☐	☐	☐
F. Other (please specify)					
28. Spill recovery system on-site (MARK ONE X)					
A. Yes	☐	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐
29. Overfill protection (tank only) (MARK ONE X)					
A. Yes	☐	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐
30. Spill containment around fill pipe (MARK ONE X)					
A. Yes	☐	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐

† If boxes 27 B, C, D, E above have been answered – answer questions 31 and 32 below.

31. Substance last used in tank (MARK ONE X)					
A. Leaded gasoline	☐	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
N. Motor oil	☐	☐	☐	☐	☐
P. Lubricating Oil	☐	☐	☐	☐	☐
Q. Sewage	☐	☐	☐	☐	☐
R. Sewage sludge	☐	☐	☐	☐	☐
S. Hazardous waste (specify ID number)					
T. Industrial wastewater	☐	☐	☐	☐	☐
U. Mineral spirits	☐	☐	☐	☐	☐
V. Mixtures (please specify)					
W. Emergency spill tank (specify substance)					
X. Other petroleum products (please specify)					
Y. Other (please specify)					
32. Estimated date last used (month/year)	Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.

OWNER OR OPERATOR CERTIFICATION

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including fines and/or imprisonment."

(SIGNATURE) 3/8/94 (DATE)

DANIEL WINTERS (PRINT OR TYPE NAME)

Pres. (TITLE)

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
DIVISION OF RESPONSIBLE PARTY SITE REMEDIATION
BUREAU OF APPLICABILITY AND COMPLIANCE
Registration and Billing Section
CN 028
Trenton, N.J. 08625-0028
1-800-722-TANK

For State Use Only

	YES	NO
Ck.	✓	
A/C		
Inv.		
R/F		
Sp. Hnd.		
Staff	20	

Annual Certification Questionnaire

Compliance with this Annual Certification will meet all requirements of State Law P.L. 1986, c. 102, The Underground Storage of Hazardous Substances Act (N.J.S.A. 58:10A-21) and the Underground Storage Tank Regulations (N.J.A.C. 7:14B-1 through 15).

IMPORTANT INFORMATION

FEE: The Fee Schedule is printed on the reverse side of the billing invoice. Please make your payment instrument payble to: "Treasurer", State of New Jersey. Use of the enclosed return envelope will expedite processing.

PENALTY: Failure by onwer or operator of a regulated underground storage tank to comply with any requirement of the State UST Act or regulations may result in the penalties set forth in N.J..S.A. 58:10A-10.

EMERGENCY: If a discharge or spill occurs, the NJDEPE Hotline at (609) 292-7172 must be called IMMEDIATELY - 24 hours a day.

UPGRADE EXEMPTION: Residential heating oil underground storage tanks are exempt from all upgrade requirements.

DATES TO KNOW (critical deadlines)

December 22, 1989 - All federally regulated tank systems installed before 1965 (or of unknown age) must have installed leak detection.
December 22, 1990 - All federally regulated tank systems installed between 1965-1969 must have installed leak detection.
December 22, 1991 - All federally regulated tank systems installed between 1969-1974 must have installed leak detection.
December 22, 1992 - All federallly regulated tank systems installed between 1974-1979 must have installed leak detection.
December 22, 1993 - All regulated tanks must install cathodic protection, monitoring systems and, spill/overfill protection (non-residential heating oil tanks exluded).
August 6, 1994 - All non-residential heating oil tanks installed prior to August 6, 1974 must install cathodic protection, monitoring systems, and spill/overfill protection.
August 6, 1995 - All non-residential heating oil tanks installed on or after August 6, 1974 must install cathodic protection, monitoring systems, and spill/overfill protection.
December 22, 1998 - All regulated hazardous waste substance systems must have secondary containment (petroleum products and waste oil tank systems excluded).

SECTION A

REGISTRATION & BILLING

Have there been any changes to this facility's registration status during the last twelve months that have not been reported to this office?
☐ YES ☒ NO

If YES, please check the appropriate type of change(s) below and complete the enclosed REGISTRATION QUESTIONNAIRE (black bar on face of the form) with NEW information ONLY. Then, complete the remainder of this form and submit to this office.

_____ Company Name and Address
_____ Facility Location
_____ Operator
_____ Contact Person
_____ Type of Product(s) Stored
_____ Spills, accidents, leaks or releases
_____ Substantial Modificattion(s)
_____ Other (please specify)

PLEASE USE REGISTRATION FORM WITH BLACK BAR AT THE TOP FOR REPORTING THIS INFORMATION

If NO, please complete the remainder of this form and return to this office.

SECTION B

MONITORING SYSTEMS

1. Does this facility have a secondary containment system which was installed before the effective date of the UST Technical regulations?
☐ YES ☒ NO
If Yes, does the secondary containment system comply with all provisions of these regulations?
☐ YES ☐ NO
2. Does this facility have a monitoring system which is in compliance with N.J.A.C. 7:14B-4.5(e) (for systems installed prior to the effective date of these regulations) or N.J.A.C. 7:14B-6 (for systems installed after the effective date of these regulations)?
☐ YES ☒ NO
If No, please be aware that the facility must meet the appropriate deadline. (See Dates to Know at top of this page).
3. Does this facility have an UST system installed prior to 1965 or of unknown age? ☐ YES ☒ NO
If Yes, has the facility installed a leak detection system that complies with all provisions of the Federal UST Technical Regulations 40 CFR 280.40? ☐ YES ☐ NO
If No, were the closure procedures completed as required by the Federal UST Technical Regulations 40 CFR 280.71, 72? ☐ YES ☒ NO

SECTION C

RECORDKEEPING/COMPLIANCE

Please answer all the questions in this Section on a facility basis. Any one tank not in compliance requires a "NO" answer for the entire facility.

1. Does this facility have cathodic protection systems? ☐ YES ☑ NO
   If Yes, are the systems properly operated and maintained as required by the UST Technical Regulations Subchapter 6? ☐ YES ☐ NO
2. Are the performance claims and documentation of monitoring systems maintained by the owner or operator as required by Subchapter 6.6? ☐ YES ☑ NO
3. Are the proper monitoring, testing, sampling, repair and inventory records kept on-site as required by Subchapter 6.6? ☐ YES ☑ NO
4. Is the proper Release Response Plan kept on-site per Subchapter 5.5? ☐ YES ☑ NO
5. Does the facility have spill and overfill protection systems per Subchapter 5.2(a) (5)? ☐ YES ☑ NO
   If yes, are they properly operated and maintained as required by the UST Technical Regulations? ☐ YES ☑ NO
6. Have all Fill Ports been permanently marked as per API #1637 as stated in Subchapter 4.5(h)? ☐ YES ☑ NO

SECTION D

FINANCIAL RESPONSIBILITY

All facilities are required to obtain financial responsibility assurance by the deadlines listed in Subchapter 14. Please list the appropriate financial information below:

Liability — Type

Lloyd Insurance / Bronell, Tramor, Walker & Kino Agency — Carrier/Issuing agency

9, 4, 92 — Date Effective

N-SP-21406Y-000 — Policy Number

$ _____ — Amount

CERTIFICATIONS

Who must sign?

CERTIFICATION NO. 1:

Must be signed by the highest ranking individual at the facility with overall responsibility

CERTIFICATION NO. 2:

Must be signed as follows
: For corporations, by the vice president or higher
: For sole proprietorships, by the proprietor
: For partnerships, by the general partner
: For government or public agency, by the principal executive officer or ranking official

NOTE: IF THE PERSON SIGNING CERTIFICATION No. 2 IS THE SAME AS THE PERSON SIGNING CERTIFICATION No. 1, THEN CERTIFICATION No. 1 ONLY NEEDS TO BE SIGNED. (If different persons are required to sign No. 1 and No. 2, then they must do so.)

No. 1

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, incaccurate or incomplete information, including fines and/or imprisonment."

(Signature)

DANIEL WINTERS

(Typed/Printed Name)

OWNER

(Title)

5/26/93

(Date Signed)

No. 2

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this transmittal and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including the possibility of fines and/or imprisonment."

(Signature)

(Typed/Printed Name)

(Title)

(Date Signed)

01294/26

(UST Number)

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
DIVISION OF RESPONSIBLE PARTY SITE REMEDIATION
CN 028
Trenton, N.J. 08625-0028

RECEIVED MAY 11 1993

FOR STATE USE ONLY
UST # 012956

	YES	NO
CK. IN.	☐	☐
AMT.	☐	☐
AUTH.	☐	☐
SP. ROUTE	☐	☐
SITE PLN.	☐	☐
SIGN.	☐	☐

COMCODE

12/13/93 on SUP file

*** ANNUAL CERTIFICATION ***
UNDERGROUND STORAGE TANK REGISTRATION QUESTIONNAIRE

Bureau of Applicability and Compliance
Registration and Billing Section
1-800-722-TANK

Use this form ONLY when submitting corrections/changes to registration at Annual Certification

General Facility Information

1. Facility Name: ALLIED BUILDING SUPPLY CO
2. Facility Location: 101 WEST ELIZABETH AVE (NUMBER AND STREET)
   LINDEN (CITY OR MUNICIPALITY)
   UNION (COUNTY) NJ (STATE) 07036 (ZIP CODE)
   00254 (BLOCK) 0010 (LOT)
3. Owner's mailing address: P.O. BOX 3817 (NUMBER AND STREET)
   UNION (CITY OR MUNICIPALITY)
   UNION (COUNTY) NJ (STATE) 070833817 (ZIP CODE)
4. Owner's name: DANIEL WINTERS
5. Contact person (Facility Operator): AL FIORE (PERSON OR TITLE)
6. Contact telephone number: 908 (AREA CODE) 964 (CHANGE) 1555 (NUMBER)
7. Total number of facility underground storage tanks: 0001 (Complete Questions 12 thru 32 for each tank)
8. Total facility underground storage tank capacity (gallons): 0002000
9. Status of owner: (mark one) A. ☒ CURRENT B. ☐ FORMER
10. Type of owner (mark one) A. ☐ State B. ☒ Commercial C. ☐ Local D. ☐ Federal E. ☐ Charitable or Public School F. ☐ Residence G. ☐ Ownership Uncertain
11a. Two copies of a site plan are submitted with this registration A. ☒ YES B. ☐ NO

Submit two (2) copies of SITE PLAN showing facility or property boundary, buildings and the location of ALL underground storage tanks. EITHER, an existing engineering site plan, if available, OR a neat and legible hand-drawn sketch of the site may be submitted. In either case the site plan or sketch MUST show the location and distances that tanks, buildings, and dispensers are from the facility's property boundary. Include all tanks that are: E (existing/in use), P (empty), M (emergency), A (abandoned), C (other). Each underground tank on the site plan or sketch shall be numbered in accordance with the instructions for question 12. The number assigned to a tank on the site plan or sketch MUST match and be identical to the tank identification number assigned to that tank on this form.

INCLUDE FACILITY NAME, OWNER'S NAME, FACILITY ADDRESS AND TELEPHONE NUMBER ON ALL SITE PLANS.

11b. Do you have financial responsibility assurance? ☒ YES ☐ NO

Liability (Type)
N-SP-21406-000 (Policy Number)
Royal Ins. (Company/Carrier)
9/4/93 (Expiration Date)

UST NO. 0129486

ALL underground tanks, including those taken out of operation (UNLESS THE TANK WAS REMOVED FROM THE GROUND) must be included in this registration. All in-ground tanks shall be reported as underground tanks on this questionnaire regardless of their current status; Existing, E; Empty, P; Emergency, M; Abandoned, A; or Other, C.

SPECIFIC TANK INFORMATION

	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
12. Tank Identification number	0001				
13. CAS number (hazardous substances only)					
14. Tank age (years)					
15. Tank size (gallons)	00210100				
16. Tank contents (MARK ONE X)					
A. Leaded gasoline	☐	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (please specify)					
N. Motor oil	☐	☐	☐	☐	☐
P. Lubricating Oil	☐	☐	☐	☐	☐
Q. Sewage	☐	☐	☐	☐	☐
R. Sewage sludge	☐	☐	☐	☐	☐
S. Hazardous waste (specify ID number)					
T. Industrial wastewater	☐	☐	☐	☐	☐
U. Mineral spirits	☐	☐	☐	☐	☐
V. Mixtures (please specify)					
W. Emergency spill tank (specify substance)					
X. Other petroleum products (please specify)					
Y. Other (please specify)					

17. Tank and piping construction (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Bare steel UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Carbon steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Galvanized steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Coated steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Iron (cast or ductile)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Cathodically protected steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Fiberglass-coated steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Other metallic (please specify)										
J. Fiberglass-reinforced plastic	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Other non-metallic (please specify)										
L. Other (please specify)										

18. Tank and piping structure (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Single wall UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Double wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Manway in tank	☐		☐		☐		☐		☐	

19. Internal tank and piping lining (MARK ONE X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. YES (please specify type of material)										
B. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. 019486

	TANK NO.		TANK NO.		TANK NO.		TANK NO.		TANK NO.	
Tank I D. No.	0001									
20. Tank and piping lining installed (MARK ONE X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. At purchase of tank UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Retrofitted	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Secondary containment (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Liner UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Vault	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Double wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Other (please specify)										
22. External type/application of cathodic protection (MARK ALL THAT APPLY X) UNKNOWN	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Sacrificial anode	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Impressed current	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Other (please specify)										
23. Monitoring/detection method (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Automatic sampling UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Manual sampling	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Ground water monitoring	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. System in secondary containment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. System outside backfill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. System within piping (piping leak detector)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. System within backfill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Type of monitoring/detection system (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Continuous UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Event activated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Audio	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Visual	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. In-tank (automatic) monitoring gauge	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Pressure/vacuum loss sensor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Liquid filled annular space	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Liquid sensor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
J. Vapor sniff wells	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Other (please specify)										
L. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25. Tank/piping tested (any type) (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Yes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. No	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Test positive (MARK IF LEAK WAS DISCOVERED)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Leak/spill occurrence (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Within the past 1 year	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Within the past 1 to 5 years	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. More than 5 years ago	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. No Records	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. None	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. 29486

	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
Tank I D. No.	0001				
27. Tank status (MARK ONE X)					
A. In-use	☑	☐	☐	☐	☐
† B. Empty less than 12 months	☐	☐	☐	☐	☐
† C. Empty 12 months or more	☐	☐	☐	☐	☐
† D. Emergency spill tank (sump)	☐	☐	☐	☐	☐
† E. Abandoned, in place, filled and sealed	☐	☐	☐	☐	☐
F. Other (please specify)					
28. Spill recovery system on-site (MARK ONE X)					
A. Yes	☐	☐	☐	☐	☐
B. No	☑	☐	☐	☐	☐
29. Overfill protection (tank only) (MARK ONE X)					
A. Yes	☑	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐
30. Spill containment around fill pipe (MARK ONE X)					
A. Yes	☑	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐

† If boxes 27 B, C, D, E above have been answered – answer questions 31 and 32 below.

31. Substance last used in tank (MARK ONE X)					
A. Leaded gasoline	☐	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
N. Motor oil	☐	☐	☐	☐	☐
P. Lubricating Oil	☐	☐	☐	☐	☐
Q. Sewage	☐	☐	☐	☐	☐
R. Sewage sludge	☐	☐	☐	☐	☐
S. Hazardous waste (specify ID number)					
T. Industrial wastewater	☐	☐	☐	☐	☐
U. Mineral spirits	☐	☐	☐	☐	☐
V. Mixtures (please specify)					
W. Emergency spill tank (specify substance)					
X. Other petroleum products (please specify)					
Y. Other (please specify)					
32. Estimated date last used (month/year)	0293 Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.

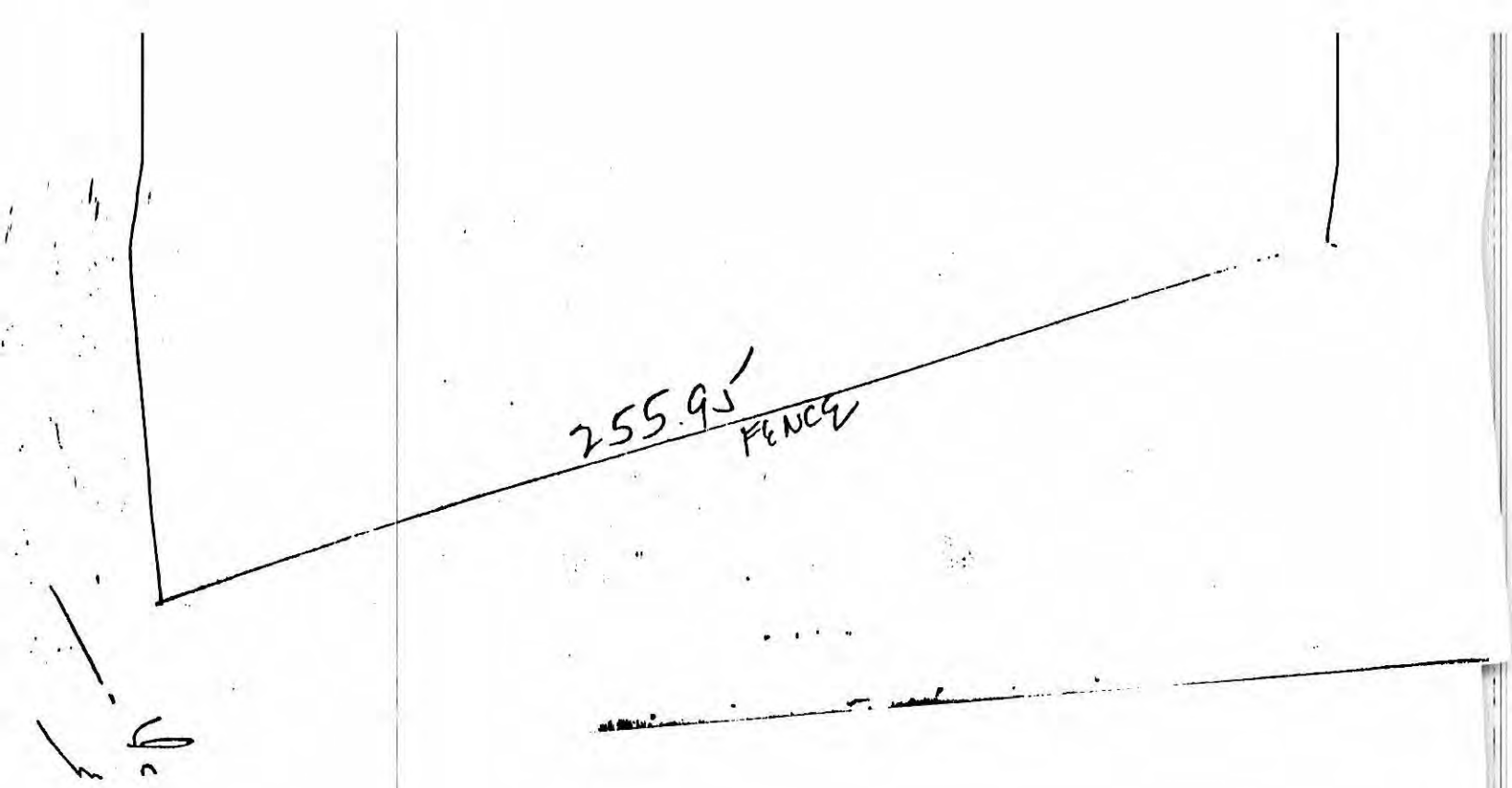
OWNER OR OPERATOR CERTIFICATION

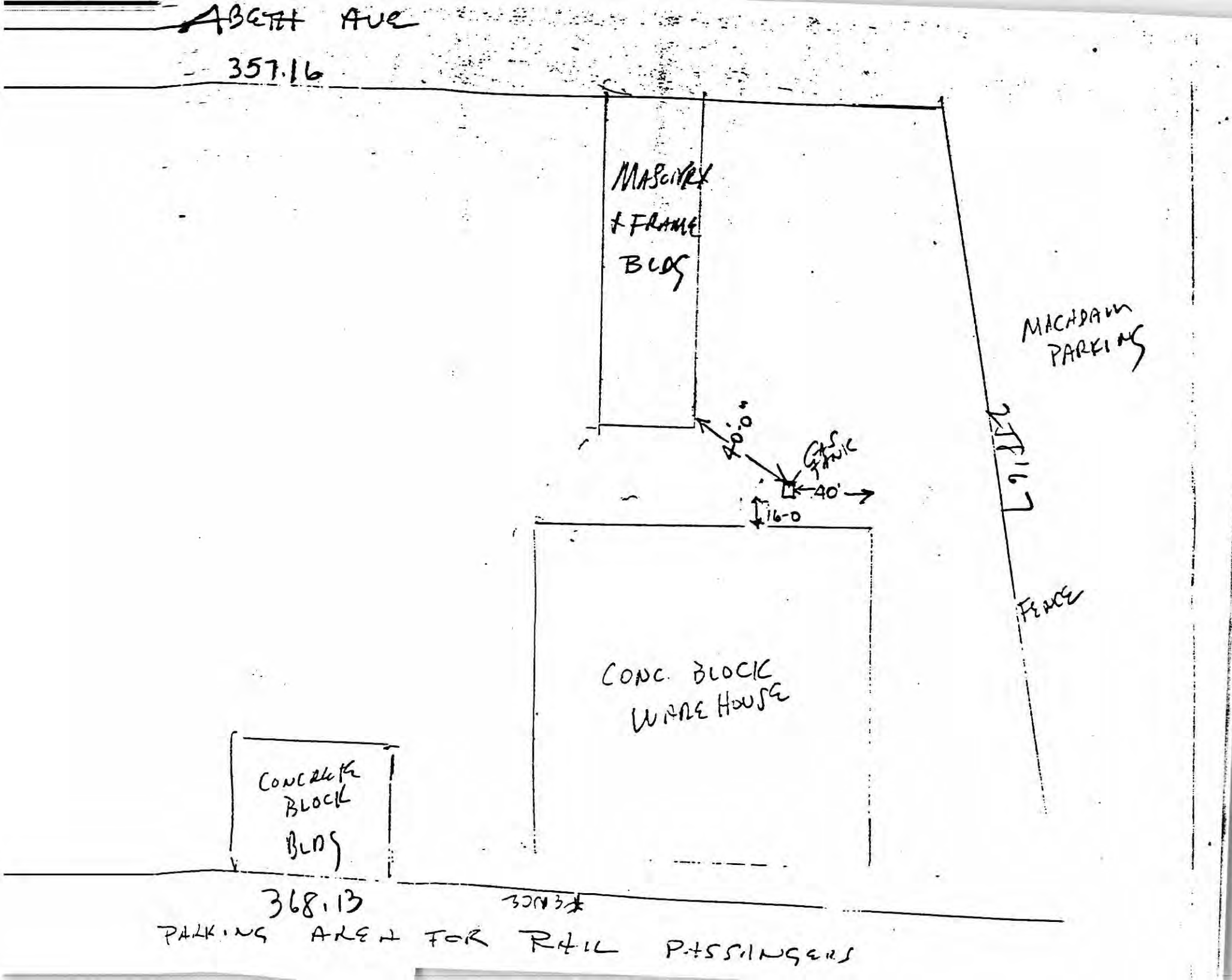
"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including fines and/or imprisonment."

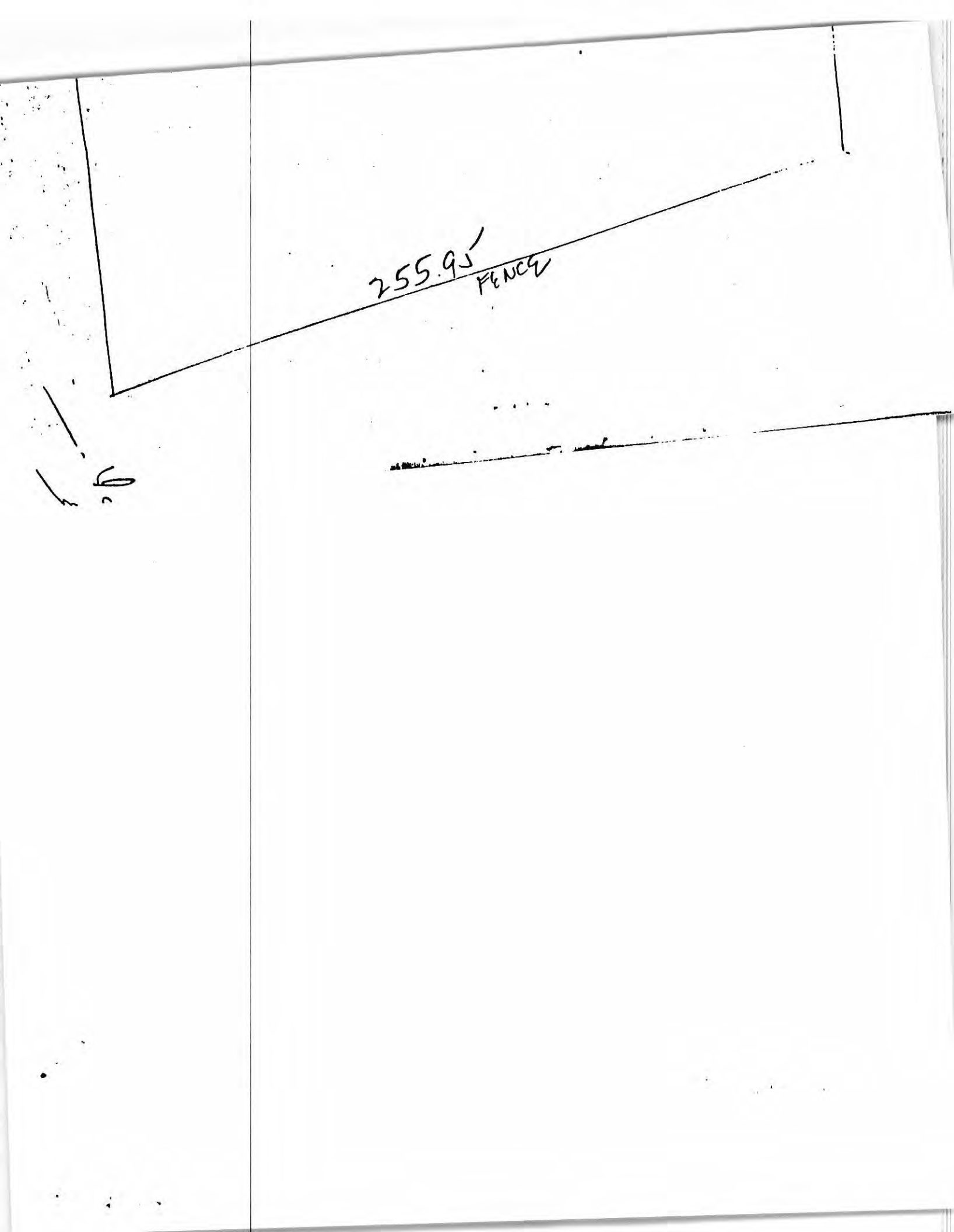
5/26/93
(SIGNATURE) (DATE)

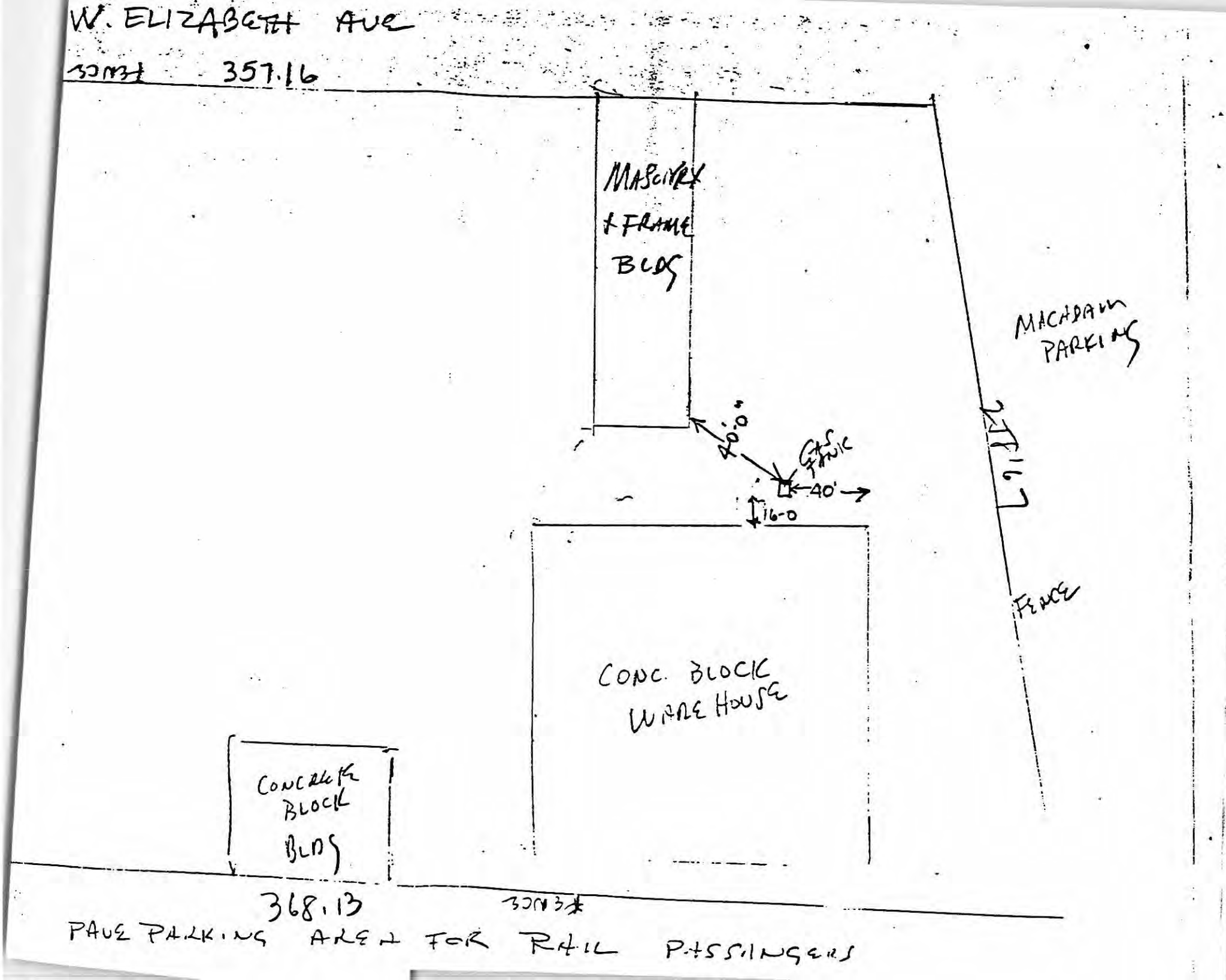
DANIEL WINTERS
(PRINT OR TYPE NAME)

OWNER
(TITLE)


255.9'
FENCE


ABETH AVE
357.16
MASONRY
+ FRAME
BLDG
MACADAM
PARKING
20'-0"
GAS
TANK
40'
16-0
277.16
FENCE
CONC. BLOCK
WARE HOUSE
CONCRETE
BLOCK
BLDG
368.13
PARKING AREA FOR RAIL PASSENGERS


255.9'
FENCE


W. ELIZABETH AVE
357.16
MASONRY & FRAME BLDG
MACADAM PARKING
40'-0"
GAS STATION
40'
16-0
211.6
FENCE
CONC. BLOCK WARE HOUSE
CONCRETE BLOCK BLDG
368.13
PAVE PARKING AREA FOR RAIL PASSINGERS

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
DIVISION OF RESPONSIBLE PARTY SITE REMEDIATION
CN 028
Trenton, N.J. 08625-0028

FOR STATE USE ONLY
UST # 029486

	YES	NO
CK. IN.	X	☐
AMT.	☐	☐
AUTH.	☐	☐
SP. ROUTE	☐	☐
SITE PLN.	☐	☐
SIGN.	☐	☐

COMCODE

92

*** ANNUAL CERTIFICATION ***

UNDERGROUND STORAGE TANK REGISTRATION QUESTIONNAIRE

Bureau of Applicability and Compliance
Registration and Billing Section
1-800-722-TANK

Use this form ONLY when submitting corrections/changes to registration at Annual Certification

General Facility Information

1. Facility Name: ALLIED BUILDING SUPPLY CO
2. Facility Location: 101 WEST ELIZABETH AVE.
   NUMBER AND STREET: LINDEN
   CITY OR MUNICIPALITY: UNION (COUNTY) NJ (STATE) 07036 (ZIP CODE)
   BLOCK: 00254 LOT: 0010
3. Owner's mailing address: P.O. BOX 3817
   NUMBER AND STREET: UNION
   CITY OR MUNICIPALITY: UNION (COUNTY) NJ (STATE) 070833817 (ZIP CODE)
4. Owner's name: DANIEL WINTERS
5. Contact person (Facility Operator): AL FIORE
   PERSON OR TITLE
6. Contact telephone number: 908 (AREA CODE) 964 (CHANGE) 1555 (NUMBER)
7. Total number of facility underground storage tanks: 0001 (Complete Questions 12 thru 32 for each tank)
8. Total facility underground storage tank capacity (gallons): 000200
9. Status of owner: (mark one) A. ☒ CURRENT B. ☐ FORMER
10. Type of owner (mark one) A. ☐ State B. ☒ Commercial C. ☐ Local D. ☐ Federal E. ☐ Charitable or Public School F. ☐ Residence G. ☐ Ownership Uncertain
11a. Two copies of a site plan are submitted with this registration A. ☒ YES B. ☐ NO

Submit two (2) copies of SITE PLAN showing facility or property boundary, buildings and the location of ALL underground storage tanks. EITHER, an existing engineering site plan, if available, OR a neat and legible hand-drawn sketch of the site may be submitted. In either case the site plan or sketch MUST show the location and distances that tanks, buildings, and dispensers are from the facility's property boundary. Include all tanks that are: E (existing/in use), P (empty), M (emergency), A (abandoned), C (other). Each underground tank on the site plan or sketch shall be numbered in accordance with the instructions for question 12. The number assigned to a tank on the site plan or sketch MUST match and be identical to the tank identification number assigned to that tank on this form.

INCLUDE FACILITY NAME, OWNER'S NAME, FACILITY ADDRESS AND TELEPHONE NUMBER ON ALL SITE PLANS.

11b. Do you have financial responsibility assurance? ☒ YES ☐ NO

Liability (Type)
Royal INS. (Company/Carrier)
N-SP-214064-000 (Policy Number)
5/4/92 (Expiration Date)

UST NO. 0129486

ALL underground tanks, including those taken out of operation (UNLESS THE TANK WAS REMOVED FROM THE GROUND) must be included in this registration. All in-ground tanks shall be reported as underground tanks on this questionnaire regardless of their current status; Existing, E; Empty, P; Emergency, M; Abandoned, A; or Other, C.

SPECIFIC TANK INFORMATION

	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
12. Tank Identification number	0001				
13. CAS number (hazardous substances only)					
14. Tank age (years)					
15. Tank size (gallons)	012,000				
16. Tank contents (MARK ONE X)					
A. Leaded gasoline	☐	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (please specify)					
N. Motor oil	☐	☐	☐	☐	☐
P. Lubricating Oil	☐	☐	☐	☐	☐
Q. Sewage	☐	☐	☐	☐	☐
R. Sewage sludge	☐	☐	☐	☐	☐
S. Hazardous waste (specify ID number)					
T. Industrial wastewater	☐	☐	☐	☐	☐
U. Mineral spirits	☐	☐	☐	☐	☐
V. Mixtures (please specify)					
W. Emergency spill tank (specify substance)					
X. Other petroleum products (please specify)					
Y. Other (please specify)					

17. Tank and piping construction (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Bare steel UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Carbon steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Galvanized steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Coated steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Iron (cast or ductile)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Cathodically protected steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Fiberglass-coated steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Other metallic (please specify)										
J. Fiberglass-reinforced plastic	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Other non-metallic (please specify)										
L. Other (please specify)										

18. Tank and piping structure (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Single wall UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Double wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Manway in tank	☐		☐		☐		☐		☐	

19. Internal tank and piping lining (MARK ONE X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. YES (please specify type of material)										
B. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. 0129486

	TANK NO.		TANK NO.		TANK NO.		TANK NO.		TANK NO.	
Tank I D. No.	0001									
20. Tank and piping lining installed (MARK ONE X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. At purchase of tank UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Retrofitted	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Secondary containment (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Liner UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Vault	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Double wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Other (please specify)										
22. External type/application of cathodic protection (MARK ALL THAT APPLY X) UNKNOWN	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Sacrificial anode	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Impressed current	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Other (please specify)										
23. Monitoring/detection method (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Automatic sampling UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Manual sampling	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Ground water monitoring	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. System in secondary containment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. System outside backfill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. System within piping (piping leak detector)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. System within backfill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Type of monitoring/detection system (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Continuous UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Event activated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Audio	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Visual	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. In-tank (automatic) monitoring gauge	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Pressure/vacuum loss sensor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Liquid filled annular space	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Liquid sensor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
J. Vapor sniff wells	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Other (please specify)										
L. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25. Tank/piping tested (any type) (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Yes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. No	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Test positive (MARK IF LEAK WAS DISCOVERED)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Leak/spill occurrence (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Within the past 1 year	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Within the past 1 to 5 years	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. More than 5 years ago	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. No Records	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. None	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. 0129486

	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
Tank I D. No.	0001				
27. Tank status (MARK ONE X)					
A. In-use	☑	☐	☐	☐	☐
† B. Empty less than 12 months	☐	☐	☐	☐	☐
† C. Empty 12 months or more	☐	☐	☐	☐	☐
† D. Emergency spill tank (sump)	☐	☐	☐	☐	☐
† E. Abandoned, in place, filled and sealed	☐	☐	☐	☐	☐
F. Other (please specify)					
28. Spill recovery system on-site (MARK ONE X)					
A. Yes	☐	☐	☐	☐	☐
B. No	☑	☐	☐	☐	☐
29. Overfill protection (tank only) (MARK ONE X)					
A. Yes	☑	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐
30. Spill containment around fill pipe (MARK ONE X)					
A. Yes	☑	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐

† If boxes 27 B, C, D, E above have been answered – answer questions 31 and 32 below.

31. Substance last used in tank (MARK ONE X)					
A. Leaded gasoline	☐	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
N. Motor oil	☐	☐	☐	☐	☐
P. Lubricating Oil	☐	☐	☐	☐	☐
Q. Sewage	☐	☐	☐	☐	☐
R. Sewage sludge	☐	☐	☐	☐	☐
S. Hazardous waste (specify ID number)					
T. Industrial wastewater	☐	☐	☐	☐	☐
U. Mineral spirits	☐	☐	☐	☐	☐
V. Mixtures (please specify)					
W. Emergency spill tank (specify substance)					
X. Other petroleum products (please specify)					
Y. Other (please specify)					
32. Estimated date last used (month/year)	1191 Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.

OWNER OR OPERATOR CERTIFICATION

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including fines and/or imprisonment."

(SIGNATURE) 5/3/91 (DATE)

DANIEL WINTERS

(PRINT OR TYPE NAME)

OWNER

(TITLE)

012486

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
DIVISION OF RESPONSIBLE PARTY SITE REMEDIATION
BUREAU OF APPLICABILITY AND COMPLIANCE
Registration and Billing Section
CN 028
Trenton, N.J. 08625-0028
1-800-722-TANK

92

For State Use Only	YES	NO
Ck.		
A/C		
Inv.		
R/F		
Sp. Hnd.		
Staff		

Annual Certification Questionnaire

Compliance with this Annual Certification will meet all requirements of State Law P.L. 1986, c. 102, The Underground Storage of Hazardous Substances Act (N.J.S.A. 58:10A-21) and the Underground Storage Tank Regulations (N.J.A.C. 7:14B-1 through 15).

IMPORTANT INFORMATION

FEE: The Fee Schedule is printed on the reverse side of the billing invoice. Please make your payment instrument payble to: "Treasurer", State of New Jersey. Use of the enclosed return envelope will expedite processing.

PENALTY: Failure by onwer or operator of a regulated underground storage tank to comply with any requirement of the State UST Act or regulations may result in the penalties set forth in N.J..S.A. 58:10A-10.

EMERGENCY: If a discharge or spill occurs, the NJDEPE Hotline at (609) 292-7172 must be called IMMEDIATELY - 24 hours a day.

UPGRADE EXEMPTION: Residential heating oil underground storage tanks are exempt from all upgrade requirements.

DATES TO KNOW (critical deadlines)

December 22, 1989 - All federally regulated tank systems installed before 1965 (or of unknown age) must have installed leak detection.
December 22, 1990 - All federally regulated tank systems installed between 1965-1969 must have installed leak detection.
December 22, 1991 - All federally regulated tank systems installed between 1969-1974 must have installed leak detection.
December 22, 1992 - All federallly regulated tank systems installed between 1974-1979 must have installed leak detection.
December 22, 1993 - All regulated tanks must install cathodic protection, monitoring systems and, spill/overfill protection (non-residential heating oil tanks exluded).
August 6, 1994 - All non-residential heating oil tanks installed prior to August 6, 1974 must install cathodic protection, monitoring systems, and spill/overfill protection.
August 6, 1995 - All non-residential heating oil tanks installed on or after August 6, 1974 must install cathodic protection, monitoring systems, and spill/overfill protection.
December 22, 1998 - All regulated hazardous waste substance systems must have secondary containment (petroleum products and waste oil tank systems excluded).

SECTION A — REGISTRATION & BILLING

Have there been any changes to this facility's registration status during the last twelve months that have not been reported to this office?

☐ YES ☒ NO

If YES, please check the appropriate type of change(s) below and complete the enclosed REGISTRATION QUESTIONNAIRE (black bar on face of the form) with NEW information ONLY. Then, complete the remainder of this form and submit to this office.

_____ Company Name and Address
_____ Facility Location
_____ Operator
_____ Contact Person
_____ Type of Product(s) Stored
_____ Spills, accidents, leaks or releases
_____ Substantial Modificattion(s)
_____ Other (please specify)

PLEASE USE REGISTRATION FORM WITH BLACK BAR AT THE TOP FOR REPORTING THIS INFORMATION

If NO, please complete the remainder of this form and return to this office.

SECTION B — MONITORING SYSTEMS

1. Does this facility have a secondary containment system which was installed before the effective date of the UST Technical regulations?
☐ YES ☑ NO
If Yes, does the secondary containment system comply with all provisions of these regulations?
☐ YES ☐ NO
2. Does this facility have a monitoring system which is in compliance with N.J.A.C. 7:14B-4.5(e) (for systems installed prior to the effective date of these regulations) or N.J.A.C. 7:14B-6 (for systems installed after the effective date of these regulations)?
☐ YES ☑ NO
If No, please be aware that the facility must meet the appropriate deadline. (See Dates to Know at top of this page).
3. Does this facility have an UST system installed prior to 1965 or of unknown age? ☐ YES ☑ NO
If Yes, has the facility installed a leak detection system that complies with all provisions of the Federal UST Technical Regulations 40 CFR 280.40? ☐ YES ☐ NO
If No, were the closure procedures completed as required by the Federal UST Technical Regulations 40 CFR 280.71, 72? ☐ YES ☑ NO

SECTION C

RECORDKEEPING/COMPLIANCE

Please answer all the questions in this Section on a facility basis. Any one tank not in compliance requires a "NO" answer for the entire facility.

1. Does this facility have cathodic protection systems? ☐ YES ☑ NO
   If Yes, are the systems properly operated and maintained as required by the UST Technical Regulations Subchapter 6? ☐ YES ☐ NO
2. Are the performance claims and documentation of monitoring systems maintained by the owner or operator as required by Subchapter 6.6? ☐ YES ☑ NO
3. Are the proper monitoring, testing, sampling, repair and inventory records kept on-site as required by Subchapter 6.6? ☐ YES ☑ NO
4. Is the proper Release Response Plan kept on-site per Subchapter 5.5? ☐ YES ☑ NO
5. Does the facility have spill and overfill protection systems per Subchapter 5.2(a) (5)? ☐ YES ☑ NO
   If yes, are they properly operated and maintained as required by the UST Technical Regulations? ☐ YES ☑ NO
6. Have all Fill Ports been permanently marked as per API #1637 as stated in Subchapter 4.5(h)? ☐ YES ☑ NO

SECTION D

FINANCIAL RESPONSIBILITY

All facilities are required to obtain financial responsibility assurance by the deadlines listed in Subchapter 14. Please list the appropriate financial information below:

Type	Carrier/Issuing agency	Date Effective	Policy Number	Amount
Liability	Royal Insurance / Brownell, Kramon, Waldron & Lowe Agency	9/4/91	N-SP-214064-000	$

CERTIFICATIONS

Who must sign?

CERTIFICATION NO. 1:

Must be signed by the highest ranking individual at the facility with overall responsibility

CERTIFICATION NO. 2:

Must be signed as follows
- : For corporations, by the vice president or higher
- : For sole proprietorships, by the proprietor
- : For partnerships, by the general partner
- : For government or public agency, by the principal executive officer or ranking official

NOTE: IF THE PERSON SIGNING CERTIFICATION No. 2 IS THE SAME AS THE PERSON SIGNING CERTIFICATION No. 1, THEN CERTIFICATION No. 1 ONLY NEEDS TO BE SIGNED. (If different persons are required to sign No. 1 and No. 2, then they must do so.)

No. 1

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, incaccurate or incomplete information, including fines and/or imprisonment."

(Signature)

DANIEL WINTERS

(Typed/Printed Name)

OWNER

(Title)

5/3/92

(Date Signed)

No. 2

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this transmittal and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including the possibility of fines and/or imprisonment."

(Signature)

(Typed/Printed Name)

(Title)

(Date Signed)

0129486

(UST Number)

Let's protect our earth

MAY 10 1991

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES

BUREAU OF UNDERGROUND STORAGE TANKS
Registration and Billing Section
CN-029
TRENTON, NEW JERSEY 08625
1-800-722-TANK

For State Use Only	YES	NO
Ck.	✓	
A/C	✓	
Inv.	✓	
R/F		
Sp. Hnd.		
Staff		

0129486

Annual Certification Questionnaire

Compliance with this Annual Certification will meet all requirements of State Law P.L. 1986, c. 102, The Underground Storage of Hazardous Substances Act (N.J.S.A. 58:10A-21) and The Underground Storage Tank Regulations (N.J.A.C. 7:14B-1 through 15).

IMPORTANT INFORMATION

FEE	The Fee Schedule is printed on the reverse side of the billing invoice. Please make your payment instrument payable to: "Treasurer", State of New Jersey. Use of the enclosed return envelope will expedite processing of your certification.
PENALTY	Failure by owner or operator of a regulated underground storage tank to comply with any requirement of the State UST Act of regulations may result in the penalties set forth in N.J.S.A. 58:10A-10.
EMERGENCY	If a discharge or spill occurs, the NJDEP Hotline at (609) 292-7172 must be called IMMEDIATELY - 24 hours a day.

DATES TO KNOW (critical deadlines)

December 22, 1989 -	All tank systems installed before 1965 (or of unknown age) must have installed leak detection (federally regulated tanks only).
December 22, 1990 -	All tank systems installed between 1965-1969 must have leak detection (federally regulated tanks only).
December 22, 1990 -	All pressure piping must have line leak detection and have done a precision test if tank system lacks a monitoring system (federally regulated tanks only).
September 3, 1991 -	All regulated tanks must install cathodic protection, monitoring systems, and spill/overfill protection (except residential heating oil).
December 22, 1993 -	All agricultural tanks installed before September 3, 1986 must install cathodic protection, monitoring systems, and spill/overfill protection.
December 22, 1998 -	All regulated hazardous waste substance systems must have secondary containment (petroleum products and waste oil tank systems excluded).

SECTION A — REGISTRATION & BILLING

Have there been any changes to this facility's registration status during the last twelve months that have not been reported to this office?
☒ YES ☐ NO

If YES, please check the appropriate type of change(s) below and complete the enclosed REGISTRATION QUESTIONNAIRE (black bar on face of the form) with NEW information ONLY. Then, complete the remainder of this form and submit to this office.

_____ Company Name and Address
_____ Facility Location
_____ Operator
✓ Contact Person
_____ Type of Product(s) Stored
_____ Spills, accidents, leaks or releases
_____ Substantial Modificattion(s)
✓ Other (please specify)
OWNERS ADDRESS

PLEASE USE REGISTRATION FORM WITH BLACK BAR AT THE TOP FOR REPORTING THIS INFORMATION

If NO, please complete the remainder of this form and return to this office.

SECTION B — MONITORING SYSTEMS

1. Does this facility have a secondary containment system which was installed before the effective date of the UST Technical regulations?
☐ YES ☒ NO
If Yes, does the secondary containment system comply with all provisions of these regulations?
☐ YES ☐ NO
2. Does this facility have a monitoring system which is in compliance with N.J.A.C. 7:14B-4.5(e) (for systems installed prior to the effective date of these regulations) or N.J.A.C. 7:14B-6 (for systems installed after the effective date of these regulations)?
☐ YES ☒ NO
If No, please be aware that the facility must meet the appropriate deadline. (See Dates to Know at top of this page).
3. Does this facility have an UST system installed prior to 1965 or of unknown age? ☐ YES ☒ NO
If Yes, has the facility installed a leak detection system that complies with all provisions of the Federal UST Technical Regulations 40 CFR 280.40? ☐ YES ☐ NO
If No, were the closure procedures completed as required by the Federal UST Technical Regulations 40 CFR 280.71, 72? ☐ YES ☒ NO

SECTION C

RECORDKEEPING/COMPLIANCE

Please answer all the questions in this Section on a facility basis. ~~v~~ one tank not in compliance requires a "NO" answer for the entire facility.

1. Does this facility have cathodic protection systems? ☐ YES ☑ NO
   If Yes, are the systems properly operated and maintained as required by the UST Technical Regulations Subchapter 6. ☐ YES ☐ NO
2. Are the performance claims and documentation of monitoring systems maintained by the owner or operator as required by Subchapter 6.6? ☐ YES ☑ NO
3. Are the proper monitoring, testing, sampling, repair and inventory records kept on-site as required by Subchapter 6.6? ☐ YES ☑ NO
4. Is the proper Release Response Plan kept on-site per Subchapter 5.5? ☐ YES ☑ NO
5. Does the facility have spill and overfill protection systems per Subchapter 5.2(a) (5)? ☐ YES ☑ NO
   If yes, are they properly operated and maintained as required by the UST Technical Regulations? ☐ YES ☑ NO
6. Have all Fill Ports been permanently marked as per API #1637 as stated in Subchapter 4.5(h)? ☐ YES ☑ NO

SECTION D

FINANCIAL RESPONSIBILITY

All facilities are required to obtain financial responsibility assurance by the deadlines listed in Subchapter 14. Please list the appropriate financial information below:

Liability — Type

CIGNA — Carrier/Issuing agency

1/1/91 — Date Effective

MFSC-1985568 — Policy Number

$ _____ — Amount

CERTIFICATIONS

Who must sign?

CERTIFICATION NO. 1:

Must be signed by the highest ranking individual at the facility with overall responsibility

CERTIFICATION NO. 2:

Must be signed as follows
: For corporations, by the vice president or higher
: For sole proprietorships, by the proprietor
: For partnerships, by the general partner
: For government or public agency, by the principal executive officer or ranking official

NOTE: IF THE PERSON SIGNING CERTIFICATION No. 2 IS THE SAME AS THE PERSON SIGNING CERTIFICATION No. 1, THEN CERTIFICATION No. 1 ONLY NEEDS TO BE SIGNED. (If different persons are required to sign No. 1 and No. 2, then they must do so.)

No. 1

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including fines and/or imprisonment."

(Signature)

DANIEL WINTERS

(Typed/Printed Name)

OWNER

(Title)

5/8/91

(Date Signed)

No. 2

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this transmittal and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including the possibility of fines and/or imprisonment."

(Signature)

(Typed/Printed Name)

(Title)

(Date Signed)

0129486

(UST Number)

ACQ-6/90

Let's protect our earth

MAY 10 1991

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
Trenton, N.J. 08625-0029

FOR STATE USE ONLY		
UST # 0129486		
	YES	NO
CK. IN.	☑	☐
AMT.	☑	☐
AUTH.	☐	☐
SP. ROUTE	☐	☐
SITE PLN.	☑	☐
SIGN.	☑	☐
COMCODE		

*** ANNUAL CERTIFICATION ***

UNDERGROUND STORAGE TANK REGISTRATION QUESTIONNAIRE

Bureau of Underground Storage Tanks
Registration Section
1-800-722-TANK

Use this form ONLY when submitting corrections/changes to registration at Annual Certification

General Facility Information

1. Facility Name: ALLIED BUILDING SUPPLY CO
2. Facility Location: 1011 WEST ELIZABETH AVE. (NUMBER AND STREET)
   LINDEN (CITY OR MUNICIPALITY)
   UNION (COUNTY) NJ (STATE) 07036 (ZIP CODE)
   00257 (BLOCK) 00110 (LOT)
3. Owner's mailing address: P.O. BOX 3187 (NUMBER AND STREET)
   UNION (CITY OR MUNICIPALITY)
   UNION (COUNTY) NJ (STATE) 07083-0187 (ZIP CODE)
4. Owner's name: DANIEL WINTERS
5. Contact person (Facility Operator): ALFIORE (PERSON OR TITLE)
6. Contact telephone number: 908 (AREA CODE) 964 (CHANGE) 1555 (NUMBER)
7. Total number of facility underground storage tanks: 0001 (Complete Questions 12 thru 32 for each tank)
8. Total facility underground storage tank capacity (gallons): 00020000
9. Status of owner: (mark one) A. ☐ CURRENT B. ☐ FORMER
10. Type of owner (mark one) A. ☐ State B. ☒ Commercial C. ☐ Local D. ☐ Federal E. ☐ Charitable or Public School F. ☐ Residence G. ☐ Ownership Uncertain
11a. Two copies of a site plan are submitted with this registration A. ☒ YES B. ☐ NO

Submit two (2) copies of SITE PLAN showing facility or property boundary, buildings and the location of ALL underground storage tanks. EITHER, an existing engineering site plan, if available, OR a neat and legible hand-drawn sketch of the site may be submitted. In either case the site plan or sketch MUST show the location and distances that tanks, buildings, and dispensers are from the facility's property boundary. Include all tanks that are: E (existing/in use), P (empty), M (emergency), A (abandoned), C (other). Each underground tank on the site plan or sketch shall be numbered in accordance with the instructions for question 12. The number assigned to a tank on the site plan or sketch MUST match and be identical to the tank identification number assigned to that tank on this form.

INCLUDE FACILITY NAME, OWNER'S NAME, FACILITY ADDRESS AND TELEPHONE NUMBER ON ALL SITE PLANS.

11b. Do you have financial responsibility assurance? ☑ YES ☐ NO

LIABILITY (Type)
CIGNA (Company/Carrier)
MFCD 1985168 (Policy Number)
1/1/92 (Expiration Date)

UST NO. _____

ALL underground tanks, including those taken out of operation (UNLESS THE TANK WAS REMOVED FROM THE GROUND) must be included in this registration. All in-ground tanks shall be reported as underground tanks on this questionnaire regardless of their current status; Existing, E; Empty, P; Emergency, M; Abandoned, A; or Other, C.

SPECIFIC TANK INFORMATION

	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
12. Tank Identification number	0001				
13. CAS number (hazardous substances only)					
14. Tank age (years)					
15. Tank size (gallons)	02,000				
16. Tank contents (MARK ONE X)					
A. Leaded gasoline	☐	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (please specify)					
N. Motor oil	☐	☐	☐	☐	☐
P. Lubricating Oil	☐	☐	☐	☐	☐
Q. Sewage	☐	☐	☐	☐	☐
R. Sewage sludge	☐	☐	☐	☐	☐
S. Hazardous waste (specify ID number)					
T. Industrial wastewater	☐	☐	☐	☐	☐
U. Mineral spirits	☐	☐	☐	☐	☐
V. Mixtures (please specify)					
W. Emergency spill tank (specify substance)					
X. Other petroleum products (please specify)					
Y. Other (please specify)					

17. Tank and piping construction (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Bare steel (UNKnown)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Carbon steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Galvanized steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Coated steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Iron (cast or ductile)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Cathodically protected steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Fiberglass-coated steel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Other metallic (please specify)										
J. Fiberglass-reinforced plastic	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Other non-metallic (please specify)										
L. Other (please specify)										

18. Tank and piping structure (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Single wall (Unknown)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Double wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Manway in tank	☐		☐		☐		☐		☐	

19. Internal tank and piping lining (MARK ONE X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. YES (please specify type of material)										
B. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. _____

	TANK NO.		TANK NO.		TANK NO.		TANK NO.		TANK NO.	
Tank I D. No.	0001									
20. Tank and piping lining installed (MARK ONE X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. At purchase of tank UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Retrofitted	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Secondary containment (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Liner UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Vault	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Double wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Other (please specify)										
22. External type/application of cathodic protection (MARK ALL THAT APPLY X) UNKNOWN	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Sacrificial anode	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Impressed current	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Other (please specify)										
23. Monitoring/detection method (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Automatic sampling UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Manual sampling	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Ground water monitoring	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. System in secondary containment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. System outside backfill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. System within piping (piping leak detector)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. System within backfill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Type of monitoring/detection system (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Continuous UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Event activated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Audio	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Visual	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. In-tank (automatic) monitoring gauge	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Pressure/vacuum loss sensor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Liquid filled annular space	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Liquid sensor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
J. Vapor sniff wells	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Other (please specify)										
L. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25. Tank/piping tested (any type) (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Yes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. No	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Test positive (MARK IF LEAK WAS DISCOVERED)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Leak/spill occurrence (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Within the past 1 year	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Within the past 1 to 5 years	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. More than 5 years ago	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. No Records	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐
E. None	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. _____

	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
Tank I D. No.	0 0 0 1				
27. Tank status (MARK ONE X)					
A. In-use	☑	☐	☐	☐	☐
† B. Empty less than 12 months	☐	☐	☐	☐	☐
† C. Empty 12 months or more	☐	☐	☐	☐	☐
† D. Emergency spill tank (sump)	☐	☐	☐	☐	☐
† E. Abandoned, in place, filled and sealed	☐	☐	☐	☐	☐
F. Other (please specify)					
28. Spill recovery system on-site (MARK ONE X)					
A. Yes	☐	☐	☐	☐	☐
B. No	☑	☐	☐	☐	☐
29. Overfill protection (tank only) (MARK ONE X)					
A. Yes	☑	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐
30. Spill containment around fill pipe (MARK ONE X)					
A. Yes	☑	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐

† If boxes 27 B, C, D, E above have been answered – answer questions 31 and 32 below.

31. Substance last used in tank (MARK ONE X)					
A. Leaded gasoline	☐	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
N. Motor oil	☐	☐	☐	☐	☐
P. Lubricating Oil	☐	☐	☐	☐	☐
Q. Sewage	☐	☐	☐	☐	☐
R. Sewage sludge	☐	☐	☐	☐	☐
S. Hazardous waste (specify ID number)					
T. Industrial wastewater	☐	☐	☐	☐	☐
U. Mineral spirits	☐	☐	☐	☐	☐
V. Mixtures (please specify)					
W. Emergency spill tank (specify substance)					
X. Other petroleum products (please specify)					
Y. Other (please specify)					
32. Estimated date last used (month/year)	0 3 9 0 Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.

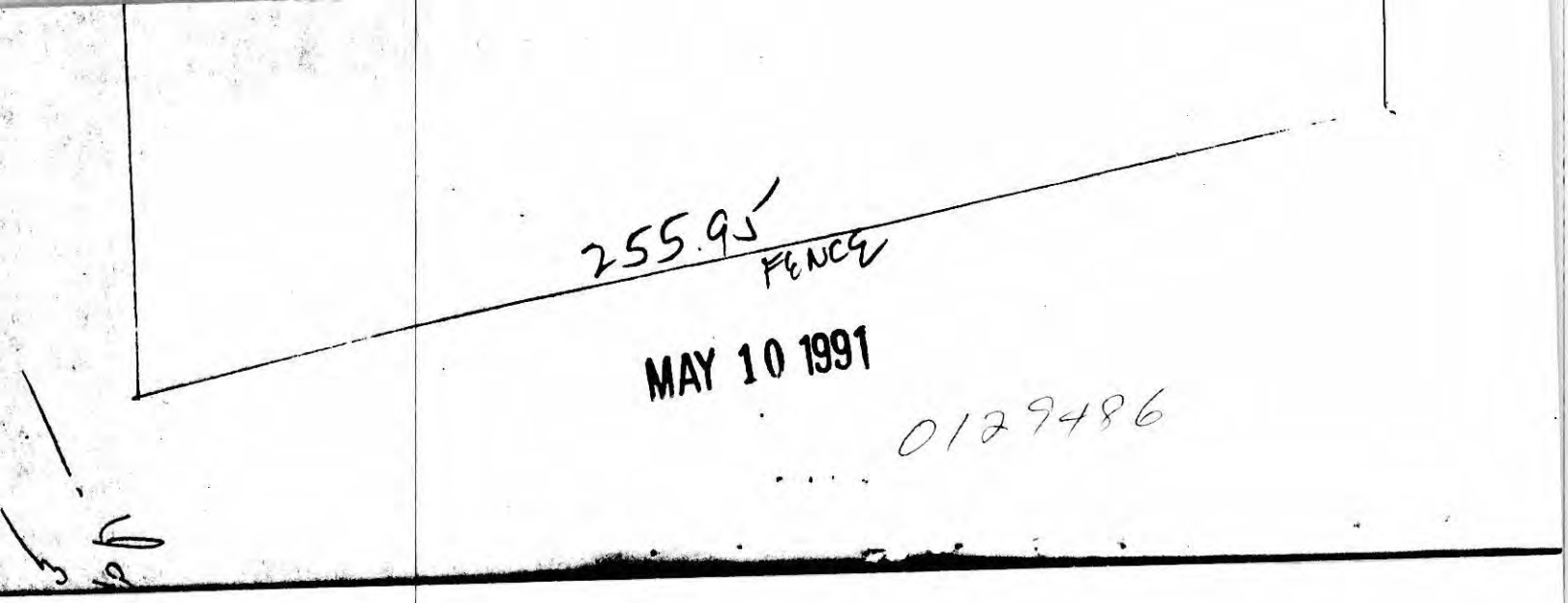
OWNER OR OPERATOR CERTIFICATION

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including fines and/or imprisonment."

DANIEL WINTER — (SIGNATURE) — 5/3/91 (DATE)

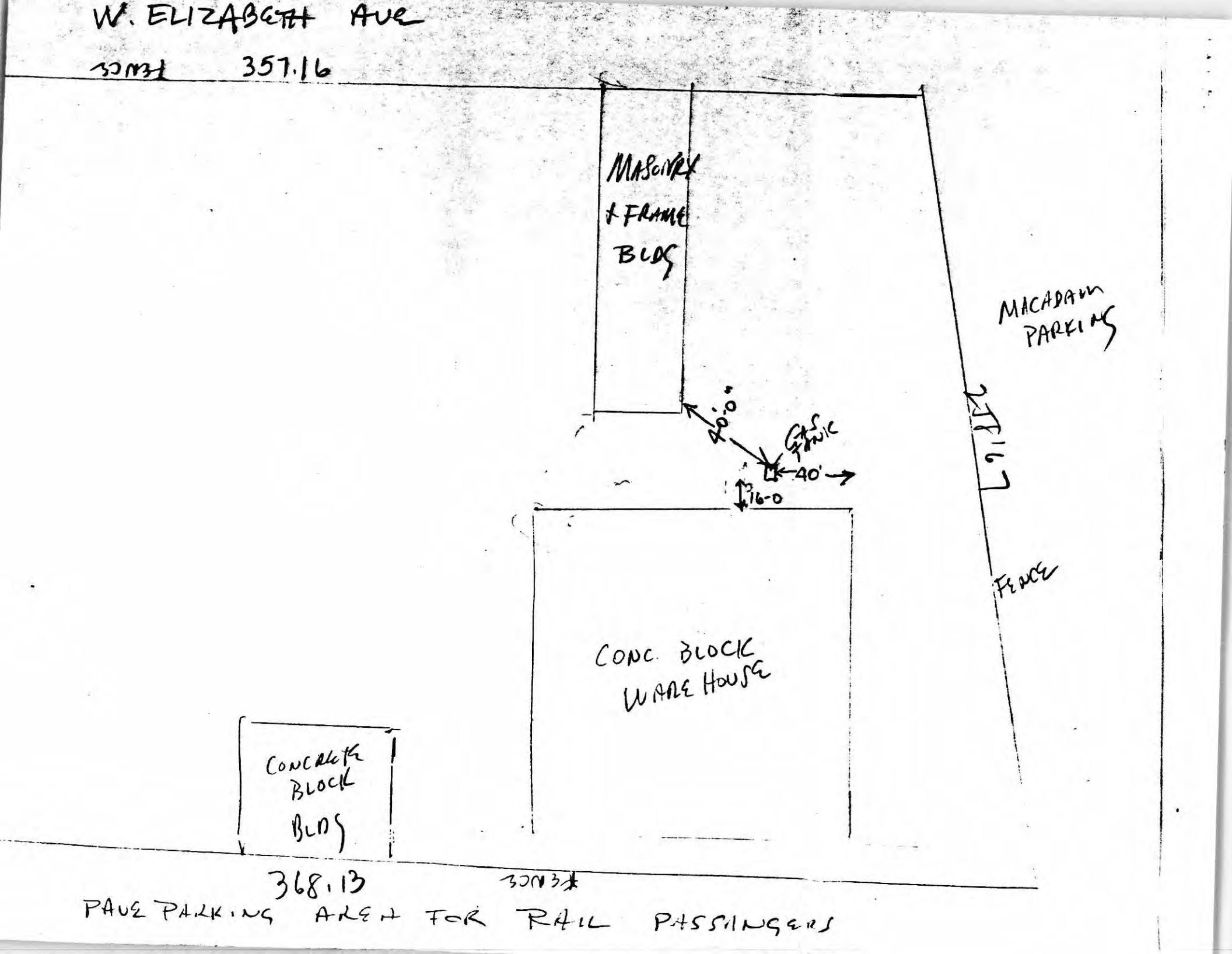
DANIEL WINTER
(PRINT OR TYPE NAME)

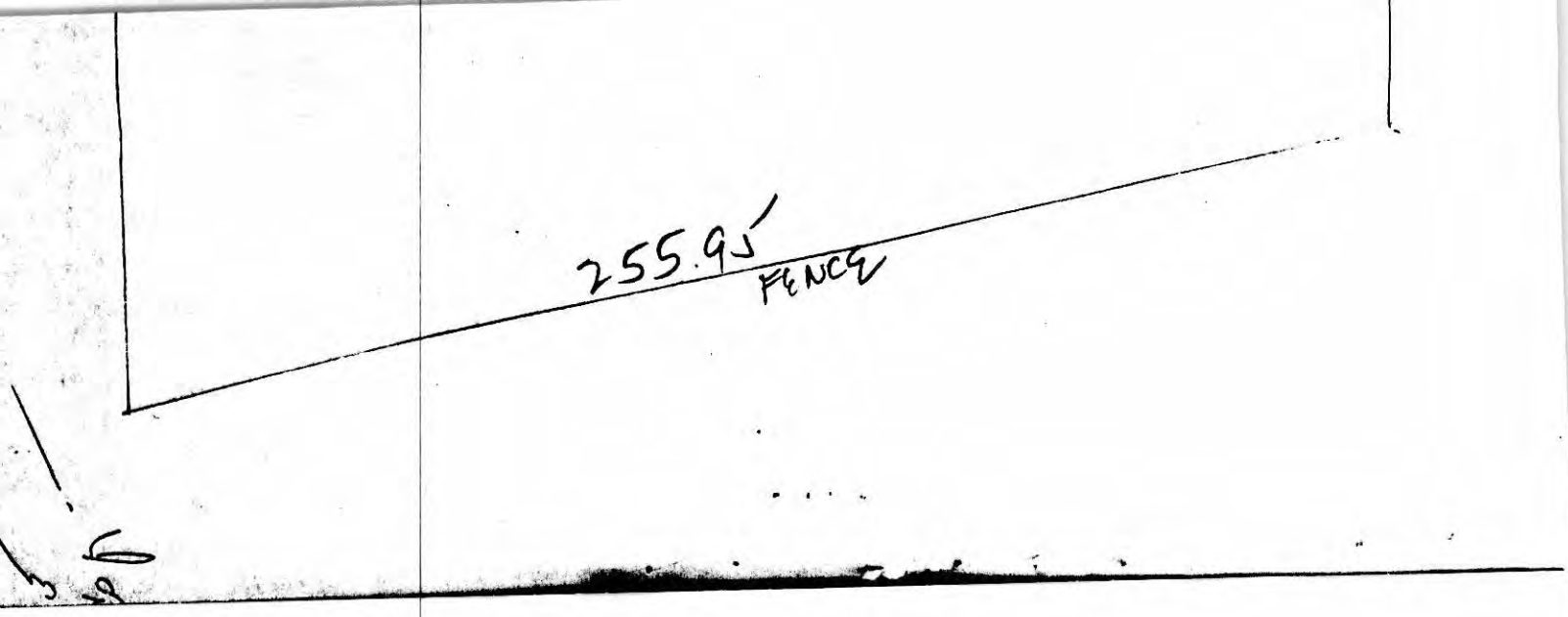
OWNER
(TITLE)

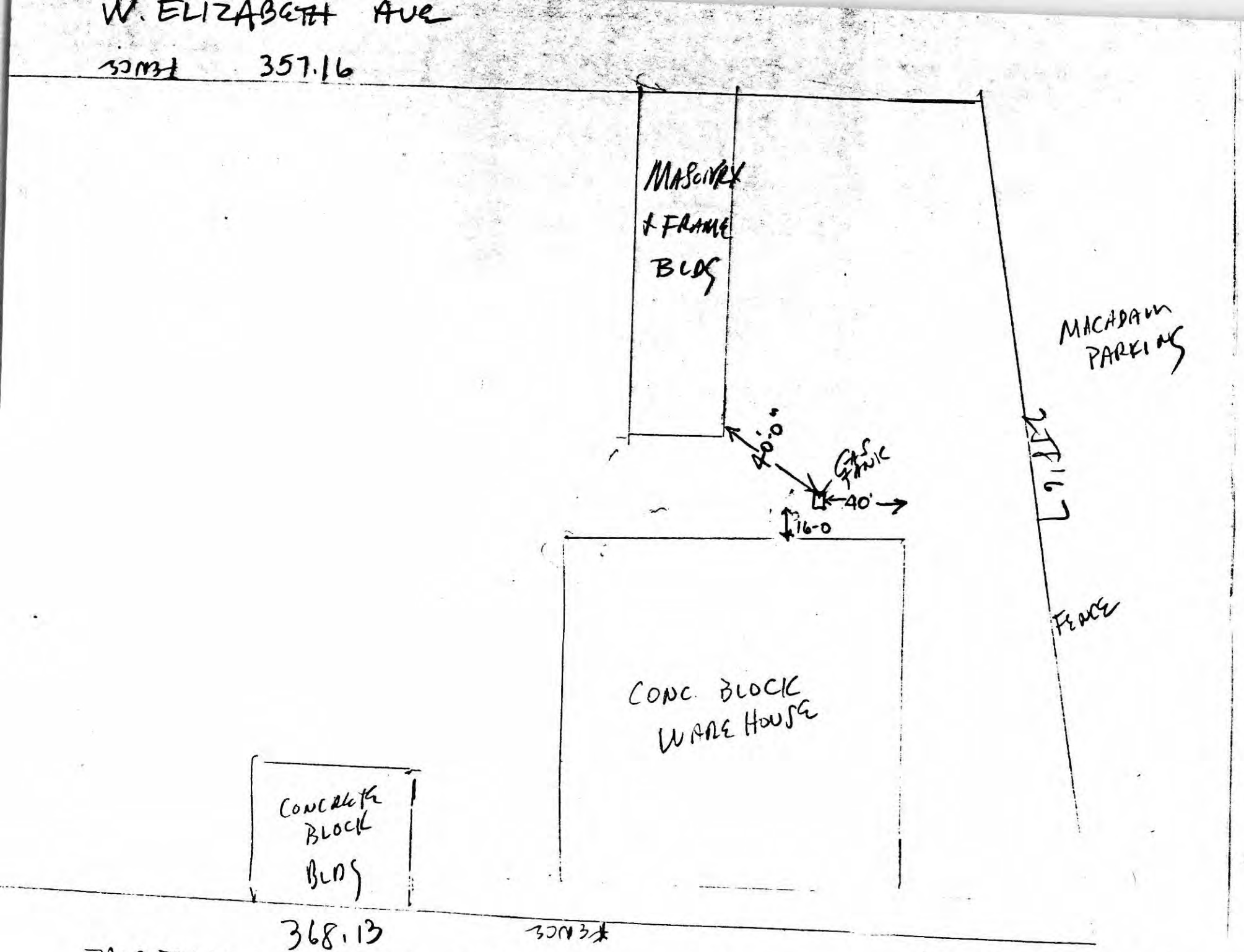


MAY 10 1991

0129486


W. ELIZABETH AVE
357.16
MASONRY & FRAME BLDG
MACADAM PARKING
20'-0"
GAS PUMPS
40'
16-0
211.7
FENCE
CONC. BLOCK WARE HOUSE
CONCRETE BLOCK BLDG
368.13
PAVE PARKING AREA FOR RAIL PASSENGERS


255.9'
FENCE



MAY 10 1991 0129486

0129486

For State Use Only

	Yes	No
Ck.	✓	
A/C	✓	
Inv.		
R/F		
Sp. Hnd.		
Staff		

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
BUREAU OF UNDERGROUND STORAGE TANKS
Registration and Billing Section
CN-029
TRENTON, NEW JERSEY 08625
1-800-722-TANK

Let's protect our earth

RECEIVED MAR 15 1988

ANNUAL CERTIFICATION
QUESTIONNAIRE

SECTION A:

Have there been any changes in this facility's registration status during the past twelve months that have not already been reported to the Bureau of Underground Storage Tanks on a Standard Reporting Form?

☒ NO ☐ YES

If NO, please complete Sections B, D, E and return this form with the top half of the billing invoice and the appropriate fee.

If YES, please check the appropriate type of change (s) below that occurred and complete the enclosed Registration Questionnaire with the NEW information ONLY and sign the questionnaire and return it along with the top half of the billing invoice, this form and the appropriate fee.

____ Company Name and Address (ownership change)

____ Facility location

____ Operator(s)

____ Contact Person(s)

____ Type of product(s) stored

____ Spills, accidents or leaks

____ Other (explain)

(OVER)

SECTION B:

Are inventory records maintained on-site?

☐ NO ☒ YES

Have any unaccountable losses been discovered at your facility?

☒ NO ☐ YES

NOTE It is required that all leaks be reported to the NJDEP within 24 hours of discovery by contacting the NJDEP Hotline telephone number (609) 292-7172.

SECTION C:

Failure by owner or operator of an underground storage tank to comply with any requirement of the State Act or this chapter may result in the penalties set forth in N.J.S.A. 58:10A-10.

SECTION D:

CERTIFICATION

*** This registration form shall be signed by the highest ranking individual at the facility with overall responsibility for that facility. (7:14B-2.3 (a) 1). ***

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including fines and/or imprisonment.

(Signature)

3/10/88
(Date)

DANIEL WINTERS
(Name - print or type)

OWNER
(Title)

***UST NO. 0129486
(Use the UST Number from you invoice)

SECTION E:

The Fee Schedule is printed on the reverse side of the billing invoice. Please make your payment instrument payable to: "Treasurer", State of New Jersey. Use of the enclosed return envelope will expedite the processing of your certification.

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Water Resources
CN-029
Trenton, New Jersey 08625

FOR STATE USE ONLY
UST #- 0129486

	YES	NO
CK. IN.	☑	☐
AMT.	☑	☐
AUTH.	☐	☐
SP. ROUTE	☐	☐
SITE PLN.	☑	☐
SIGN.	☐	☐

COMCODE

RECEIVED MAR 15 1988

*** ANNUAL CERTIFICATION ***
UNDERGROUND STORAGE TANK REGISTRATION QUESTIONNAIRE

Bureau of Underground Storage Tanks
Registration Section
1-800-722-TANK

Use this form ONLY when submitting corrections/changes to registration at Annual Certification

General Facility Information

1. Facility name: ALLIED BUILDING SUPPLY CO
2. Facility location: 1011 WEST ELIZABETH AVENUE
   NUMBER AND STREET
   LINDEN
   CITY OR MUNICIPALITY
   UNION — COUNTY; NJ — STATE; 07036 — ZIP CODE
3. Owner's mailing address: 591 RAHWAY AVENUE
   NUMBER AND STREET
   UNION
   CITY OR MUNICIPALITY
   UNION — COUNTY; NJ — STATE; 07083 — ZIP CODE
4. Owner's name: DANIEL WINTERS
5. Contact person (Facility Operator) JOHN SAUER
   PERSON OR TITLE
6. Contact telephone number: 201 — AREA CODE; 862 — EXCHANGE; 4070 — NUMBER
7. Total number of facility underground storage tanks: 0001 (Complete Questions 12 thru 33 for each tank)
8. Total facility underground storage tank capacity (gallons): 0002000
9. Status of owner: (mark one) A. ☒ CURRENT B. ☐ FORMER
10. Type of owner: (mark one)
    A. ☐ STATE OR LOCAL GOVERNMENT
    B. ☒ PRIVATE OR CORPORATE
    C. ☐ OWNERSHIP UNCERTAIN
    D. ☐ FEDERAL GOVT. (GSA FACILITY I.D. NUMBER)
11. Two copies of a site plan are submitted with this registration. A. ☑ YES B. ☐ NO

Submit two (2) copies of SITE PLAN showing facility or property boundary, buildings and the location of ALL underground storage tanks. EITHER, an existing engineering site plan, if available, OR a neat and legible hand-drawn sketch of the site may be submitted. In either case the site plan or sketch MUST show the location and distances that tanks, buildings, and dispensers are from the facility's property boundary. Include all tanks that are operating or existing, (E); abandoned, (A); or out of service, (C). Each underground tank on the site plan or sketch shall be numbered in accordance with the instructions for question 12. The number assigned to a tank on the site plan or sketch MUST match and be identical to the tank identification number assigned to that tank on this form.

INCLUDE FACILITY NAME, OWNER'S NAME, FACILITY ADDRESS AND TELEPHONE NUMBER ON ALL SITE PLANS.

UST NO. _____

ALL underground tanks, including those taken out of operation. **(UNLESS THE TANK WAS REMOVED FROM THE GROUND)** must be included in this registration. All in-ground tanks shall be reported as underground tanks on this questionnaire regardless of their current status; Existing, E; Abandoned, A; or out of service, C.

SPECIFIC TANK INFORMATION

	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
12. Tank Identification Number	0001				
13. CASRN Number (Hazardous Substances Only)					
14. Tank Age (Years) UNKNOWN					
15. Tank Size (gallons)	10,000				
16. Tank Contents (MARK ONE X)					
A. Leaded gasoline	☒	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
N. Other; Please Specify					
17. Tank and Piping Construction (MARK ALL THAT APPLY X)	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping
A. Bare steel UNKNOWN	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
B. Carbon steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
C. Stainless steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
D. Aluminum	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
E. Polyvinyl chloride	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
F. Concrete	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
G. Bronze	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
H. Earthen walls	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
J. Fiberglass reinforced plastic	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
K. Fiberglas-clad steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
L. Painted/asphalt steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
M. Vaulted	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
N. Composite	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
P. Iron (cast or ductile)	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
R. Non-metallic	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
S. Other; Please Specify					
18. Tank and Piping Structure (MARK ALL THAT APPLY X)	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping
A. Single wall UNKNOWN	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
B. Double wall	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
C. Manway in tank	☐	☐	☐	☐	☐
19. Internal Tank and Piping Lining UNKNOWN (MARK ALL THAT APPLY X)	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping
A. Rubber	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
B. Epoxy	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
C. Alklyd	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
D. Phenolic	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
E. Glass	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
F. Clay	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
G. None	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
H. Other, Please Specify					

UST NO. 0129486

	Tank I.D. No.	TANK NO.		TANK NO.		TANK NO.		TANK NO.		TANK NO.	
20. Tank and Piping Lining installed UNKNOWN (MARK ALL THAT APPLY X)		Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. At purchase of tank		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Retrofitted		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Secondary containment (MARK ALL THAT APPLY X)		Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Liner UNKNOWN		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Vault		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Double wall		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. None		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Other, Please Specify											
22. External Type/Application of Cathodic Protection (MARK ALL THAT APPLY X)											
A. Wrapped UNKNOWN		Tank ☐	Piping ☐	Tank ☐	Piping ☐	Tank ☐	Piping ☐	Tank ☐	Piping ☐	Tank ☐	Piping ☐
B. Sprayed		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Sacrificial anode		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Impressed current		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. None		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Other, Please Specify											
23. Monitoring/detection method (MARK ALL THAT APPLY X)											
A. Automatic sampling UNKNOWN		Tank ☐	Piping ☐	Tank ☐	Piping ☐	Tank ☐	Piping ☐	Tank ☐	Piping ☐	Tank ☐	Piping ☐
B. Manual sampling		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Ground water monitoring		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. System in secondary containment		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. System outside backfill		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. System within piping (piping leak detector)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. None		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Type of monitoring/detection system (MARK ALL THAT APPLY X)											
A. Continuous UNKNOWN		Tank ☐	Piping ☐	Tank ☐	Piping ☐	Tank ☐	Piping ☐	Tank ☐	Piping ☐	Tank ☐	Piping ☐
B. Event activated		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Audio		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Visual		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Electric sensor		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Stock/inventory control (manual)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Stock/inventory control (electronic)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Tile drain		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
J. Vapor sniff wells		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Internal inspection		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
L. Other, Please Specify											
M. None		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25. Tank/piping tested (any type) (MARK ALL THAT APPLY X)											
A. Yes		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. No		☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Test positive (MARK IF LEAK WAS DISCOVERED)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. None (Never tested)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Leak/spill occurrence (MARK ALL THAT APPLY X)											
A. Within the past 1 year		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Within the past 1 to 5 years		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. More than 5 years ago		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. No Records		☑	☒	☐	☐	☐	☐	☐	☐	☐	☐
E. None		☒	☐	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. _____

Tank I.D. No.	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
27. Tank Status (MARK ONE X) A. Operational	☒	☐	☐	☐	☐
(+) B. Temporarily out of service (Less than 90 days)	☐	☐	☐	☐	☐
(+) C. Extended out of service (90 days to 2 years)	☐	☐	☐	☐	☐
D. Long term out of service (Greater than 2 years)	☐	☐	☐	☐	☐
* SEE BELOW E. Abandoned, in place	☐	☐	☐	☐	☐
F. Abandoned, in place, filled only	☐	☐	☐	☐	☐
G. Abandoned, in place, sealed only	☐	☐	☐	☐	☐
H. Abandoned, in place, filled and sealed	☐	☐	☐	☐	☐
(+) J. Seasonal (Answer only for motor fuel uses)	☐	☐	☐	☐	☐
K. Prior retrofitting work, Please Specify					
L. Other, Please Specify					
28. Spill recovery system on-site (MARK ONE X) A. Yes	☐	☐	☐	☐	☐
B. No	☒	☐	☐	☐	☐
29. Overfill protection (tank only) (MARK ONE X) A. Yes	☒	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐
30. Emergency shut-off mechanisms (dispensers) (MARK ONE X) A. Yes	☒	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐

* If boxes 27 E, F, G or H above have been answered - answer questions 31, 32 and 33 below.

31. Substance last used in tank (MARK ONE X) A. Leaded gasoline	☒	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
I. Heating oil (No. 4)	☐	☐	☐	☐	☐
J. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
K. Aviation fuel	☐	☐	☐	☐	☐
L. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
M. Other, Please Specify					
32. Estimated date last used (month/year)	0387 Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.
33. Estimated quantity (gallons) left in tank	00700				

*** This registration form shall be signed by the highest ranking individual at the facility with overall responsibility for that facility (7:14B-2.3 (a) 1). ***

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including fines and/or imprisonment.

(SIGNATURE)

DANIEL WINTERS

(PRINT OR TYPE NAME)

OWNER

(TITLE)

CHANGE OF MAILING ADDRESS INFORMATION PLEASE PRINT

Business or Company Name : CST # 0129486

Care/Attention of :

Delivery Address (Indicate One) : A) PO Box 381 (No.) B) Rural Route ____ (No.) Box ____ (No.)

C) Street Address ____ (No.) ____ (Name)

D) Mail Stop ____

Other : (Optional) Bldg Name/Number ____ Floor Number ____

Room Name/Number ____ Suite Name/Number ____

Postal City: Union State: N.J. Zip Code: 07083-0381

CST # 0129486

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Water Resources
CN-029
Trenton, New Jersey 08625

FOR STATE USE ONLY
UST # 0129486

	YES	NO
CK. IN.	☐	☐
AMT.	☐	☐
AUTH.	☐	☐
SP. ROUTE	☐	☑
SITE PLN.	☑	☐
SIGN.	☑	☐
COMCODE	[redacted]	

2035

AUG 2 7 1987

UNDERGROUND STORAGE TANK REGISTRATION QUESTIONNAIRE

Bureau of Underground Storage Tanks
Registration Section
1-800-722-TANK

COMPLIANCE WITH THIS REGISTRATION WILL MEET ALL REQUIREMENTS OF STATE LAW, P.L. 1986, c. 102, THE UNDERGROUND STORAGE OF HAZARDOUS SUBSTANCES ACT, N.J.S.A. 58:10A-21. 8/3

General Facility Information

1. Facility name: ALLIED BUILDING SUPPLY CO
2. Facility location: 1011 WEST ELIZABETH AVENUE
   NUMBER AND STREET
   LINDEN
   CITY OR MUNICIPALITY
   UNION (COUNTY) NJ (STATE) 07036 (ZIP CODE)
3. Owner's mailing address: 5811 RAHWAY AVENUE
   NUMBER AND STREET
   UNION
   CITY OR MUNICIPALITY
   UNION (COUNTY) NJ (STATE) 07083 (ZIP CODE)
4. Owner's name: DANIEL WINTERS
5. Contact person (Facility Operator) JOHN SAUER
   PERSON OR TITLE
6. Contact telephone number: 201 (AREA CODE) 862 (EXCHANGE) 4070 (NUMBER)
7. Total number of facility underground storage tanks: 0001 (Complete Questions 12 thru 33 for each tank)
8. Total facility underground storage tank capacity (gallons): 0002000
9. Status of owner: (mark one) A. ☒ CURRENT B. ☐ FORMER
10. Type of owner: (mark one) A. ☐ STATE OR LOCAL GOVERNMENT B. ☒ PRIVATE OR CORPORATE C. ☐ OWNERSHIP UNCERTAIN D. ☐ FEDERAL GOVT. (GSA FACILITY I.D. NUMBER)
11. Two copies of a site plan are submitted with this registration. A. ☐ YES B. ☐ NO

Submit two (2) copies of SITE PLAN showing facility or property boundary, buildings and the location of ALL underground storage tanks. EITHER, an existing engineering site plan, if available, OR a neat and legible hand-drawn sketch of the site may be submitted. In either case the site plan or sketch MUST show the location and distances that tanks, buildings, and dispensers are from the facility's property boundary. Include all tanks that are operating or existing, (E); abandoned, (A); or out of service, (C). Each underground tank on the site plan or sketch shall be numbered in accordance with the instructions for question 12. The number assigned to a tank on the site plan or sketch MUST match and be identical to the tank identification number assigned to that tank on this form.

INCLUDE FACILITY NAME, OWNER'S NAME, FACILITY ADDRESS AND TELEPHONE NUMBER ON ALL SITE PLANS.

UST NO. 0129486

ALL underground tanks, including those taken out of operation. (UNLESS THE TANK WAS REMOVED FROM THE GROUND) must be included in this registration. All in-ground tanks shall be reported as underground tanks on this questionnaire regardless of their current status; Existing, E; Abandoned, A; or out of service, C.

SPECIFIC TANK INFORMATION

	TANK NO. 0001	TANK NO.	TANK NO.	TANK NO.	TANK NO.
12. Tank Identification Number					
13. CASRN Number (Hazardous Substances Only)					
14. Tank Age (Years)	UNKNOWN				
15. Tank Size (gallons)	01012010				
16. Tank Contents (MARK ONE X)					
A. Leaded gasoline	X	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
N. Other; Please Specify					
17. Tank and Piping Construction (MARK ALL THAT APPLY X)	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping
A. Bare steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
B. Carbon steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
C. Stainless steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
D. Aluminum	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
E. Polyvinyl chloride	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
F. Concrete	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
G. Bronze	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
H. Earthen walls	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
J. Fiberglass reinforced plastic	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
K. Fiberglas-clad steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
L. Painted/asphalt steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
M. Vaulted	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
N. Composite	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
P. Iron (cast or ductile)	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
R. Non-metallic	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
S. Other; Please Specify					
18. Tank and Piping Structure (MARK ALL THAT APPLY X)	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping
A. Single wall UNKNOWN	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
B. Double wall	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
C. Manway in tank	☐	☐	☐	☐	☐
19. Internal Tank and Piping Lining UNKNOWN (MARK ALL THAT APPLY X)	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping
A. Rubber	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
B. Epoxy	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
C. Alklyd	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
D. Phenolic	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
E. Glass	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
F. Clay	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
G. None	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
H. Other, Please Specify					

UST NO. 0179486

	Tank I.D. No.	TANK NO. 0000		TANK NO.		TANK NO.		TANK NO.		TANK NO.	
20. Tank and Piping Lining installed UNKNOWN (MARK ALL THAT APPLY X)		Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. At purchase of tank		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Retrofitted		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. None		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Secondary containment (MARK ALL THAT APPLY X)		Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Liner UNKNOWN		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Vault		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Double wall		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. None		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Other, Please Specify											
22. External Type/Application of Cathodic Protection (MARK ALL THAT APPLY X)											
A. Wrapped UNKNOWN		Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
B. Sprayed		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Sacrificial anode		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Impressed current		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. None		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Other, Please Specify		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
23. Monitoring/detection method (MARK ALL THAT APPLY X) UNKNOWN											
A. Automatic sampling		Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
B. Manual sampling		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Ground water monitoring		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. System in secondary containment		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. System outside backfill		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. System within piping (piping leak detector)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. None		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Type of monitoring/detection system (MARK ALL THAT APPLY X)											
A. Continuous UNKNOWN		Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
B. Event activated		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Audio		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Visual		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Electric sensor		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Stock/inventory control (manual)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Stock/inventory control (electronic)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Tile drain		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
J. Vapor sniff wells		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Internal inspection		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
L. Other, Please Specify		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
M. None											
25. Tank/piping tested (any type) (MARK ALL THAT APPLY X)											
A. Yes		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. No ✓		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Test positive (MARK IF LEAK WAS DISCOVERED)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. None (Never tested)		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Leak/spill occurrence (MARK ALL THAT APPLY X)											
A. Within the past 1 year		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Within the past 1 to 5 years		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. More than 5 years ago		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. No Records		☒	☒	☐	☐	☐	☐	☐	☐	☐	☐
E. None		☒	☒	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. 0129486

Tank I.D. No.	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
27. Tank Status (MARK ONE X) A. Operational	☒	☐	☐	☐	☐
(+) B. Temporarily out of service (Less than 90 days)	☐	☐	☐	☐	☐
(+) C. Extended out of service (90 days to 2 years)	☐	☐	☐	☐	☐
D. Long term out of service (Greater than 2 years)	☐	☐	☐	☐	☐
* SEE BELOW E. Abandoned, in place	☐	☐	☐	☐	☐
F. Abandoned, in place, filled only	☐	☐	☐	☐	☐
G. Abandoned, in place, sealed only	☐	☐	☐	☐	☐
H. Abandoned, in place, filled and sealed	☐	☐	☐	☐	☐
(+) J. Seasonal (Answer only for motor fuel uses)	☐	☐	☐	☐	☐
K. Prior retrofitting work, Please Specify					
L. Other, Please Specify					
28. Spill recovery system on-site (MARK ONE X) A. Yes	☐	☐	☐	☐	☐
B. No	☒	☐	☐	☐	☐
29. Overfill protection (tank only) (MARK ONE X) A. Yes	☒	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐
30. Emergency shut-off mechanisms (dispensers) (MARK ONE X) A. Yes	☒	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐

* If boxes 27 E, F, G or H above have been answered - answer questions 31, 32 and 33 below.

31. Substance last used in tank (MARK ONE X) A. Leaded gasoline	☒	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
I. Heating oil (No. 4)	☐	☐	☐	☐	☐
J. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
K. Aviation fuel	☐	☐	☐	☐	☐
L. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
M. Other, Please Specify					
32. Estimated date last used (month/year)	0881 Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.
33. Estimated quantity (gallons) left in tank	000800				

OWNER OR OWNER'S AGENT CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

(SIGNATURE)

DANIEL WINTERS

(PRINT OR TYPE NAME)

OWNER

(TITLE)

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Water Resources
CN-029
Trenton, New Jersey 08625

0129486
ALLIED BUILDING SUPPLY CO

AMT.	☐ ☐
AUTH.	☐ ☐
SP. ROUTE	☐ ☐
SITE PLN.	☑ ☐
SIGN.	☑ ☐
COMCODE	12161

UNDERGROUND STORAGE TANK REGISTRATION QUESTIONNAIRE

JUN 01 1986

Bureau of Ground Water Quality Management
Underground Storage Tank Section
(609)984-9736

COMPLIANCE WITH THIS REGISTRATION WILL MEET ALL REGISTRATION REQUIREMENTS OF THE FEDERAL LAW. P.L. 93-616, THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984, SUBTITLE 1, SECTIONS 9001-9010.

General Facility Information

1. Facility name: ALLIED BUILDING SUPPLY CO

2. Facility location: 1011 WEST ELIZABETH AVENUE
NUMBER AND STREET
LINDEN
CITY OR MUNICIPALITY
UNION — COUNTY; NJ — STATE; 07036 — ZIP CODE

3. Owner's mailing address: 581 RAHWAY AVENUE
NUMBER AND STREET
UNION
CITY OR MUNICIPALITY
UNION — COUNTY; NJ — STATE; 07083 — ZIP CODE

4. Owner's name: DANIELI WINTERS

5. Contact person (Facility Operator) JOHN SAUER
PERSON OR TITLE

6. Contact telephone number: 201 — AREA CODE; 862 — EXCHANGE; 4070 — NUMBER

7. Total number of facility underground storage tanks: 0001 (Complete Questions 12 thru 33 for each tank)

8. Total facility underground storage tank capacity (gallons): 0002000

9. Type and status of owner (mark all that apply).

A. ☒ CURRENT B. ☐ FORMER C. ☐ STATE OR LOCAL GOVERNMENT D. ☐ PRIVATE OR CORPORATE E. ☐ OWNERSHIP UNCERTAIN F. ☐ FEDERAL GOVT. (GSA FACILITY I.D. NUMBER)

10. Two copies of a site plan are submitted with this registration. A. ☒ YES B. ☐ NO

Submit two (2) copies of SITE PLAN showing facility or property boundary, buildings and the location of ALL underground storage tanks. EITHER, an existing engineering site plan, if available, OR a neat and legible hand-drawn sketch of the site may be submitted. In either case the site plan or sketch MUST show the location and distances that tanks, buildings, and dispensers are from the facility's property boundary. Include all tanks that are operating or existing, (E); abandoned, (A); or closed, (C). Each underground tank on the site plan or sketch shall be numbered in accordance with the instructions for question 12. The number assigned to a tank on the site plan or sketch MUST match and be identical to the tank identification number assigned to that tank on this form.

INCLUDE FACILITY NAME, OWNER'S NAME, FACILITY ADDRESS AND TELEPHONE NUMBER ON ALL SITE PLANS.

UST NO. 12948

11. All underground tanks used after January 1, 1974 including those taken out of operation, **(UNLESS THE TANK WAS REMOVED FROM THE GROUND)** must be included in this registration. All in-ground tanks shall be reported as underground tanks on this questionnaire regardless of their current status; Existing, E; Abandoned, A; or Closed C.

SPECIFIC TANK INFORMATION

	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
12. Tank Identification Number	UNKNOWN				
13. CASRN Number (Hazardous Substances Only)					
14. Tank Age (Years)	UNKNOWN				
15. Tank Size (gallons)	002000			10,0 #UL	
16. Tank Contents (MARK ONE X)					
A. Leaded gasoline	X	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
K. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
L. Aviation fuel	☐	☐	☐	☐	☐
M. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
N. Other; Please Specify					
17. Tank and Piping Construction (MARK ALL THAT APPLY X)	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping
A. Bare steel	UNKNOWN ☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
B. Carbon steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
C. Stainless steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
D. Aluminum	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
E. Polyvinyl chloride	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
F. Concrete	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
G. Bronze	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
H. Earthen walls	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
J. Fiberglass reinforced plastic	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
K. Fiberglas-clad steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
L. Painted/asphalt steel	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
M. Vaulted	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
N. Composite	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
P. Iron (cast or ductile)	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
R. Non-metallic	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
S. Other; Please Specify					
18. Tank and Piping Structure (MARK ALL THAT APPLY X)	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping
A. Single wall	UNKNOWN ☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
B. Double wall	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
C. Manway in tank	☐	☐	☐	☐	☐
19. Internal Tank and Piping Lining (MARK ONE X)	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping	Tank / Piping
A. Rubber	UNKNOWN ☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
B. Epoxy	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
C. Alklyd	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
D. Phenolic	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
E. Glass	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
F. Clay	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
G. None	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
H. Other; Please Specify					

UST NO. 12448

Tank I.D. No.	TANK NO.		TANK NO.		TANK NO.		TANK NO.		TANK NO.	
20. Tank and Piping Lining installed (MARK ONE X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. At purchase of tank UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Retrofitted	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Secondary containment (MARK ALL THAT APPLY X)	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Liner UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Vault	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Double wall	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Other, Please Specify										
22. External Type/Application of Cathodic Protection (MARK ALL THAT APPLY X)										
	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Wrapped UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Sprayed	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Sacrificial anode	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Impressed current	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Other, Please Specify										
23. Monitoring/detection method (MARK ALL THAT APPLY X)										
	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Automatic sampling UNKNOWN	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Manual sampling	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Ground water monitoring	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. System in secondary containment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. System outside backfill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. System within piping (piping leak detector)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Type of monitoring/detection system (MARK ALL THAT APPLY X)										
	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
A. Continuous	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Event activated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. Audio	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. Visual	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E. Electric sensor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F. Stock/inventory control (manual)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
G. Stock/inventory control (electronic)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
H. Tile drain	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
J. Vapor sniff wells	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
K. Internal inspection	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
L. Other, Please Specify										
M. None	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25. Testing history recorded (MARK ALL THAT APPLY X)										
A. Yes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. No	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐
C. Test Result (MARK IF LEAKING NOW)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Leak/spill occurrence (MARK ALL THAT APPLY X)										
A. Within the past 1 year NONE	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B. Within the past 1 to 5 years	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C. More than 5 years ago	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D. No Records	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

UST NO. 12-948

Tank I.D. No.	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
27. Tank Status (MARK ONE X) A. Active (operational)	☒	☐	☐	☐	☐
B. Inactive (non-operational)	☐	☐	☐	☐	☐
C. Closed (temporarily out-of-service)	☐	☐	☐	☐	☐
D. Closed (permanently out-of-service)	☐	☐	☐	☐	☐
* SEE BELOW E. Abandoned, in place	☐	☐	☐	☐	☐
F. Abandoned, in place, filled only	☐	☐	☐	☐	☐
G. Abandoned, in place, sealed only	☐	☐	☐	☐	☐
H. Abandoned, in place, filled and sealed	☐	☐	☐	☐	☐
J. Seasonal	☐	☐	☐	☐	☐
K. Prior retrofitting work, Please Specify					
L. Other, Please Specify					
28. Spill recovery system on-site (MARK ONE X) A. Yes	☐	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐
29. Overfill protection (tank only) (MARK ONE X) A. Yes	☐	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐
30. Emergency shut-off mechanisms (dispensers) (MARK ONE X) A. Yes	☐	☐	☐	☐	☐
B. No	☐	☐	☐	☐	☐

* If boxes 27 E, F, G or H above have been answered - answer questions 31, 32 and 33 below.

31. Substance last used in tank (MARK ONE X) A. Leaded gasoline	☐	☐	☐	☐	☐
B. Unleaded gasoline	☐	☐	☐	☐	☐
C. Alcohol enriched gasoline	☐	☐	☐	☐	☐
D. Light diesel fuel (No. 1-D)	☐	☐	☐	☐	☐
E. Medium diesel fuel (No. 2-D)	☐	☐	☐	☐	☐
F. Waste oil	☐	☐	☐	☐	☐
G. Kerosene (No. 1)	☐	☐	☐	☐	☐
H. Home heating oil (No. 2)	☐	☐	☐	☐	☐
J. Heating oil (No. 4)	☐	☐	☐	☐	☐
J. Heavy heating oil (No. 6)	☐	☐	☐	☐	☐
K. Aviation fuel	☐	☐	☐	☐	☐
L. Hazardous substances (per Fact Sheet)	☐	☐	☐	☐	☐
M. Other, Please Specify					
32. Estimated date last used (month/year)	Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.	Mo. Yr.
33. Estimated quantity (gallons) left in tank					

OWNER OR OWNER'S AGENT CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

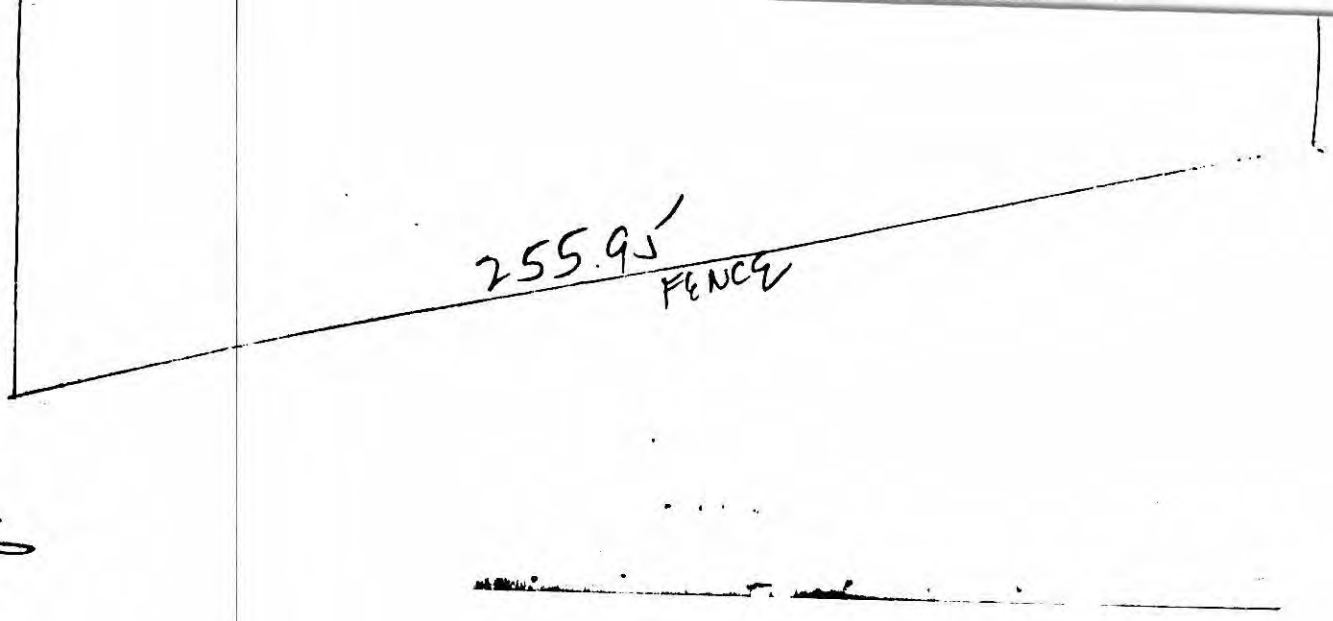
(SIGNATURE)

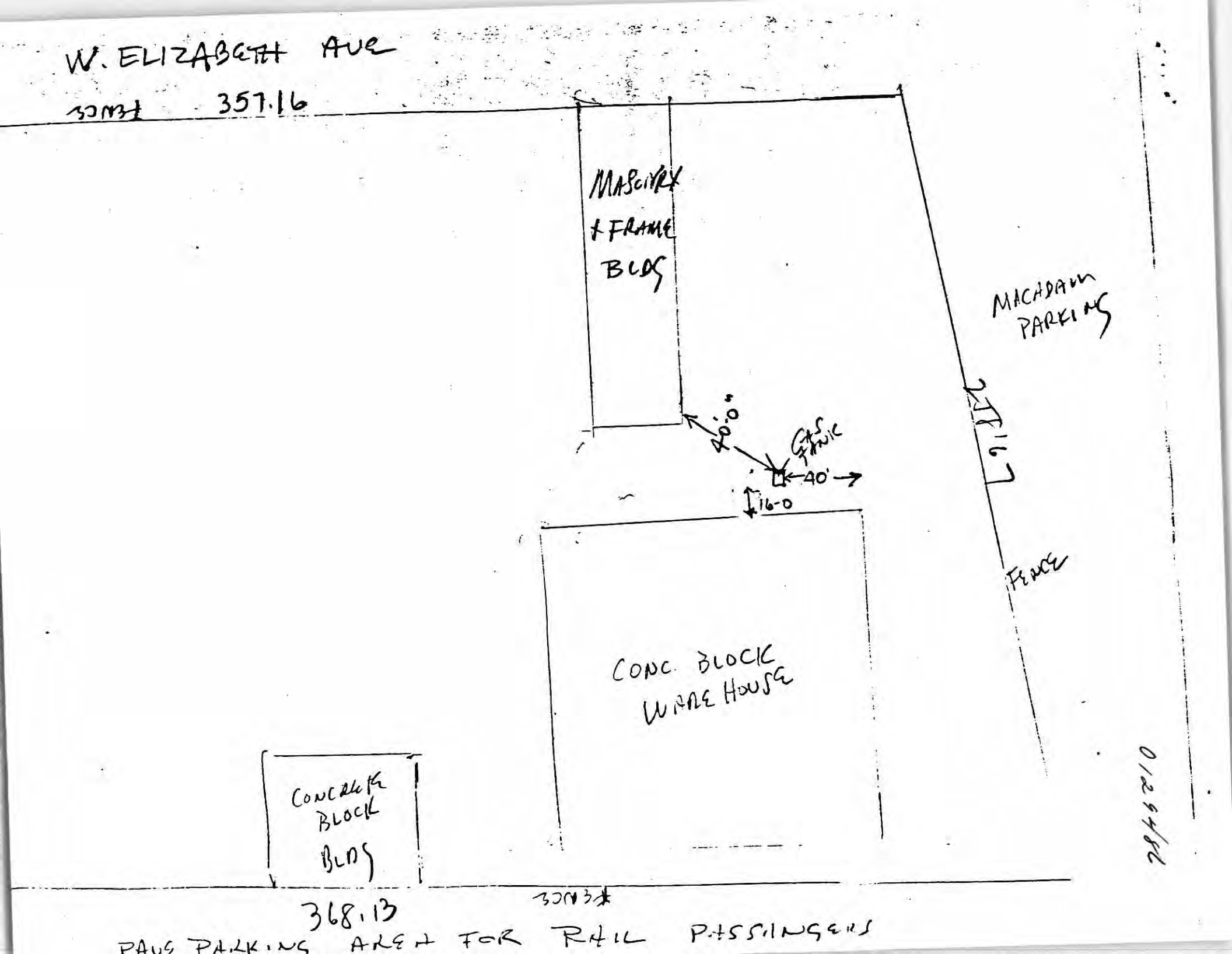
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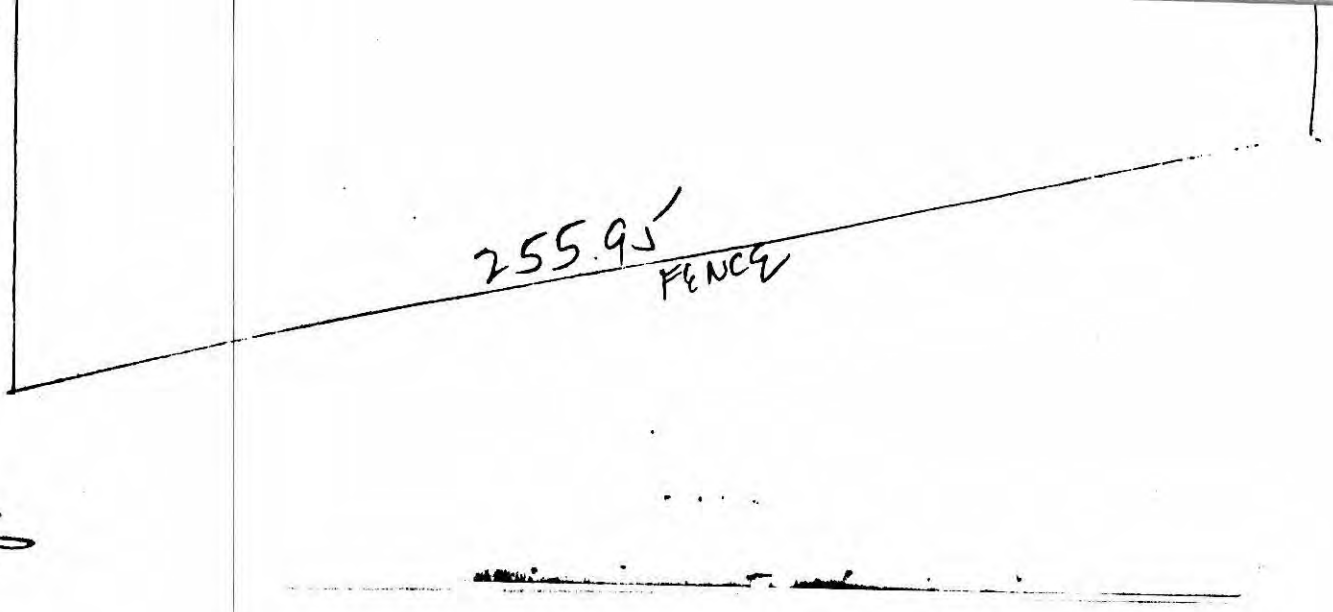
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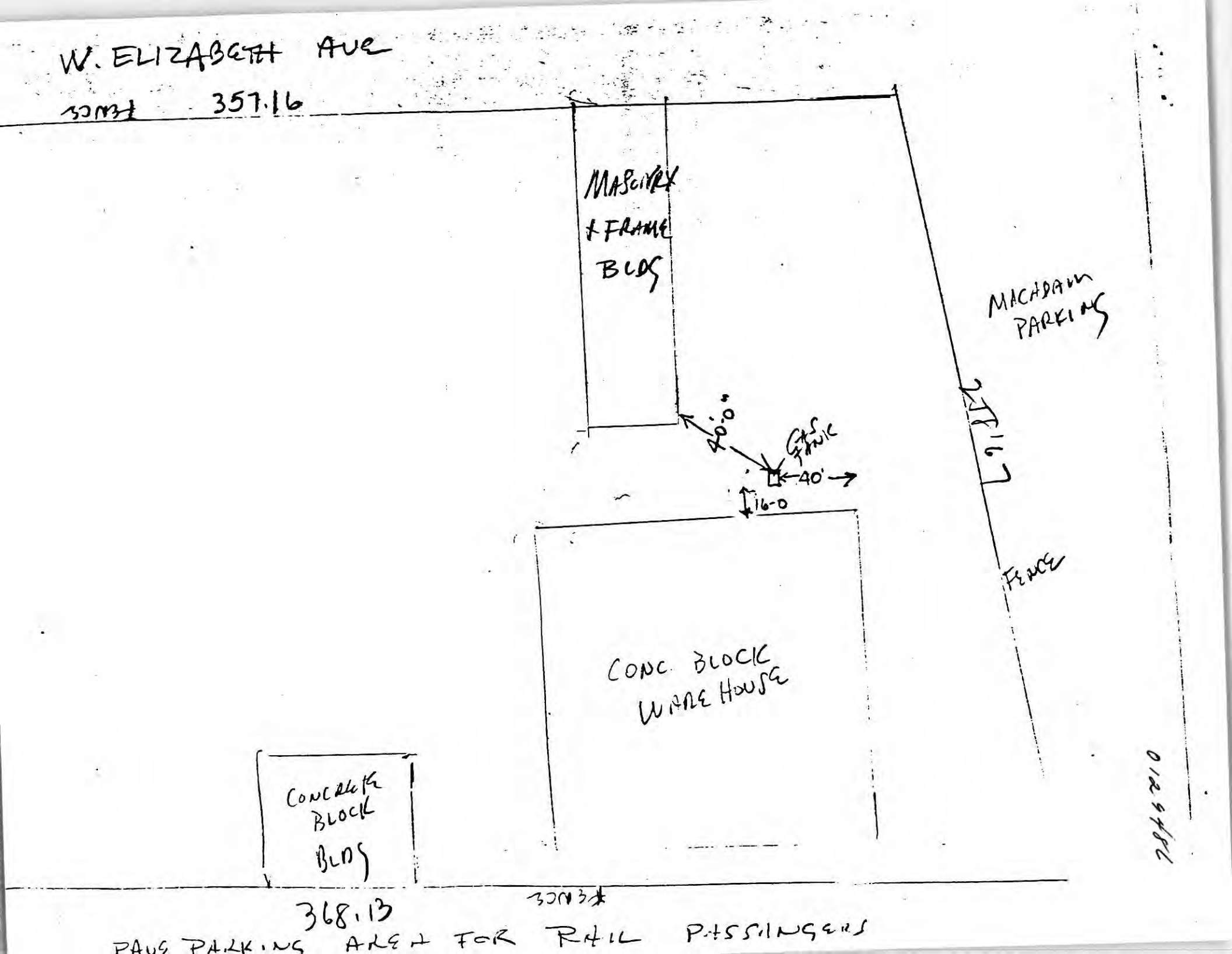
OWNER

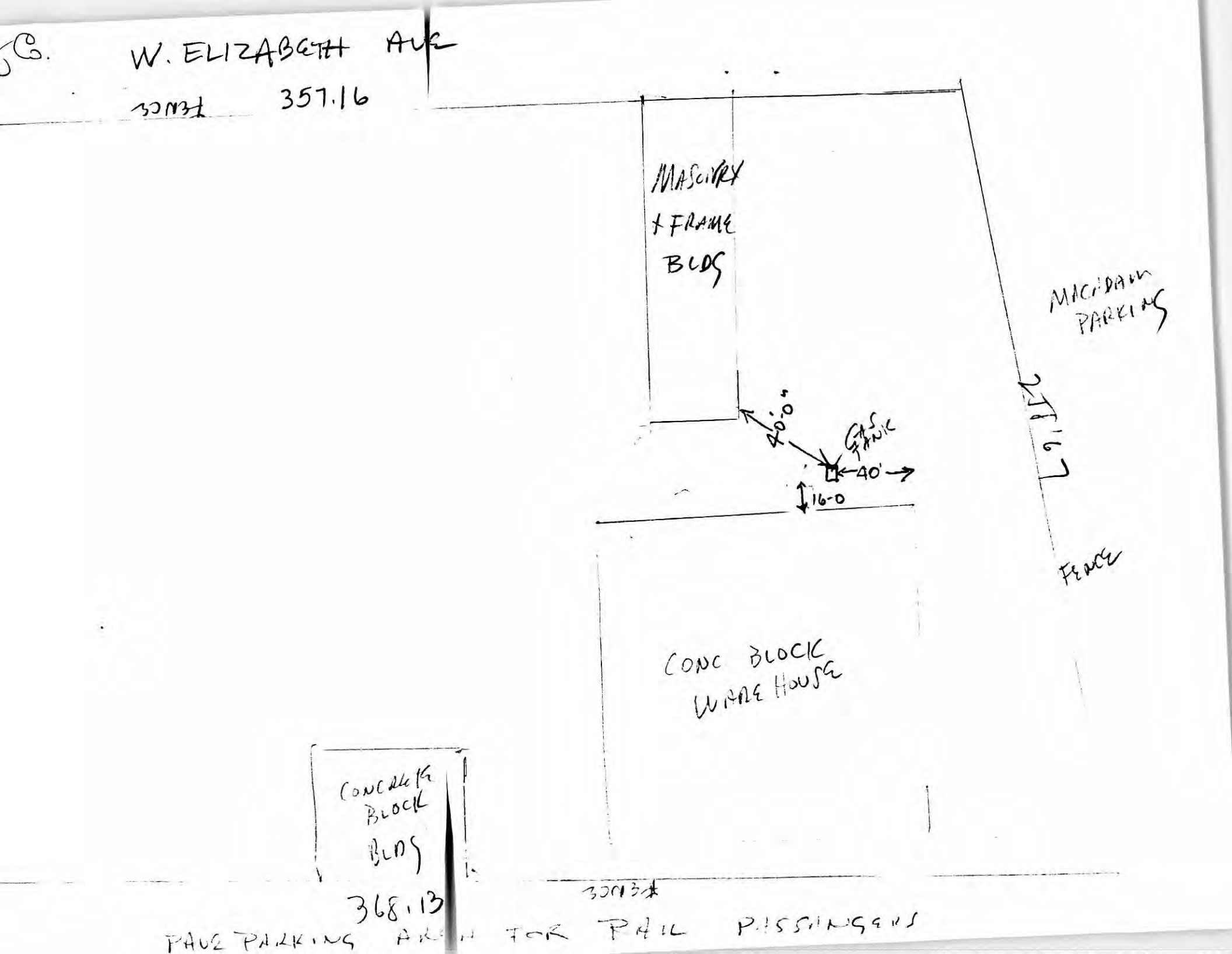
(TITLE)


255.9'
FENCE


W. ELIZABETH AVE
357.16
MASONRY & FRAME BLDG
MACADAM PARKING
40'-0"
GAS PUMP
40'
16-0
211.67
FENCE
CONC. BLOCK WARE HOUSE
CONCRETE BLOCK BLDG
368.13
PAVE PARKING AREA FOR RAIL PASSENGERS
0/2 9+6C


255.9'
FENCE

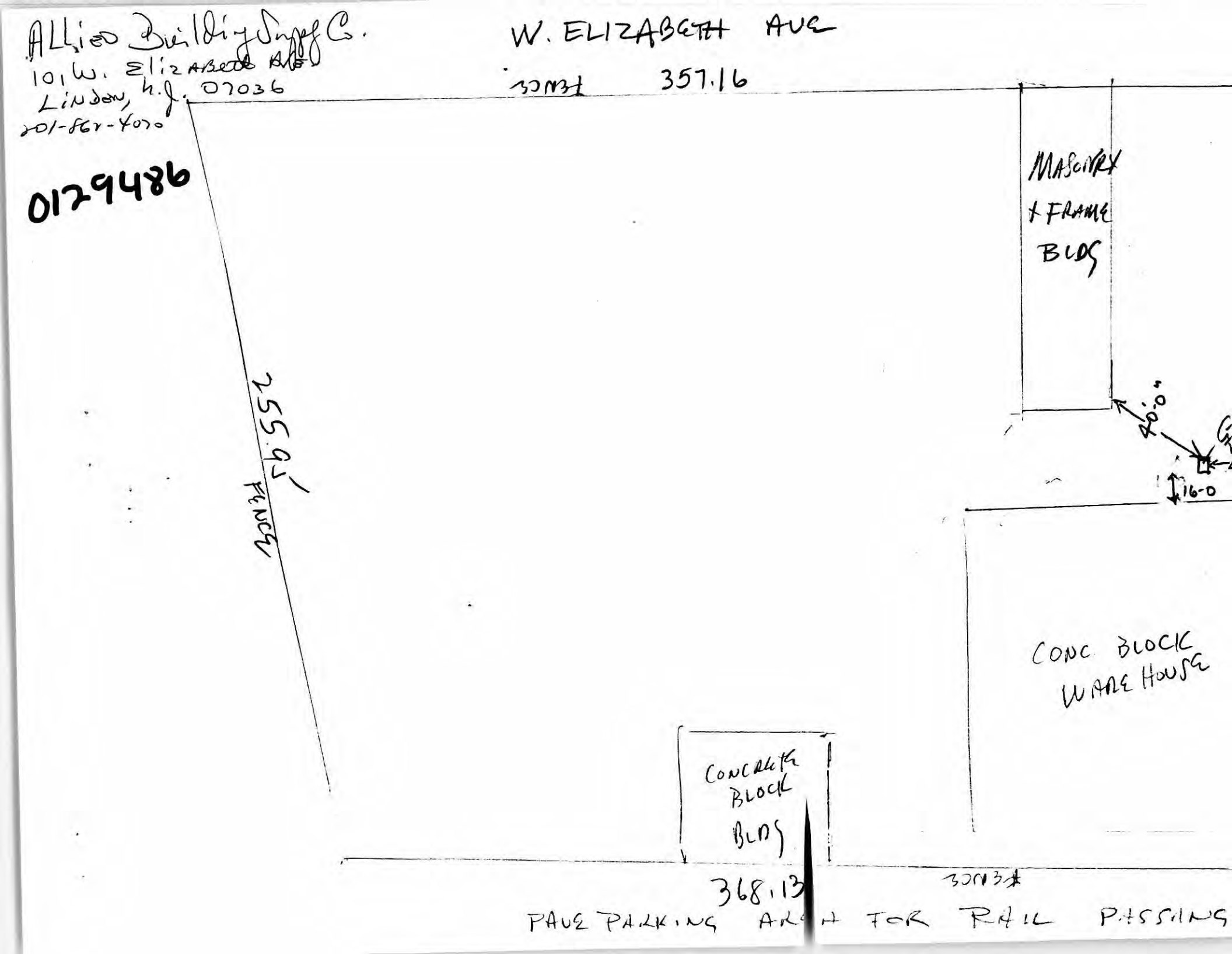

W. ELIZABETH AVE
30M±
357.16
MASONRY & FRAME BLDG
MACADAM PARKING
217.7
20.0
GAS STATION
40'
16-0
FENCE
CONC. BLOCK WARE HOUSE
CONCRETE BLOCK BLDG
30M±
368.13
PAVE PARKING AREA FOR RAIL PASSENGERS


W. ELIZABETH AVE
357.16
MASONRY
+ FRAME
BLDG
MACADAM
PARKING
40'-0"
GAS
TANK
40'
16-0
CONC BLOCK
WARE HOUSE
FENCE
CONCRETE
BLOCK
BLDG
368.13
PAVE PARKING AREA FOR PHIL PASSENGERS

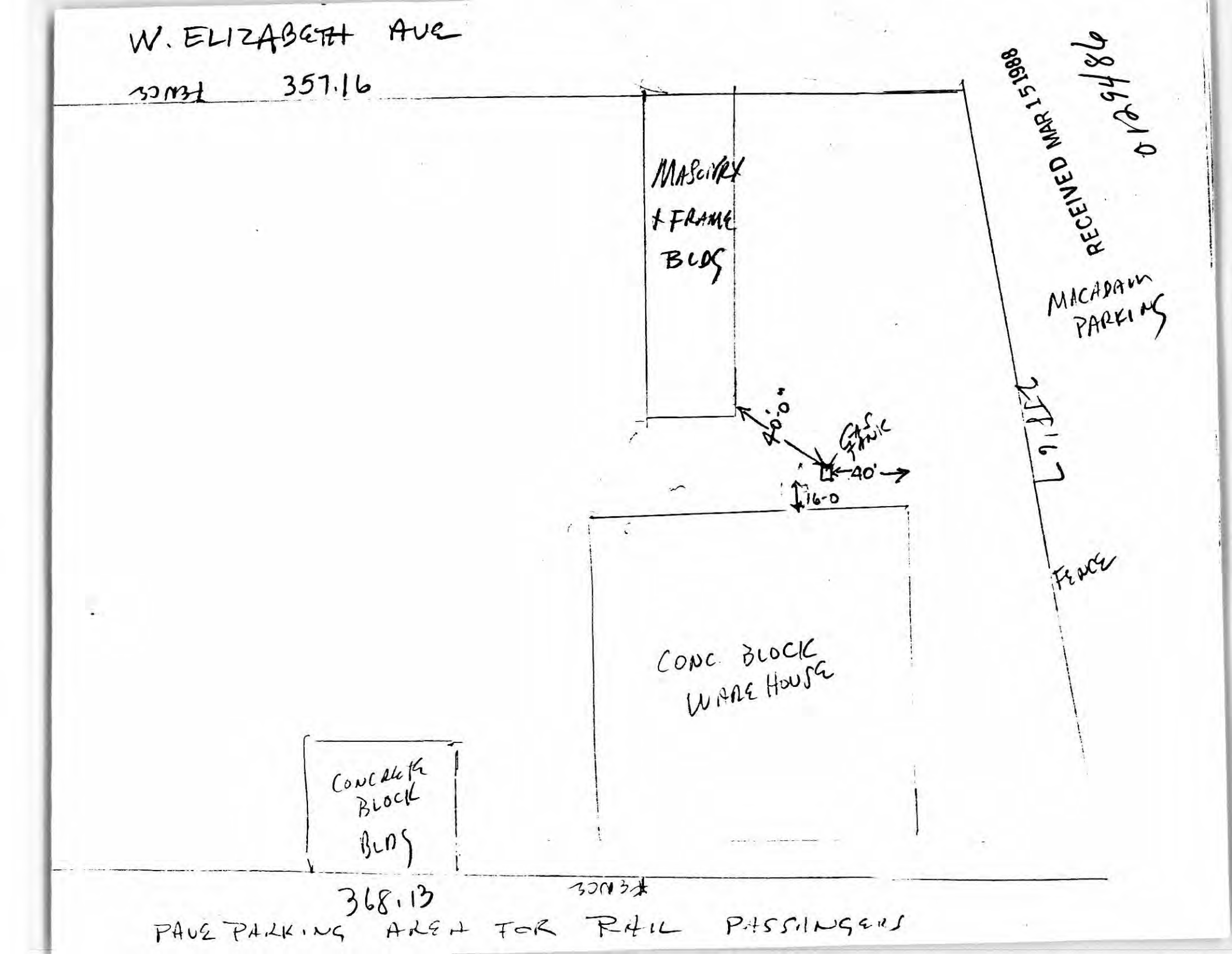
MACADAM
PARKING
219.67
HWY

ALLied Building Supply Co.
101 W. Elizabeth Ave
Linden, N.J. 07036
201-862-4070

0129486



Fence
Gate


W. ELIZABETH AVE
357.16
MASONRY & FRAME BLDG
RECEIVED MAR 15 1988
MACADAM PARKING
20'-0"
GAS TANK
40'
16-0
217.67
FENCE
CONC. BLOCK WARE HOUSE
CONCRETE BLOCK BLDG
368.13
PAVE PARKING AREA FOR RAIL PASSENGERS

RECEIVED MAR 15 1988

01/95/86

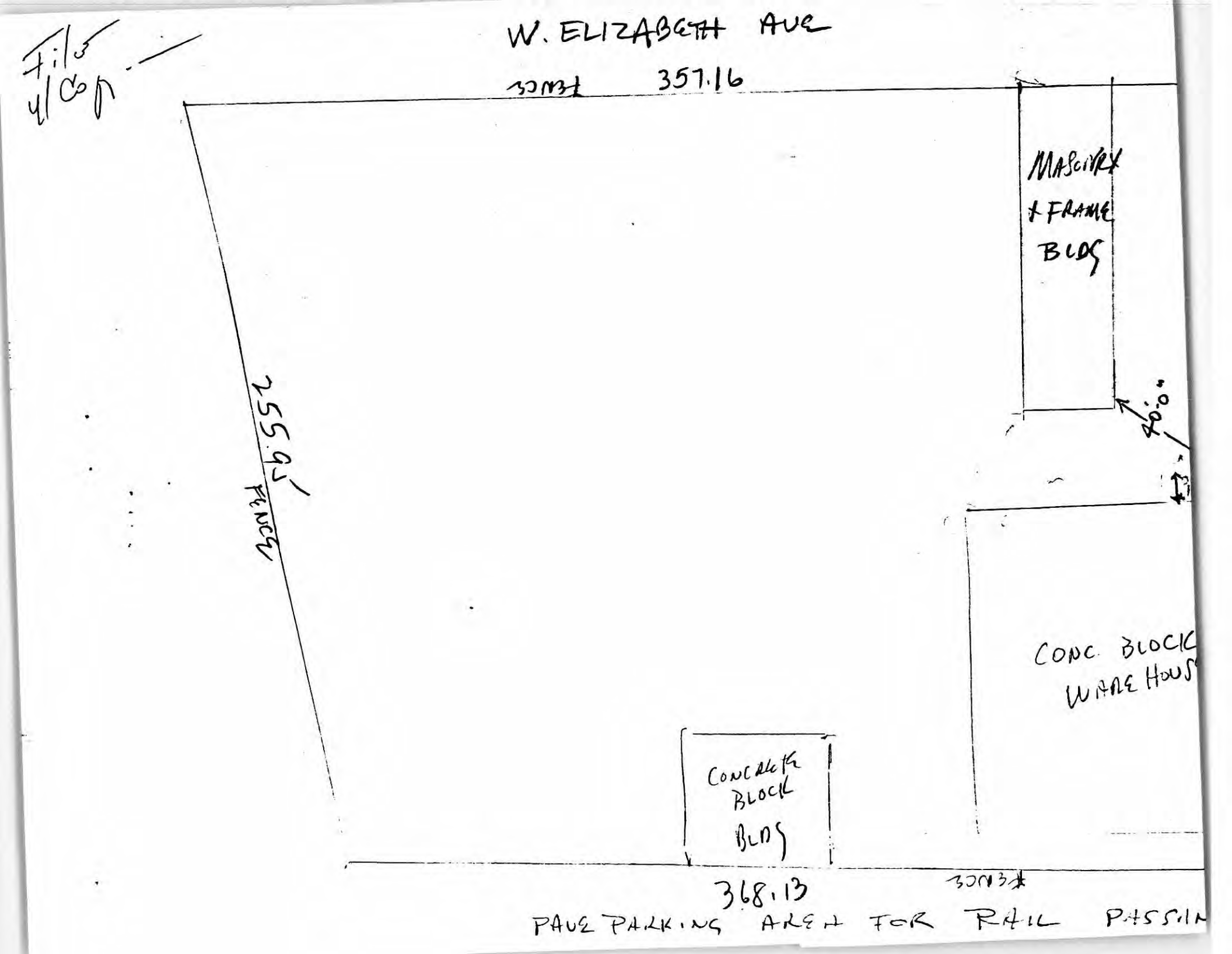
MACADAMS PARKING

91'8"

FENCE

40'

6-0


W. ELIZABETH AVE
30M±
357.16
MASONRY
+ FRAME
BLDG
20.0'
255.91'
PARCEL
CONC. BLOCK
WARE HOUSE
CONCRETE
BLOCK
BLDG
368.13
30M±
PAVE PARKING AREA FOR RAIL PASSEN

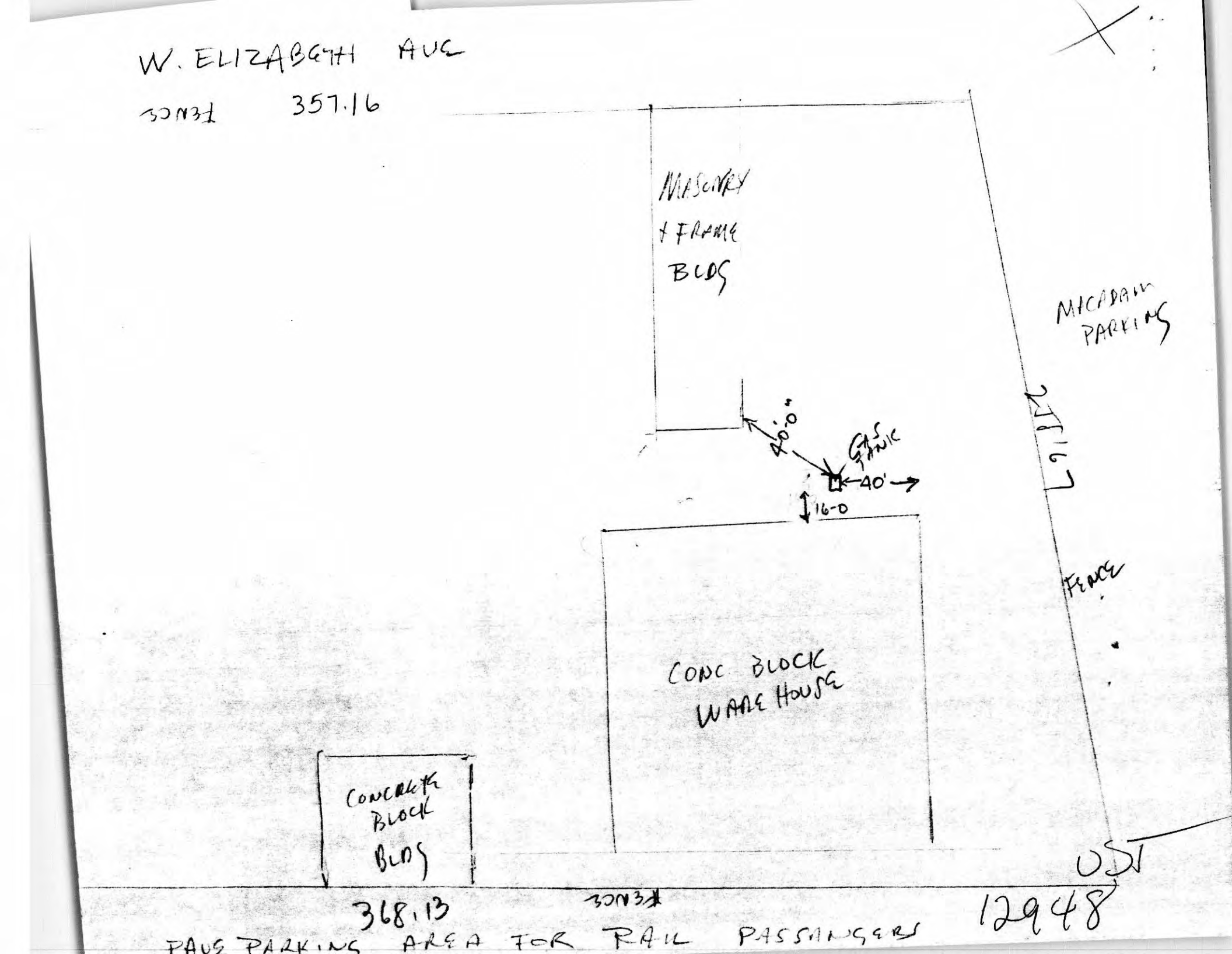
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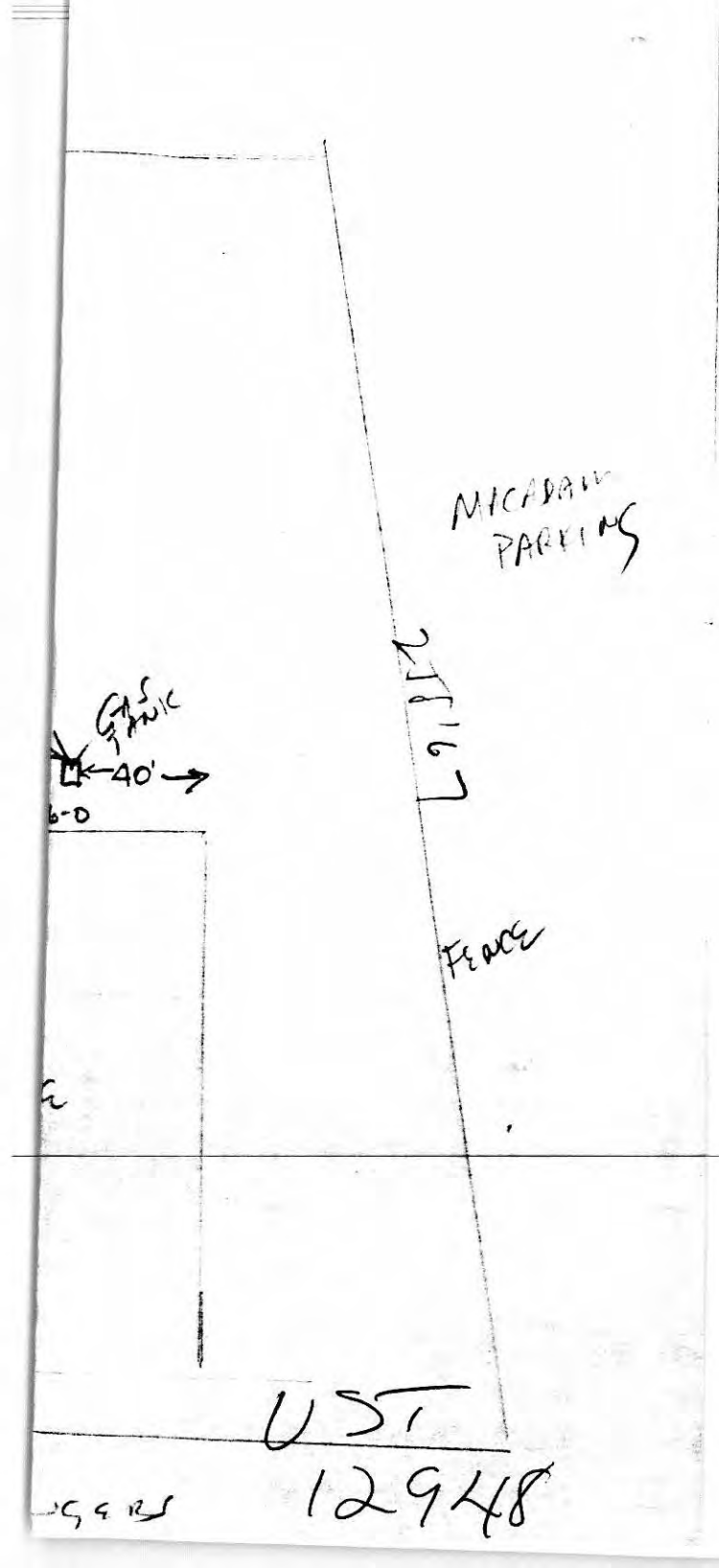
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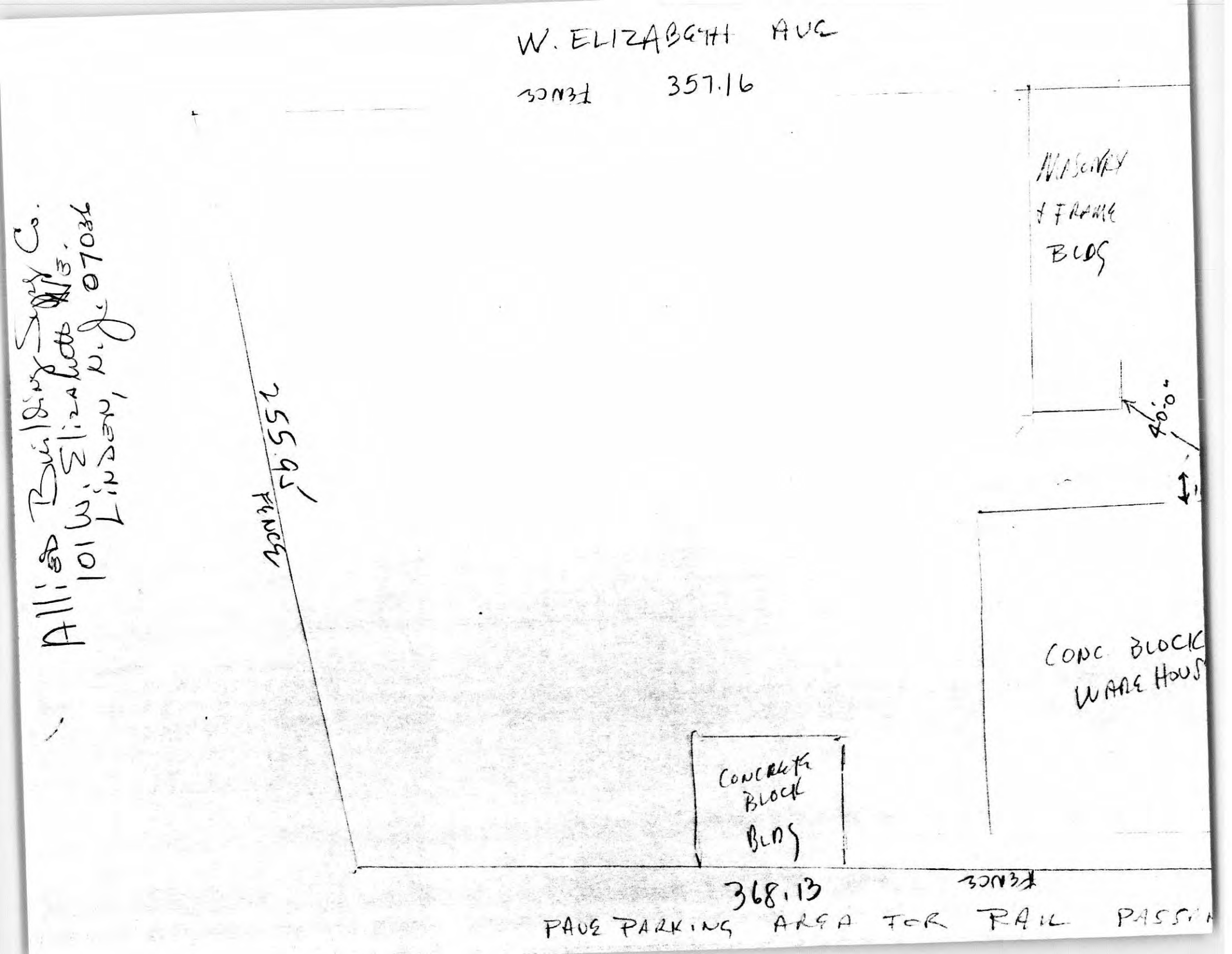
012948

Allied Building Supply Co.
101 W. Elizabeth Ave.
Linden, N.J. 07036

FENCE
155.95


W. ELIZABETH AVE
SOUTH
357.16
MASONRY
+ FRAME
BLDG
MICCOSUKEE
PARKING
40'-0"
GAS
TANK
40'
16-0
CONC BLOCK
WAREHOUSE
CONCRETE
BLOCK
BLDG
FENCE
SOUTH
368.13
SOUTH
PAVED PARKING AREA FOR RAIL PASSENGERS
UST
12948


MICADALE
PARKING
LOT
FENCE
40'
6-0
UST
12948


W. ELIZABETH AVE
30N3±
357.16
MASONRY & FRAME BLDG
40'-0"
CONC BLOCK WARE HOUS
CONCRETE BLOCK BLDG
30N3±
368.13
PAVE PARKING AREA FOR RAIL PASS
30N4±
255.92
Allied Building Supply Co.
101 W. Elizabeth Ave.
Linden, N. J. 07036

APPENDIX C:
Geophysical Survey Findings

Subsurface Environmental Technologies, LLC
230 Route 130 South
Bordentown, New Jersey
Phone: 609-730-0005
Fax: 609-730-1222

June 6, 2022
SET Proposal No: **22-095GD**

Mr. John Robinson
Dewberry
600 Parsippany Road
Parsippany, New Jersey

Subject: Geophysical Investigation Results
Alfred Building Products Site
101 Elizabeth Avenue
Linden, New Jersey

Dear Mr. Robinson,

Subsurface Environmental Technologies (SET) Geophysics Department presents this report to Dewberry of Parsippany, New Jersey describing the methods and results of a geophysical investigation conducted at the Alfred Building Products Site located at 101 Elizabeth Avenue in Linden, New Jersey. For this project, SET surveyed several locations where buried monitoring wells (MW) may be present, as defined by Dewberry in the field. The field activities for this investigation were completed by SET on Thursday April 14, 2022.

Objectives

The primary objective of this geophysical survey was to locate six (6) buried monitoring wells that were though to exist at the site. The geophysical data was analyzed closely for these targets. To meet the objective of the investigation, SET used the hand-held electromagnetic (HHEM), radiofrequency (RF), and ground-penetrating radar (GPR) methods.

Survey Grids

The HHEM, GPR and RF data were acquired in the scan mode over the discrete areas described above. Scans were collected in a radial pattern about each discrete location to provide optimal subsurface coverage. In the event that a buried utility or feature was detected, the boring location was moved to a location where no buried anomalies were observed. The positions of all detected pipelines and anomalies were marked on the ground with spray paint.

Geophysical Methods

<u>Hand-Held Electromagnetic Methods</u>

The hand-held electromagnetic method uses the principle of electromagnetic induction to detect shallowly-buried metal objects such as underground storage tanks (USTs), metal utility conduits,

reinforced concrete slabs, manhole covers, and miscellaneous metal debris. To complete this task, the operator carries the hand-held radio transmitter-receiver unit above the ground and continually scans the surface. A primary coil broadcasts a radio signal from the transmitter. This primary radio signal induces secondary electrical currents in metal objects. These secondary currents, in turn, produce a magnetic field which is detected by the receiver.

The HHEM instrument SET typically uses for shallow investigations is a Fisher TW-6 pipe and cable locator by Fischer, Inc. This instrument operates by generating both a unitless meter reading and an audible signal response when near a metal object. The peak instrument response usually occurs when the unit is directly over the object.

Ground Penetrating Radar (GPR) Method

The ground-penetrating radar (GPR) method was used to provide subsurface imaging information throughout the areas of investigation. The GPR method is based upon the transmission of repetitive, radio-frequency electromagnetic (EM) pulses into the subsurface. When the transmitted energy of down-going wave contacts an interface of dissimilar electrical character, part of the energy is returned to the surface in the form of a reflected signal. This reflected signal is detected by a receiving transducer and is displayed on the screen of the GPR unit as well as being recorded on the internal hard drive. The received GPR response remains constant as long as the electrical contrast between media is present and constant. Lateral or vertical changes in the electrical properties of the subsurface result in equivalent changes in the GPR responses. The system records a continuous image of the subsurface by plotting two-way travel time of the reflected EM pulse versus distance traveled along the ground surface. Two-way travel time values are then converted to depth using known soil velocity functions.

The GPR field procedures involved (1) instrument calibration, (2) test run completion, (3) production profile collection and recording, and (4) data storage for subsequent processing and analysis in the office. Each radar profile was examined for characteristic GPR signatures that may indicate the presence of buried targets. A Geophysical Survey System SIR System 2 and a 400 megahertz (MHz) antenna were used with a recording window of 60 nanoseconds (ns) to provide the required depth penetration and subsurface detail.

Radio-Frequency Method

The RadioDetection RD4000 multi-frequency utility locating system was used for this project. This instrument consists of a receiver/tracer and a remote transmitter, which operates at frequencies between 8 kHz and 200 kHz. The unit provides audio and visual feedback to the operator when a utility that is coupled with the transmitted signal is crossed. The transmitter produces a radio-frequency signal in the utility to be traced by either induction coupling or direct hookup. The receiver output provides measured field strength of the received signal and varies an audible pitch that is dependent upon the distance to the utility. By carefully adjusting the gain of the receiver, it is possible to determine the location of the utility and to separate it from possible adjacent utilities. In addition, the receiver can be used in 60 Hz passive mode to identify active electrical lines or lines that possess an induced current.

Results

SET has enclosed 2 figures with this report. Figure 1 is an annotated, geo-referenced orthophoto that shows the approximate locations of the six wells as placed by Dewberry, and Figure 2 shows site photographs of five of the well locations. The results of the geophysical survey are summarized below.

Buried Monitoring Wells

SET detected a few "spot" anomalies near the marked well locations where historic data indicated their presence. SET placed pink circles at those locations where the geophysical data provided responses that were consistent with a possible buried metal object roughly the size of a metal well cap. The site photos presented in Figures 2 and 3 show these locations for MW-1 through MW-5. No photograph of MW-6 was available, however SET did not detect any suspicious anomalies in that survey area. For those locations where no metal anomalies were detected, it may be that the metal well caps were removed during the parking lot construction. PVC wells are extremely difficult to detect.

Data Quality

The data quality for this project was good. The HHEM, RF, and GPR responses at the site were consistent and correlated well between profiles. The interpretations presented in this report are based on observed geophysical responses, visual observations, and historical information.

Closing

The geophysical data collection and interpretation methods used in this investigation are consistent with standard practices applied to similar geophysical investigations. The correlation of geophysical responses is based on the past results of similar surveys, although it is possible that some variation could exist at this site. Due to the nature of geophysical data, no guarantees have been made or inferred regarding the presence or absence of additional objects or targets beyond those identified or beyond the detection limits of the instrumentation used in this investigation.

If you have any questions, please contact me 609-480-9382. It was a pleasure working with you on this project, and look forward to conducting geophysical investigations for you in the future.

Sincerely,

Peter Miller

Peter T. Miller PhD, P.G.
Senior Geophysicist, SET

encl.: Figure 1: Annotated Geo-Referenced Orthophoto Showing MW Locations Placed by Dewberry, and Site Features
Figures 2-3: Annotated Site Photographs Showing MW Locations Placed by Dewberry, and Site Features



Alfred Building Products Site

101 Elizabeth Avenue
Linden, New Jersey

Legend:

⊙ MW Location defined by Dewberry

Notes:

(1) The primary objectives of this geophysical survey were to locate 6 buried wells. To meet the objectives of the investigation, SET used a SIR System 3000 Ground Penetrating Radar (GPR) unit with a 400 MHz antenna, a TW-6 hand-held electromagnetic (HHEM) instrument by Fisher, Inc., and a Radiofrequency (RF) device by Radiodetection, Inc. Their approximate locations were marked on the ground by Dewberry prior to the start of the geophysical investigation.

(2) SET detected a few "spot" anomalies near the marked well locations where historic data indicated their presence. SET placed pink circles at those locations where the geophysical data provided responses that were consistent with a possible buried metal object roughly the size of a metal well cap. The site photos presented in Figures 2 and 3 show these locations.

(3) The positions on this map should be considered approximate. They were not surveyed by a licenced surveyor.

(4) The items on this figure may not be all inclusive. SET does not warrant the fact that additional buried features may be present at this site.

SET GEOPHYSICS & DRILLING SERVICES

SUBSURFACE ENVIRONMENTAL TECH., LLC.
19 BROOKSIDE AVENUE
PENNINGTON, NJ 08534

PROJECT #:	22-095G
FIGURE DATE:	JUNE 21, 2021

ALFRED BUILDING PRODUCTS SITE
ANNOTATED GEO-REFERENCED ORTHOPHOTO
SHOWING MW LOCATIONS PLACED BY DEWBERRY,
AND SITE FEATURES

ADDRESS: 101 ELIZABETH AVENUE, LINDEN, NEW JERSEY
CLIENT: DEWBERRY
SUBSURFACE ENVIRONMENTAL TECHNOLOGIES, LLC.
DRAWN BY: P. MILLER, SENIOR GEOPHYSICIST

FIGURE 1

Alfred Building Products Site

101 Elizabeth Avenue
Linden, New Jersey

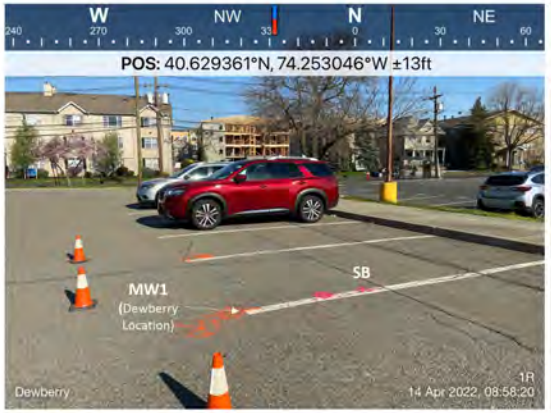


Photo 1: The photo shows the MW1 position placed by Dewberry, and a preferred boring location. SET did not detect MW1 in this area. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.



Photo 2: The photo shows the MW2 position placed by Dewberry, and an anomaly. The anomaly might be associated with buried MW2. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.



Photo 5: The photo shows the MW5 position placed by Dewberry. No anomalies were detected by SET in this area. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.



Photo 3: The photo shows the MW3 position placed by Dewberry, and 2 anomalies. Either anomaly might be associated with buried MW3. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.



Photo 4: The photo shows the MW4 position placed by Dewberry. No anomalies were detected by SET in this area. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.

Legend:

⊙ Anticipated MW Location

Notes:

(1) The primary objectives of this geophysical survey were to locate 6 buried wells. To meet the objectives of the investigation, SET used a SIR System 3000 Ground Penetrating Radar (GPR) unit with a 400 MHz antenna, a TW-6 hand-held electromagnetic (HHEM) instrument by Fisher, Inc., and a Radiofrequency (RF) device by Radiodetection, Inc. Their approximate locations were marked on the ground by Dewberry prior to the start of the geophysical investigation.

(2) SET detected a few "spot" anomalies near the marked well locations where historic data indicated their presence. SET placed pink circles at those locations where the geophysical data provided responses that were consistent with a possible buried metal object roughly the size of a metal well cap. The site photos presented in Figures 2 and 3 show these locations.

(3) The positions on this map should be considered approximate. They were not surveyed by a licenced surveyor.

(4) The items on this figure may not be all inclusive. SET does not warrant the fact that additional buried features may be present at this site.

SET GEOPHYSICS & DRILLING SERVICES		ALFRED BUILDING PRODUCTS SITE ANNOTATED SITE PHOTOGRAPHS SHOWING MW LOCATIONS PLACED BY DEWBERRY, ANOMALIES, AND SITE FEATURES	
SUBSURFACE ENVIRONMENTAL TECH., LLC. 19 BROOKSIDE AVENUE PENNINGTON, NJ 08534		ADDRESS: 101 ELIZABETH AVENUE, LINDEN, NEW JERSEY	
		CLIENT: DEWBERRY	FIGURE
PROJECT #:	22-095G	SUBSURFACE ENVIRONMENTAL TECHNOLOGIES, LLC.	2
FIGURE DATE:	JUNE 21, 2021	DRAWN BY: P. MILLER, SENIOR GEOPHYSICIST	

APPENDIX D:
Monitoring Well Information

New Jersey Department of Environmental Protection
Site Remediation Program

MONITORING WELL CERTIFICATION FORM A - AS-BUILT CERTIFICATION

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Allied Building Supply Co.

List all AKAs: NJ Transit Linden Station Lot 2

Street Address: 101 Elizabeth Avenue

Municipality: City of Linden (Township, Borough or City)

County: Union Zip Code: 07036

Program Interest (PI) Number(s): 012948 Case Tracking Number(s): 93-06-24-1425

SECTION B. WELL OWNER AND LOCATION

1. Name of Well Owner: NJ TRANSIT Corporation
2. Well Location (Street Address): 101 Elizabeth Avenue
3. Well Location (Municipal Block and Lot) Block# 254 Lot # 10

SECTION C. WELL LOCATION SPECIFICS

1. Well Permit Number (This number must be permanently affixed to the well casing):	E202203885
2. Site Well Number as shown on application or plans):	MW-1R
3. Well Completion Date:	4/14/2022
4. Distance from Top of Casing (cap off) to ground surface (nearest 0.01'):	0.69'
5. Total Depth of Well to the nearest ½ foot:	15
6. Depth to Top of Screen (or top of open hole) from top of casing (nearest 0.01'):	5.00
7. Screen Length (or length of open hole) in feet:	10
8. Screen or Slot Size:	10
9. Screen or Slot Material:	PVC
10. Casing Material (PVC, steel, or other – specify):	PVC
11. Casing Diameter (inches):	2
12. Static Water Level from top of casing at the time of installation (nearest 0.01'):	9.28
13. Yield (gallons per minute):	0.5
14. Development Techinque (specify):	Pump & Surge
15. Length of Time well is developed/pumped or bailed (hours and minutes):	1 hour 10 minutes

New Jersey Department of Environmental Protection
Site Remediation Program

Monitoring Well Certification Form B - Location Certification

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Allied Building Supply Co.

List all AKAs: NJ Transit Linden Station Lot 2

Street Address: 101 Elizabeth Avenue

Municipality: City of Linden (Township, Borough or City)

County: Union Zip Code: 07036

Program Interest (PI) Number(s): 012948 Case Tracking Number(s): 93-06-24-1425

SECTION B. WELL OWNER AND LOCATION

1. Name of Well Owner NJ Transit Corporation
2. Well Location (Street Address) 101 Elizabeth Avenue
3. Well Location (Municipal Block and Lot) Block# 254 Lot # 10

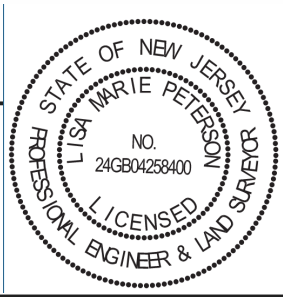
SECTION C. WELL LOCATION SPECIFICS

1. Well Permit Number (This number must be permanently affixed to the well casing): E202203885
2. Site Well Number (As shown on application or plans): MW-1R
3. Geographic Coordinate NAD 83 to nearest 1/100 of a second:
   Latitude: North 40 37 45.709 Longitude: West 74 15 11.071
4. New Jersey State Plane Coordinates NAD 83 datum, US survey feet units, to nearest foot:
   North 654269 East 560658
5. Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): 28.23'
   Elevation Top of Outer casing: 28.92' Elevation of ground: 28.92'
   Check one: ☒ NAVD 88 ☐ NGVD29 ☐ On Site Datum ☐ Other
6. Source of elevation datum (benchmark, number/description and elevation/datum). If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation (referencing NAVD 88).
   KeyNet GPS CORS station ROG2.
7. Significant observations and notes:

SECTION D. LAND SURVEYOR'S CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

SEAL



Professional Land Surveyor's Signature: Date

Surveyor's Name: Lisa M. Peterson License Number: 24GB04258400

Firm Name: Dewberry Engineers Inc. Certificate of Authorization #: 24GA28047600

Mailing Address 1015 Briggs Road Suite 210

City/Town: Mount Laurel State New Jersey Zip Code: 08054

Phone Number 856 780-3632 Ext.: N/A Fax: N/A

New Jersey State Department of Environmental Protection
Bureau of Water Allocation and Well Permitting
Mail Code 401-04Q PO BOX 420 Trenton, NJ 08625-0420 Tel: 609-984-6831

Well Permit Number
E202203885

MONITORING WELL RECORD

PROPERTY OWNER: NEW JERSEY TRANSIT CORPORATION

Company/Organization: NEW JERSEY TRANSIT CORPORATION

Address: One Penn Plaza East Newark, New Jersey 07105

WELL LOCATION: Dewberry/Linden/22-095GD

Address: 101 W Elizabeth Ave

County: Union Municipality: Linden City Lot: 10 Block: 254

Easting (X): 560661 Northing (Y): 654267
Coordinate System: NJ State Plane (NAD83) - USFEET

DATE WELL STARTED: April 14, 2022

DATE WELL COMPLETED: April 14, 2022

WELL USE: MONITORING

Other Use(s):

Local ID: MW-1R

WELL CONSTRUCTION

Total Depth Drilled (ft.): 15 Finished Well Depth (ft.): 15 Well Surface: Flush Mount

	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt/Rating/Screen # Used (lbs/ch no.)
Borehole	0	15	8		
Casing	0	5	2	PVC	Sch 40
Screen	5	15	2	PVC	10

	Depth to Top (ft.)	Depth to Bottom (ft.)	Outer Diameter (in.)	Inner Diameter (in)	Material		
					Bentonite (lbs.)	Neat Cement (lbs.)	Water (gal.)
Grout	0	3	8	2	5	94	8
Gravel Pack	3	15	8	2	#1 Sand		

Grouting Method: Pressure method (Tremie Pipe) Drilling Method: Hollow Stem Augers

ADDITIONAL INFORMATION

Protective Casing: Yes
Static Water Level: 10 ft. below land surface
Water Level Measure Tool: Tape
Well Development Period: 1 hrs.
Method of Development: Pump & Surge
Pump Type:

Pump Capacity: _ gpm
Total Design Head: _ ft.
Drilling Fluid:
Drill Rig: 6620
Health and Safety Plan Submitted? Yes

ATTACHMENTS:

GEOLOGIC LOG

0 - 15: Brown CL - Inorganic clays of low to medium plasticity, gravelly/sandy/silty/lean clays

ADDITIONAL INFORMATION:

Driller of Record: Dan Burgess, JOURNEYMAN LICENSE # 0023170 Company: SUBSURFACE ENVIRONMENTAL TECHNOLOGIES, LLC

APPENDIX E: Groundwater Sampling Field Data Sheets

Dewberry

GROUNDWATER SAMPLING FIELD DATA SHEET

Well number:	MW-1R				
Sample ID:		(if different from well no.)			
Client: NJTRANSIT Linden Station Lot 2	Job No. 50102686	Date:	4/28/22	Time:	13:20
Personnel: J. Robinson		Weather Conditions:	Clear, 52°F		

WELL DATA

Casing Diameter:	2"		Stainless Steel		Galv. Steel	X	PVC		Teflon		Other:
Intake Diameter:	2"		Stainless Steel		Galv. Steel	X	PVC		Teflon		Open rock

Well Depth:	Well Screen: [illegible]	Elevation:		
Depth To:		Static Water Level: 9.28	Bottom of Well: 15'	
Datum:	Top of Protective Casing	X Top of well Casing	Other:	
Is well clean to the bottom?	X Yes / No	Is the well in good condition	X Yes / No	
Volume of Water 5.72'	Standing in Well: 0.97 gal		To be purged: 3 gal	

PURGE DATA

METHOD:		Bailer, Size:		Bladder pump	x	2" Submersible Pump	4" Submersible pump
		Centrifugal Pump		Peristaltic Pump		Inertial Lift Pump	Other

Materials:	Pump/Bailer	X	Teflon	Tubing/Rope	Teflon
			Stainless Steel		Polyethylene
			PVC	X	Polypropylene
			Other:		Other:

Pumping Rate:	Elapsed Time:	Volume Pumped:
Was well pumped to dryness: Yes / X No		Number of Well Volumes Removed:

TIME SERIES DATA:					
	Well volumes:	0	1	2	3
	Temperature:	14.92	15.34	13.90	13.96
	pH:	8.60	7.55	7.58	7.60
	Specific Conductivity:	0.864	0.781	0.813	0.761
	Other: DO	6.68	10.30	2.86	5.65
	Other: ORP	17	5	-23	-31

PURGING EQUIPMENT:	Dedicated	X	Prepared Offsite		Field Cleaned

SAMPLING DATA:

METHOD:		X	Bailer, Size:	Bladder pump	2" Submersible Pump	4" Submersible
			Centrifugal Pump	Peristaltic Pump	Inertial Lift Pump	Other

Materials:	Pump/Bailer	X	Teflon	Tubing/Rope	Teflon
			Stainless Steel		Polyethylene
			PVC	X	Polypropylene
			Other:		Other:

PURGING EQUIPMENT:	Dedicated	x	Prepared Offsite	Field Cleaned
Metal Samples field filtered:	Yes		No	Method:
Appearance:	Clear		Turbid	Color / Contains LNAPL / Contains DNAPL
	Odor:		Yes	No / Other:

FIELD DETERMINATIONS OF RECORD:

PID Reading (ppm):							
No. of Containers	3	Field Blank	3	Trip Blank	3	Duplicate ID:	3

Remarks: SAMPLE TIME: 15:05
SAMPLE DTW: 9.39

Turbidity:	335	1000x	1000x	1000x
	clear	turbid/red	turbid/red	1000

5.2'

Dewberry

GROUNDWATER SAMPLING FIELD DATA SHEET

Well number: **MW-1R**

Sample ID: (if different from well no.)

Client: NJ Transit Linden Station Lot 2 | Job No. 50102686 | Date: 7/06/22 | Time: 10:30

Personnel: J. Robinson/J. Hammond | Weather Conditions: Clear, 75°F

WELL DATA

Casing Diameter:	2"		Stainless Steel		Galv. Steel	X	PVC		Teflon		Other:
Intake Diameter:	2"		Stainless Steel		Galv. Steel	X	PVC		Teflon		Open rock

Well Depth: | Well Screen: ~~15~~ 15' | Elevation:

Depth To: | Static Water Level: 9.80 | Bottom of Well: 15'

Datum: | Top of Protective Casing | X Top of well Casing | Other:

Is well clean to the bottom? X Yes | No | Is the well in good condition X Yes | No

Volume of Water Standing in Well: 0.88 gal | To be purged: 2.65

PURGE DATA

METHOD:		Bailer, Size:		Bladder pump	x	2" Submersible Pump		4" Submersible pump	
		Centrifugal Pump		Peristaltic Pump		Inertial Lift Pump		Other	

Materials:	Pump/Bailer	X	Teflon	Tubing/Rope	Teflon
			Stainless Steel		Polyethylene
			PVC	X	Polypropylene
			Other:		Other:

Pumping Rate: | Elapsed Time: | Volume Pumped:

Was well pumped to dryness: Yes | X No | Number of Well Volumes Removed:

TIME SERIES DATA:	Well volumes:		1	2	3
	Temperature:	23.22	21.37	20.56	19.79
	pH:	7.01	6.86	6.51	6.77
	Specific Conductivity:	1.20	1.06	1.05	1.04
	Other: DO	1.29	9.30	9.36	1.18
	Other: ORP	-17	-1	1	2

PURGING EQUIPMENT: | Dedicated | X Prepared Offsite | Field Cleaned

SAMPLING DATA:

METHOD:		X	Bailer, Size:		Bladder pump		2" Submersible Pump		4" Submersible
			Centrifugal Pump		Peristaltic Pump		Inertial Lift Pump		Other

Materials:	Pump/Bailer	X	Teflon	Tubing/Rope	Teflon
			Stainless Steel		Polyethylene
			PVC	X	Polypropylene
			Other:		Other:

PURGING EQUIPMENT: | Dedicated | x Prepared Offsite | Field Cleaned

Metal Samples field filtered: Yes | No | Method:

Appearance: Clear | X Turbid | Color red | Contains LNAPL No | Contains DNAPL

Odor: Yes | No | Other:

FIELD DETERMINATIONS OF RECORD:

PID Reading (ppm):

No. of Containers 12 | Field Blank FB-7-6-22 | Trip Blank TB | Duplicate ID: DUP-7-6-22

Remarks: | SAMPLE TIME: 11:15

SAMPLE DTW:

Turbidity: 643 585 444 163

APPENDIX F:
Laboratory Analytical Data Report

Hampton-Clarke
Analytical & Field Services

175 US Highway 46, STE D · Fairfield, NJ 07004-2327
2 Madison Road, Fairfield, NJ 07004-2327
800-426-9992 · 973-244-9770
FAX: 973-244-9787
WWW.HCVLAB.COM

Project: NJT Linden Station #2

Client PO: 50102665

Report To: Dewberry
600 Parsippany Road
Parsippany, NJ 07054
Attn: John Robinson

Received Date: 4/14/2022

Report Date: 5/24/2022

Deliverables: NJDEP-R

Lab ID: AD30164

Lab Project No: 2041509

This report is a true report of results obtained from our tests of this material. The report relates only to those samples received and analyzed by the laboratory. All results meet the requirements of the NELAC Institute standards. Laboratory reports may not be reproduced, except in full, without the written approval of the laboratory.

In lieu of a formal contract document, the total aggregate liability of Hampton-Clarke to all parties shall not exceed Hampton-Clarke's total fee for analytical services rendered.

Sean Berls - Quality Assurance Officer OR **Jean Revolus - Laboratory Director**

NJ (07071) NY (ELAP11408) CT (PH-0671)
PA (68-00463) KY (90124)

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- Form 3 Spike Recovery
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- Form 5 Tune Summary & BFB Spectra
- Form 6,7 Calibration & RT Summary
- Form 8 Internal Standard Area Summary

Sample Summary

Client: Dewberry

Project: NJT Linden Station #2

HC Project #: 2041509

Lab#	SampleID	Matrix	Collection Date	Receipt Date
AD30164-001	TWP-1	Aqueous	4/14/2022	4/14/2022
AD30164-002	TWP-2	Aqueous	4/14/2022	4/14/2022
AD30164-003	TWP-3	Aqueous	4/14/2022	4/14/2022
AD30164-004	TWP-4	Aqueous	4/14/2022	4/14/2022
AD30164-005	DUP-4-14-22	Aqueous	4/14/2022	4/14/2022
AD30164-006	FB-4-14-22	Aqueous	4/14/2022	4/14/2022
AD30164-007	TRIP BLANK	Aqueous	4/13/2022	4/14/2022

Data of Known Quality Conformance/Non-Conformance Summary Questionnaire

Laboratory Name: Hampton-Clarke

Client: Dewberry

Project Location: Linden, NJ

Project Number: 2041509

Laboratory Sample ID(s): AD30164

Sampling Date(s): 4/14/22

List DKQP Methods Used: 8260D, 524.2, 8270E, 8081B, 8082A, NJEPH, 6010D, 6020B, 9012B, 7196A

1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of KnownQuality performance standards?	Yes No
1A	Were the method specified handling, preservation, and holding time requirements met?	Yes No
1B	*EPH Method:* Was the EPH method conducted without significant modifications?	Yes No
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes No
3	Were samples received at an appropriate temperature (4±2°C)?	Yes No N/A
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	Yes No
5	a) Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt? b) Were these reporting limits met?	Yes No Yes No N/A
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	Yes No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	Yes No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality".

QC Review

HC Case Narrative

Client: Dewberry **HC Project:** 2041509
Project: NJT linden Station #2

This case narrative is in the form of an exception report. Method specific and/or QA/QC anomalies related to this report only are detailed below.

Volatile Organic Analysis:

The Method Blank Spike for batch 101380 had recoveries outside QC laboratory and DKQP limits. Please refer to the applicable Form 3 for the recoveries. Please refer to Form 4 to see which samples are associated with the Method Blank Spike.

The Matrix Spike and/or Matrix Spike Duplicate for batch 101380 had recoveries outside QC laboratory and DKQP limits. Please refer to the applicable Form 3 for the recoveries.

2-Chloroethylvinylether did not recover in the Matrix Spike and/or Matrix Spike Duplicate in batch 101380 due to acid preservation of sample. 2-Chloroethylvinylether readily decomposes under acidic conditions. The recovery of 2-Chloroethylvinylether is within QC limits in the Laboratory Control Sample. Please refer to the applicable Form 3 for the recoveries.

Sean Berls
Quality Assurance Officer

Or

Jean Revolus
Laboratory Director

5/24/2022
Date

HC Executive Summary

Client: Dewberry

HC Project #: 2041509

Project: NJT Linden Station #2

NO RESULTS FOUND

HC Report of Analysis

Client: Dewberry
HC Project #: 2041509
Project: NJT Linden Station #2

Sample ID: TWP-1
Lab#: AD30164-001
Matrix: Aqueous
Collection Date: 4/14/2022
Receipt Date: 4/14/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

Sample ID: TWP-2
Lab#: AD30164-002
Matrix: Aqueous

Collection Date: 4/14/2022
Receipt Date: 4/14/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

Sample ID: TWP-3 **Collection Date:** 4/14/2022
Lab#: AD30164-003 **Receipt Date:** 4/14/2022
Matrix: Aqueous

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

Sample ID: TWP-4
Lab#: AD30164-004
Matrix: Aqueous
Collection Date: 4/14/2022
Receipt Date: 4/14/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

Sample ID: DUP-4-14-22 **Collection Date:** 4/14/2022
Lab#: AD30164-005 **Receipt Date:** 4/14/2022
Matrix: Aqueous

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

Sample ID: FB-4-14-22
Lab#: AD30164-006
Matrix: Aqueous

Collection Date: 4/14/2022
Receipt Date: 4/14/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

Sample ID: TRIP BLANK
Lab#: AD30164-007
Matrix: Aqueous

Collection Date: 4/13/2022
Receipt Date: 4/14/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

HC Reporting Limit Definitions/Data Qualifiers

REPORTING DEFINITIONS

DF = Dilution Factor

DUP = Duplicate

LCS = Laboratory Control Spike

MBS = Method Blank Spike

MDL = Method Detection Limit

MR = Matrix Replicate

MS = Matrix Spike

MSD = Matrix Spike Duplicate

NA = Not Applicable

ND = Not Detected

PS = Post Digestion Spike

RL* = Reporting Limit

RT = Retention Time

SD = Serial Dilution

**Samples with elevated Reporting Limits (RLs) as a result of a dilution may not achieve client reporting limits in some cases. The elevated RLs are unavoidable consequences of sample dilution required to quantitate target analytes that exceed the calibration range of the instrument.*

DATA QUALIFIERS

A- Indicates that the Tentatively Identified Compound (TIC) is suspected to be an aldol-condensation product. These compounds are by-products of acetone and methylene chloride used in the extraction process.

B- Indicates analyte was present in the Method Blank and sample.

d- For Pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentration is generally reported.

E- Indicates the concentration exceeded the upper calibration range of the instrument.

J- Indicates the value is estimated because it is either a Tentatively Identified Compound (TIC) or the reported concentration is greater than the MDL but less than the RL. For samples results between the MDL and RL there is a possibility of false positives or misidentification at the quantitation levels. Additionally, the acceptance criteria for QC samples may not be met.

R- Retention Time is out.

Y- Indicates a contaminant found in the blank at less than 10% of the concentration of a contaminant found in the sample.

Laboratory Chronicle

Client: Dewberry
Project: NJT Linden Station #2

HC Project #: 2041509

Lab#: AD30164-001 **Sample ID: TWP-1**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	4/20/22 02:46	JM

Lab#: AD30164-002 **Sample ID: TWP-2**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	4/20/22 03:05	JM

Lab#: AD30164-003 **Sample ID: TWP-3**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	4/20/22 03:23	JM

Lab#: AD30164-004 **Sample ID: TWP-4**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	4/20/22 03:41	JM

Lab#: AD30164-005 **Sample ID: DUP-4-14-22**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	4/20/22 04:00	JM

Lab#: AD30164-006 **Sample ID: FB-4-14-22**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	4/19/22 15:48	JM

Laboratory Chronicle

Client: Dewberry

HC Project #: 2041509

Project: NJT Linden Station #2

Lab#: AD30164-007 **Sample ID: TRIP BLANK**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	4/19/22 16:06	JM

Chain of Custody

2041509 0016

Hampton-Clarke, Inc. (WBE/DBE/SBE)

175 Route 46 West and 2 Madison Road, Fairfield, New Jersey 07004
Ph: 800-426-9992 | 973-244-9770 Fax: 973-244-9787 | 973-439-1458
Service Center: 137-D Gaither Drive, Mount Laurel, New Jersey 08054
Ph (Service Center): 856-780-6057 Fax: 856-780-6056
NELAC/NJ #07071 | PA #68-00463 | NY #11408 | CT #PH-0671 | KY #90124 | DE HSCA Approved

Hampton-Clarke
WBE/DBE/SBE 800-426-9992
A Women-Owned, Disadvantaged, Small Business Enterprise

CHAIN OF CUSTODY RECORD

Project# (Lab Use Only): 2041509

Page _____ of _____

3) Reporting Requirements (Please Circle)

Turnaround	Report Type	Electronic Data Deliv.
When Available:	Summary	NJ Hazsite
1 Business Day (100%) *	Results + QC (Waste)	Excel Reg. NJ / NY / PA
2 Business Days (75%) *	Reduced:	EnviroData
3 Business Days (50%) *	[X] NJ [ ] NY	EQuIS:
4 Business Days (35%) *	[ ] PA [ ] Other___	[ ] 4-File [ ] EZ
5 Business Days (25%)	NJ Full / NY ASP CatB	[ ] NYDEC
6 Business Days (Stand.)	NY ASP CatA	[ ] Region 2 or 5
Other: _____	LSRP	Other: LSRP

* Expedited TAT Not Always Available. Please Check with Lab.

Customer Information

1a) Customer: Dewberry Engineers Inc
Address: 600 Parsippany Rd #301, Parsippany, NJ
1b) Email/Cell/Fax/Ph: jrobinson@dewberry.com
1c) Send Invoice to: John Robinson
1d) Send Report to: John Robinson

Project Information

2a) Project: Allied Building Supplies Inc. NJ Transit Linden Station #2
2b) Project Mgr: John Robinson
2c) Project Location (City/State): Linden, NJ
2d) Quote/PO # (If Applicable):

FOR LAB USE ONLY ↓

Batch # AD30164

===> Check If Contingent ===>

Matrix Codes
DW - Drinking Water S - Soil A - Air
GW - Ground Water SL - Sludge
WW - Waste Water OL - Oil
OT - Other (please specify under item 9, Comments)

7) Analysis *(specify methods & parameter lists)*

<=== Check If Contingent <===

Lab Sample #	4) Customer Sample ID	5) Matrix	6) Sample Date	6) Sample Time	Sample Type: Composite (C)	Sample Type: Grab (G)	BTEX	8) # of Bottles: None	MeOH	En Core	NaOH	HCl	H2SO4	HNO3	Other:	9) Comments
001	TWP-1	GW	4/14/22	15:20		G	X					3				
002	TWP-2	GW		13:55		G	X					3				
003	TWP-3	GW		15:05		G	X					3				
004	TWP-4	GW		14:20		G	X					3				
005	DUP-4-14-22	GW		—		G	X					3				
006	FB-4-14-22	W		13:50		G	X					3				
007	Trip Blank	W	4/13/22	—		-	X					3				

10) Relinquished by:	Accepted by:	Date	Time
		4/14/22	1810

11) Sampler (print name): John Robinson Date: 4/14/22

Additional Notes
DKQP LSRP

Comments, Notes, Special Requirements, HAZARDS

Indicate if low-level methods required to meet current groundwater standards (SPLP for soil):
- [ ] BN or BNA (8270E SIM)
- [ ] VOC (8260D SIM or 8011)
- [ ] SPLP (BN, BNA, Metals)
- [ ] 1,4 Dioxane

Check if applicable:
- [ ] Project-Specific Reporting Limits
- [ ] High Contaminant Concentrations
- [X] NJ LSRP Project (also check boxes above/right)

For NJ LSRP projects, indicate which standards need to be met:
- [X] NJDEP GWQS
- [ ] NJDEP SRS
- [X] NJDEP SPLP
- [ ] Other (specify):

Cooler Temperature: 3.0

Please note NUMBERED items. If not completed your analytical work may be delayed.
A fee of $5/sample will be assessed for storage should sample not be activated for any analysis.

Internal use: sampling plan (check box) HC [ ] or client [ ] FSP#

PROJECT MODIFICATIONS

Client: DEWBERRY **HC Project #:** 2041509

Project: NJT Linden Station #2

---

mkennedy192.168.1.162
5/20/2022 5:50:39 PM

Per John Robinson via email, PO# is 50102665.
MK 05/20/22

CONDITION UPON RECEIPT

Batch Number AD30164 Entered By: srobles

Date Entered 4/15/2022 11:09:00 AM

1	Yes	Is there a corresponding COC included with the samples?
2	Yes	Are the samples in a container such as a cooler or Ice chest?
3	No	Are the COC seals intact?
4	T0054	<--- Thermometer ID. Please specify the Temperature inside the container (in degC). 3.1
5	Yes	Are the samples refrigerated (where required)/have they arrived on ice?
6	Yes	Are the samples within the holding times for the parameters listed on the COC? IF no, list parameters and samples:
7	Yes	Are all of the sample bottles intact? If no, specify sample numbers broken/leaking
8	Yes	Are all of the sample labels or numbers legible? If no specify:
9	Yes	Do the contents match the COC? If no, specify
10	Yes	Is there enough sample sent for the analyses listed on the COC? If no, specify:
11	Yes	Are samples preserved correctly?
12	Yes	Was temperature blank present (Place comment below if not)? If not was temperature of samples verified?
13	NA	Other comments ...Specify (TB date, sample matrix, any missing info, etc.) TB DATE:4/13/22
14	NA	Corrective actions (Specify item number and corrective action taken).
15	NA	Were any samples for ortho-phosphate or dissolved ferrous iron field filtered?

PRESERVATION DOCUMENT

Batch Number AD30164 Entered By: srobles

Date Entered 4/15/2022 11:13:00 AM

Lab#	Container Size	Container/Vial Check	Parameter	Preservative	Preservative Lot#	PH	pH Lot#
AD30164-001	40ML	G	VO	HCL	253057	1	HC155968
AD30164-002	40ML	G	VO	HCL	253057	1	HC155968
AD30164-003	40ML	G	VO	HCL	253057	1	HC155968
AD30164-004	40ML	G	VO	HCL	253057	1	HC155968
AD30164-005	40ML	G	VO	HCL	253057	1	HC155968
AD30164-006	40ML	G	VO	HCL	253057	1	HC155968
AD30164-007	40ML	G	VO	HCL	253057	1	HC155968

Internal Chain of Custody

Lab#:	DateTime:	Loc or User	Bot Nu	A/M	Analysis
AD30164-001	04/14/22 18:10	SROB	0	M	Received
AD30164-001	04/15/22 11:06	SROB	0	M	Login
AD30164-001	04/16/22 09:14	R31	1	A	NONE
AD30164-001	04/16/22 09:14	R31	2	A	NONE
AD30164-001	04/18/22 11:58	JM	2	A	VOA
AD30164-001	04/19/22 10:20	JM	2	A	VOA
AD30164-001	04/19/22 10:20	R31	2	A	NONE
AD30164-001	04/16/22 09:14	R31	3	A	NONE
AD30164-002	04/14/22 18:10	SROB	0	M	Received
AD30164-002	04/15/22 11:06	SROB	0	M	Login
AD30164-002	04/16/22 09:14	R31	1	A	NONE
AD30164-002	04/16/22 09:14	R31	2	A	NONE
AD30164-002	04/18/22 11:58	JM	2	A	VOA
AD30164-002	04/19/22 10:20	JM	2	A	VOA
AD30164-002	04/19/22 10:20	R31	2	A	NONE
AD30164-002	04/16/22 09:14	R31	3	A	NONE
AD30164-003	04/14/22 18:10	SROB	0	M	Received
AD30164-003	04/15/22 11:06	SROB	0	M	Login
AD30164-003	04/16/22 09:14	R31	1	A	NONE
AD30164-003	04/16/22 09:14	R31	2	A	NONE
AD30164-003	04/18/22 11:58	JM	2	A	VOA
AD30164-003	04/19/22 10:20	JM	2	A	VOA
AD30164-003	04/19/22 10:20	R31	2	A	NONE
AD30164-003	04/16/22 09:14	R31	3	A	NONE
AD30164-004	04/14/22 18:10	SROB	0	M	Received
AD30164-004	04/15/22 11:06	SROB	0	M	Login
AD30164-004	04/16/22 09:14	R31	1	A	NONE
AD30164-004	04/16/22 09:14	R31	2	A	NONE
AD30164-004	04/18/22 11:58	JM	2	A	VOA
AD30164-004	04/19/22 10:20	JM	2	A	VOA
AD30164-004	04/19/22 10:20	R31	2	A	NONE
AD30164-004	04/16/22 09:14	R31	3	A	NONE
AD30164-005	04/14/22 18:10	SROB	0	M	Received
AD30164-005	04/15/22 11:06	SROB	0	M	Login
AD30164-005	04/16/22 09:14	R31	1	A	NONE
AD30164-005	04/16/22 09:14	R31	2	A	NONE
AD30164-005	04/18/22 11:58	JM	2	A	VOA
AD30164-005	04/19/22 10:20	JM	2	A	VOA
AD30164-005	04/19/22 10:20	R31	2	A	NONE
AD30164-005	04/16/22 09:14	R31	3	A	NONE
AD30164-006	04/14/22 18:10	SROB	0	M	Received
AD30164-006	04/15/22 11:06	SROB	0	M	Login
AD30164-006	04/16/22 09:14	R31	1	A	NONE
AD30164-006	04/16/22 09:14	R31	2	A	NONE
AD30164-006	04/18/22 11:58	JM	2	A	VOA
AD30164-006	04/19/22 10:20	JM	2	A	VOA
AD30164-006	04/19/22 10:20	R31	2	A	NONE
AD30164-006	04/16/22 09:14	R31	3	A	NONE
AD30164-007	04/14/22 18:10	SROB	0	M	Received
AD30164-007	04/15/22 11:06	SROB	0	M	Login
AD30164-007	04/16/22 09:14	R31	1	A	NONE
AD30164-007	04/16/22 09:14	R31	2	A	NONE
AD30164-007	04/18/22 11:58	JM	2	A	VOA
AD30164-007	04/19/22 10:20	JM	2	A	VOA
AD30164-007	04/19/22 10:20	R31	2	A	NONE
AD30164-007	04/16/22 09:14	R31	3	A	NONE

Lab#:	DateTime:	Loc or User	Bot Nu	A/M	Analysis

Samples marked as received are stored in coolers or refrigerator R12, or R24 at 4 deg C until Login

Volatile Data

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD30164-001
Client Id: TWP-1
Data File: 8M557716.D
Analysis Date: 04/20/22 02:46
Date Rec/Extracted: 04/14/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U	1330-20-7	Xylenes (Total)	1.0	U

Worksheet #: 636559

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used

Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

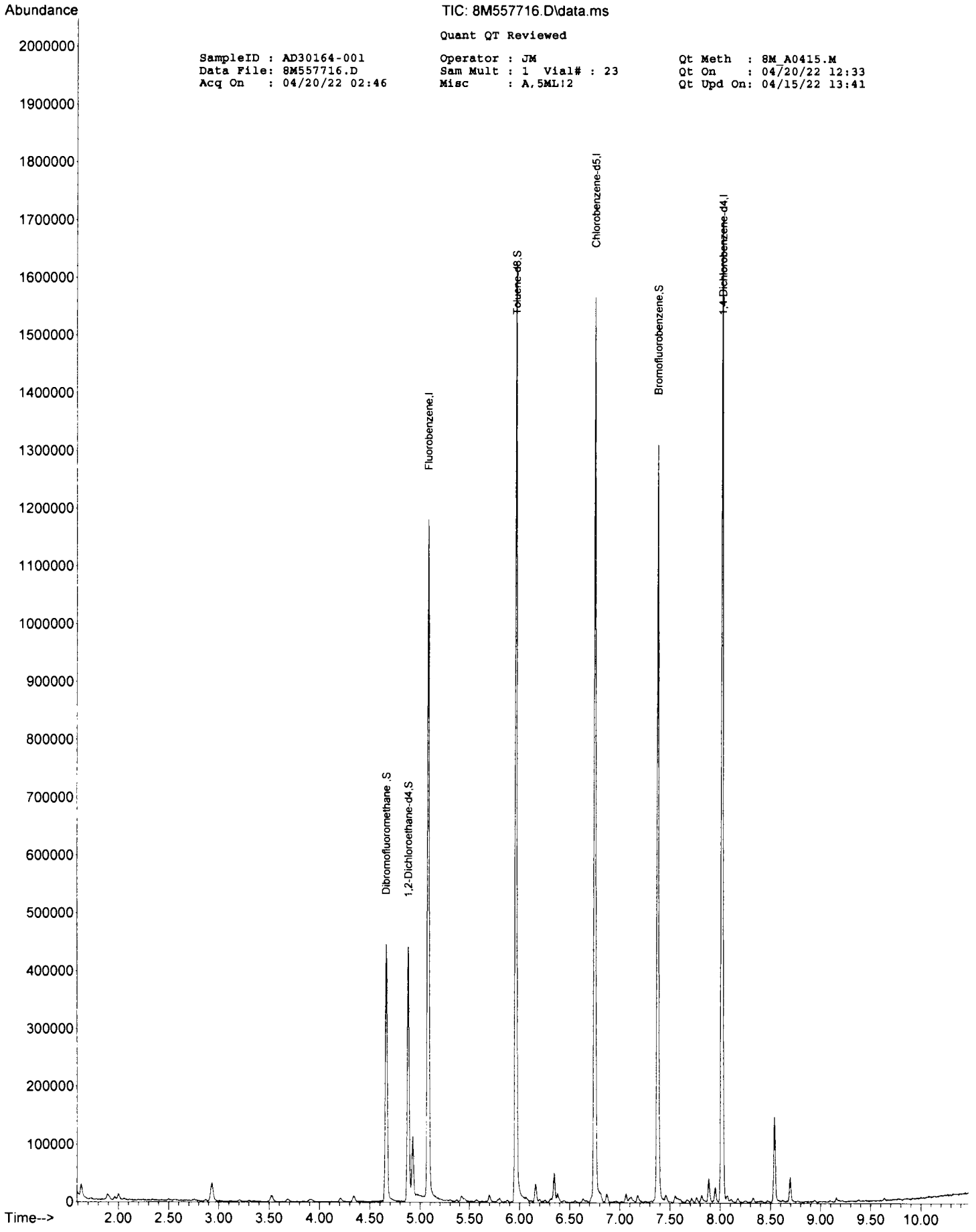
Quantitation Report (QT Reviewed)

SampleID : AD30164-001 Operator : JM Qt Meth : 8M_A0415.M
Data File: 8M557716.D Sam Mult : 1 Vial# : 23 Qt On : 04/20/22 12:33
Acq On : 04/20/22 02:46 Misc : A,5ML!2 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-1922\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	712290	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.751	117	635842	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.018	152	342110	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	189395	28.92	ug/l	0.00
Spiked Amount 30.000			Recovery = 96.40%			
39) 1,2-Dichloroethane-d4	4.883	67	101901	29.25	ug/l	0.00
Spiked Amount 30.000			Recovery = 97.50%			
66) Toluene-d8	5.963	98	726110	30.47	ug/l	0.00
Spiked Amount 30.000			Recovery = 101.57%			
76) Bromofluorobenzene	7.378	174	275583	30.09	ug/l	0.00
Spiked Amount 30.000			Recovery = 100.30%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M557716.D\data.ms
Quant QT Reviewed
SampleID : AD30164-001
Data File: 8M557716.D
Acq On : 04/20/22 02:46
Operator : JM
Sam Mult : 1 Vial# : 23
Misc : A,5ML;2
Qt Meth : 8M_A0415.M
Qt On : 04/20/22 12:33
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD30164-002
Client Id: TWP-2
Data File: 8M557717.D
Analysis Date: 04/20/22 03:05
Date Rec/Extracted: 04/14/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U	1330-20-7	Xylenes (Total)	1.0	U

Worksheet #: 636559

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used

Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

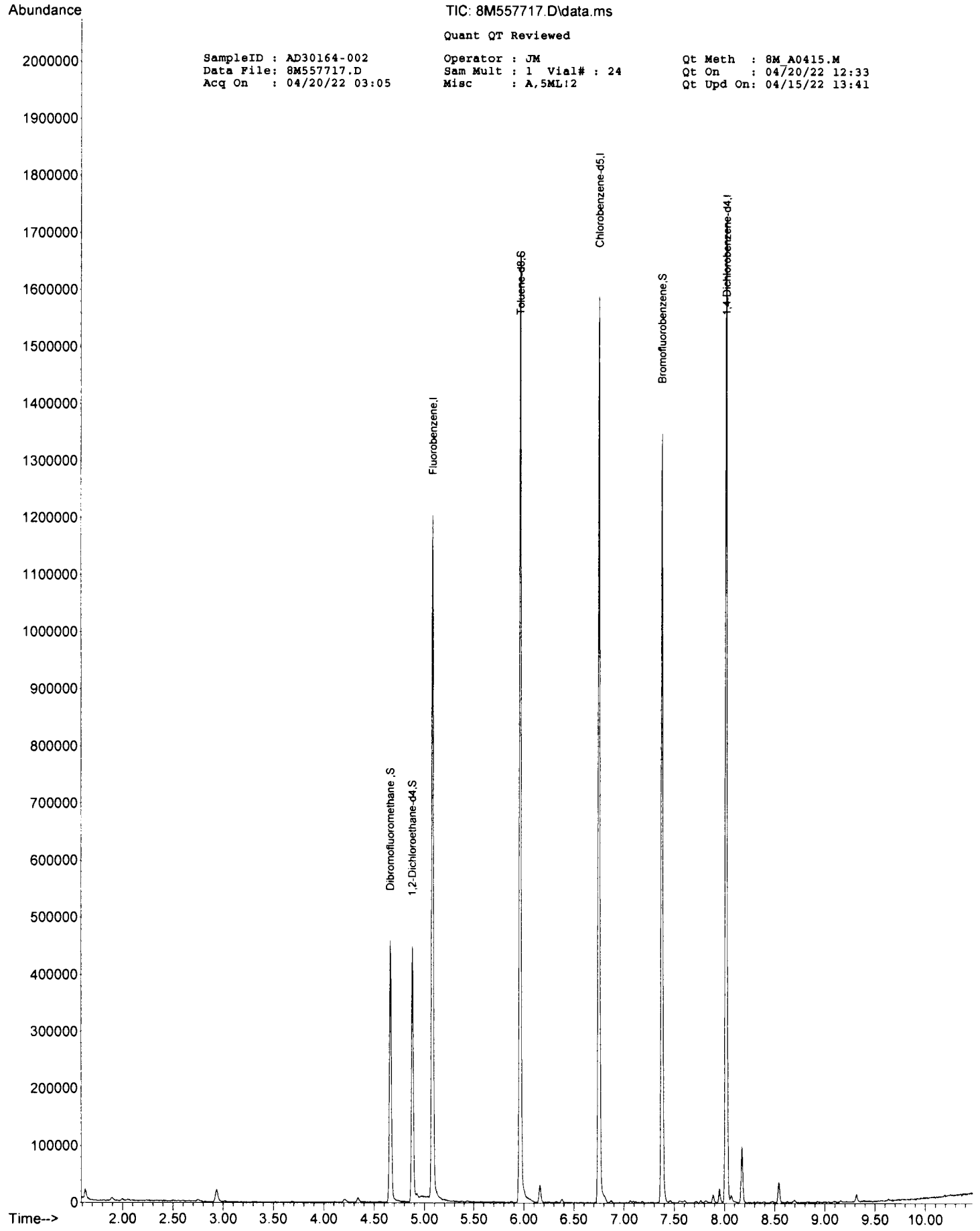
Quantitation Report (QT Reviewed)

SampleID : AD30164-002 Operator : JM Qt Meth : 8M_A0415.M
Data File: 8M557717.D Sam Mult : 1 Vial# : 24 Qt On : 04/20/22 12:33
Acq On : 04/20/22 03:05 Misc : A,5ML!2 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-1922\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.082	96	719018	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.751	117	653058	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.018	152	352787	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	194116	29.37	ug/l	0.00
Spiked Amount 30.000			Recovery = 97.90%			
39) 1,2-Dichloroethane-d4	4.880	67	106308	30.23	ug/l	0.00
Spiked Amount 30.000			Recovery = 100.77%			
66) Toluene-d8	5.963	98	742301	30.33	ug/l	0.00
Spiked Amount 30.000			Recovery = 101.10%			
76) Bromofluorobenzene	7.378	174	280619	29.71	ug/l	0.00
Spiked Amount 30.000			Recovery = 99.03%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M557717.D\data.ms
Quant QT Reviewed
SampleID : AD30164-002
Data File: 8M557717.D
Acq On : 04/20/22 03:05
Operator : JM
Sam Mult : 1 Vial# : 24
Misc : A,5ML;2
Qt Meth : 8M_A0415.M
Qt On : 04/20/22 12:33
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD30164-003
Client Id: TWP-3
Data File: 8M557718.D
Analysis Date: 04/20/22 03:23
Date Rec/Extracted: 04/14/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U	1330-20-7	Xylenes (Total)	1.0	U

Worksheet #: 636559

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used
Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

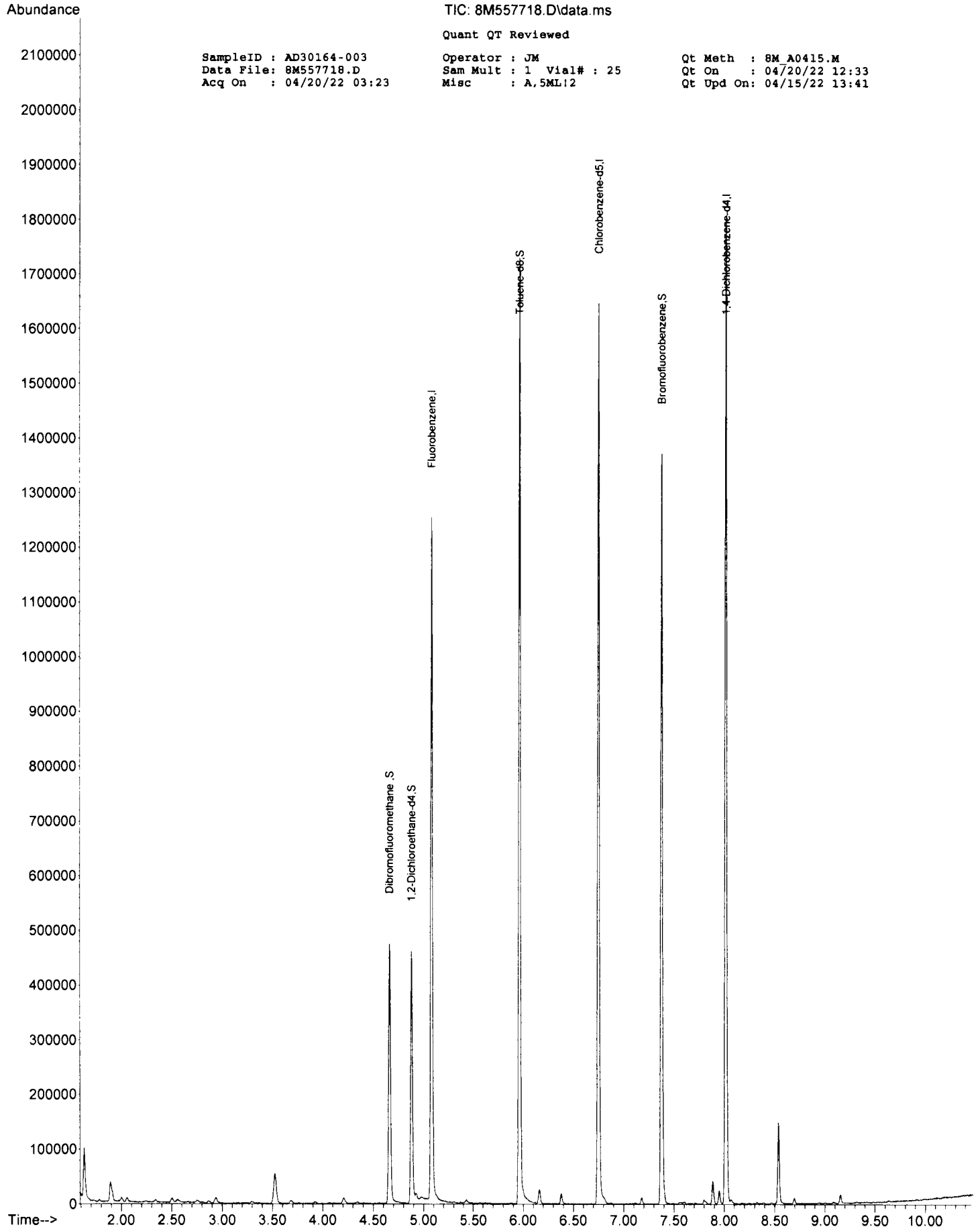
Quantitation Report (QT Reviewed)

SampleID : AD30164-003 Operator : JM Qt Meth : 8M_A0415.M
Data File: 8M557718.D Sam Mult : 1 Vial# : 25 Qt On : 04/20/22 12:33
Acq On : 04/20/22 03:23 Misc : A,5ML!2 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-1922\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	746636	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.751	117	665463	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.015	152	364846	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	203415	29.63	ug/l	0.00
Spiked Amount 30.000			Recovery = 98.77%			
39) 1,2-Dichloroethane-d4	4.880	67	108847	29.81	ug/l	0.00
Spiked Amount 30.000			Recovery = 99.37%			
66) Toluene-d8	5.960	98	768179	30.80	ug/l	0.00
Spiked Amount 30.000			Recovery = 102.67%			
76) Bromofluorobenzene	7.378	174	285555	29.23	ug/l	0.00
Spiked Amount 30.000			Recovery = 97.43%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M557718.D\data.ms
Quant QT Reviewed
SampleID : AD30164-003
Data File: 8M557718.D
Acq On : 04/20/22 03:23
Operator : JM
Sam Mult : 1 Vial# : 25
Misc : A,5ML;2
Qt Meth : 8M_A0415.M
Qt On : 04/20/22 12:33
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD30164-004
Client Id: TWP-4
Data File: 8M557719.D
Analysis Date: 04/20/22 03:41
Date Rec/Extracted: 04/14/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U	1330-20-7	Xylenes (Total)	1.0	U

Worksheet #: 636559

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used
Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

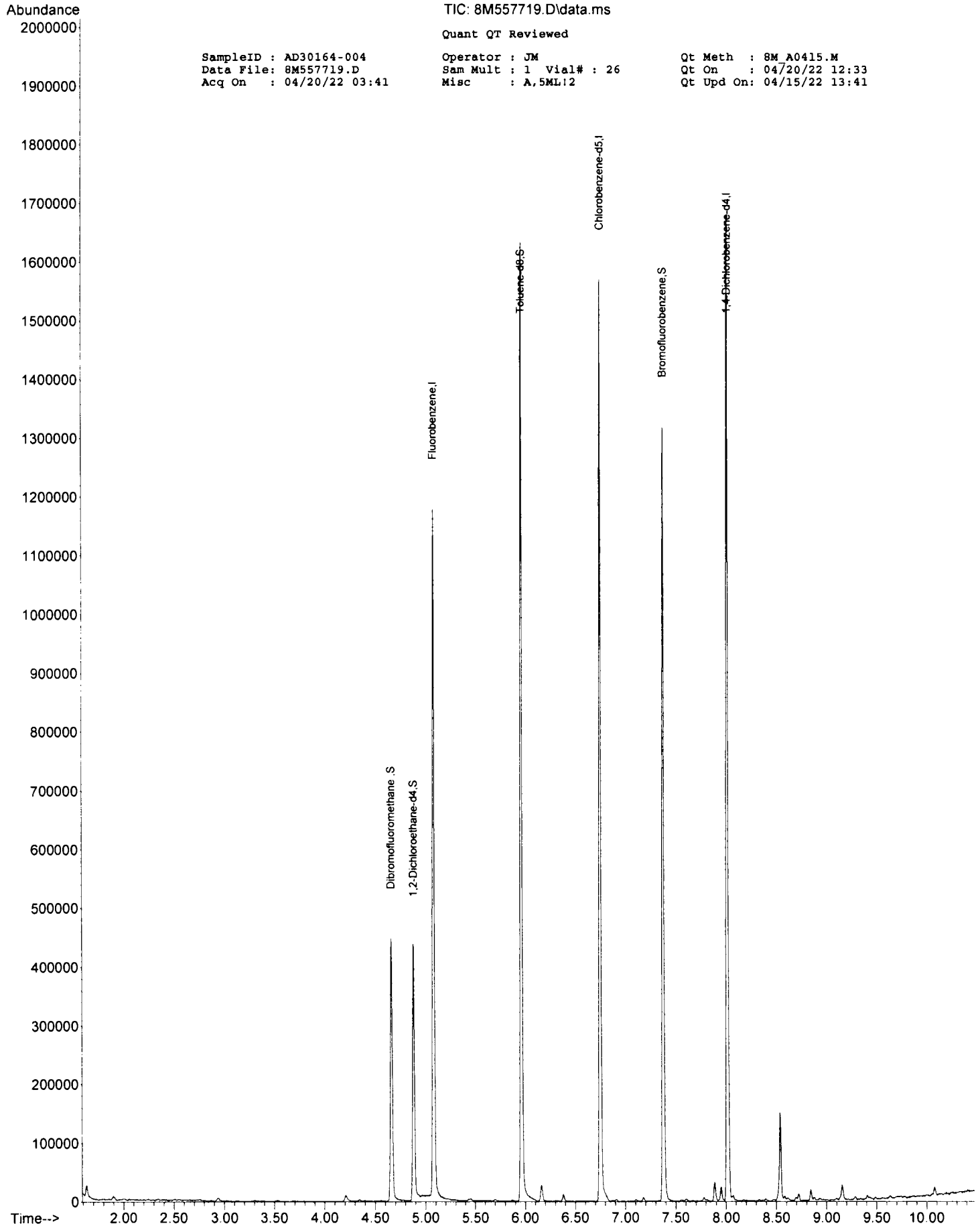
Quantitation Report (QT Reviewed)

SampleID : AD30164-004 Operator : JM Qt Meth : 8M_A0415.M
Data File: 8M557719.D Sam Mult : 1 Vial# : 26 Qt On : 04/20/22 12:33
Acq On : 04/20/22 03:41 Misc : A,5ML!2 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-1922\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	707527	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.751	117	638073	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.018	152	341219	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	189121	29.08	ug/l	0.00
Spiked Amount 30.000			Recovery =	96.93%		
39) 1,2-Dichloroethane-d4	4.883	67	103202	29.82	ug/l	0.00
Spiked Amount 30.000			Recovery =	99.40%		
66) Toluene-d8	5.963	98	730185	30.53	ug/l	0.00
Spiked Amount 30.000			Recovery =	101.77%		
76) Bromofluorobenzene	7.378	174	272063	29.78	ug/l	0.00
Spiked Amount 30.000			Recovery =	99.27%		
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M557719.D\data.ms
Quant QT Reviewed
SampleID : AD30164-004
Data File: 8M557719.D
Acq On : 04/20/22 03:41
Operator : JM
Sam Mult : 1 Vial# : 26
Misc : A,5ML!2
Qt Meth : 8M_A0415.M
Qt On : 04/20/22 12:33
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD30164-005
Client Id: DUP-4-14-22
Data File: 8M557720.D
Analysis Date: 04/20/22 04:00
Date Rec/Extracted: 04/14/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U	1330-20-7	Xylenes (Total)	1.0	U

Worksheet #: 636559

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used

Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

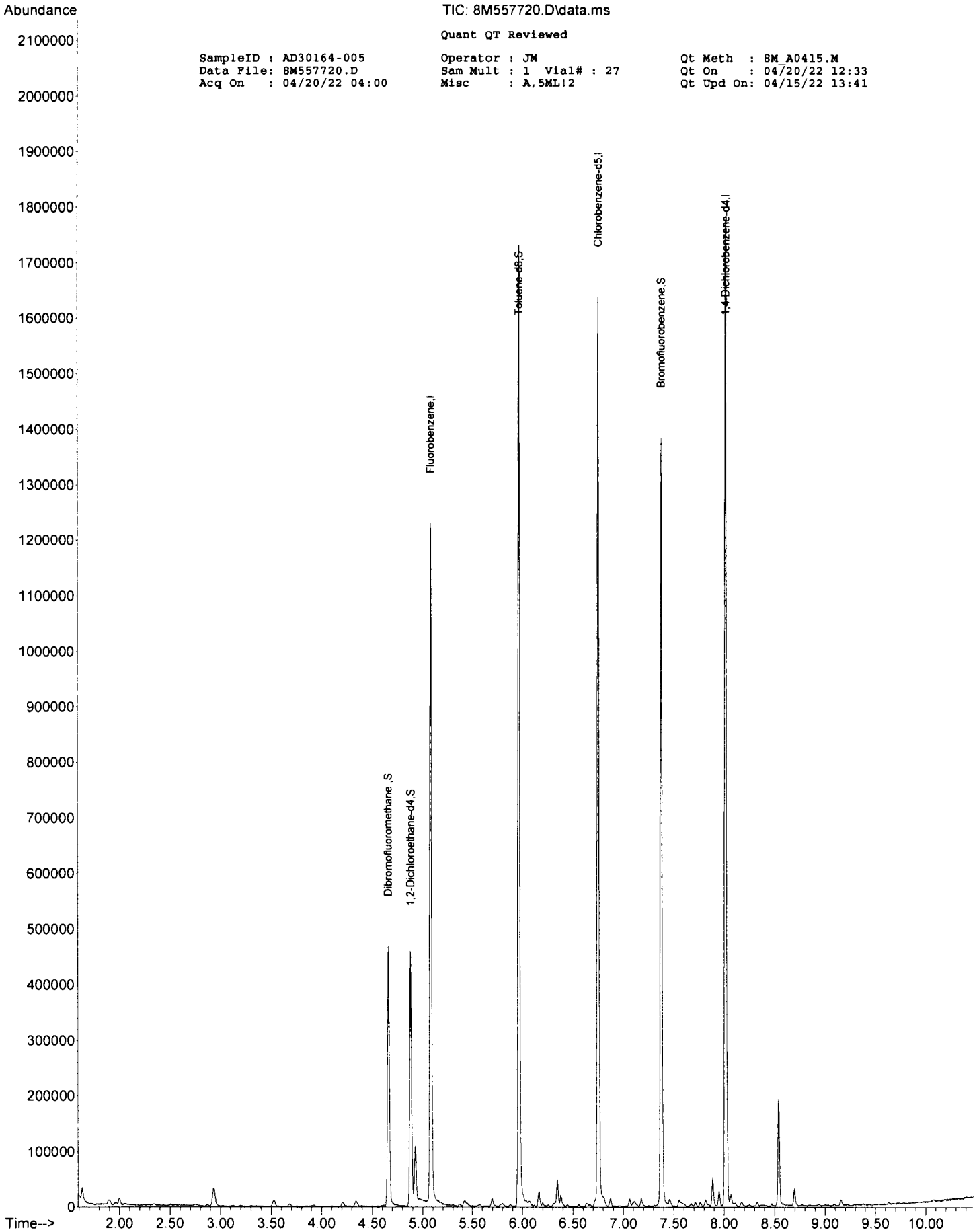
Quantitation Report (QT Reviewed)

SampleID : AD30164-005 Operator : JM Qt Meth : 8M_A0415.M
Data File: 8M557720.D Sam Mult : 1 Vial# : 27 Qt On : 04/20/22 12:33
Acq On : 04/20/22 04:00 Misc : A,5ML!2 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-1922\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	738522	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.751	117	666851	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.018	152	359104	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	199510	29.39	ug/l	0.00
Spiked Amount 30.000			Recovery = 97.97%			
39) 1,2-Dichloroethane-d4	4.883	67	107534	29.77	ug/l	0.00
Spiked Amount 30.000			Recovery = 99.23%			
66) Toluene-d8	5.963	98	757051	30.29	ug/l	0.00
Spiked Amount 30.000			Recovery = 100.97%			
76) Bromofluorobenzene	7.378	174	283582	29.50	ug/l	0.00
Spiked Amount 30.000			Recovery = 98.33%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M557720.D\data.ms
Quant QT Reviewed
SampleID : AD30164-005
Data File: 8M557720.D
Acq On : 04/20/22 04:00
Operator : JM
Sam Mult : 1 Vial# : 27
Misc : A,5ML;2
Qt Meth : 8M_A0415.M
Qt On : 04/20/22 12:33
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD30164-006
Client Id: FB-4-14-22
Data File: 8M557680.D
Analysis Date: 04/19/22 15:48
Date Rec/Extracted: 04/14/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U	1330-20-7	Xylenes (Total)	1.0	U

Worksheet #: 636559

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used
Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

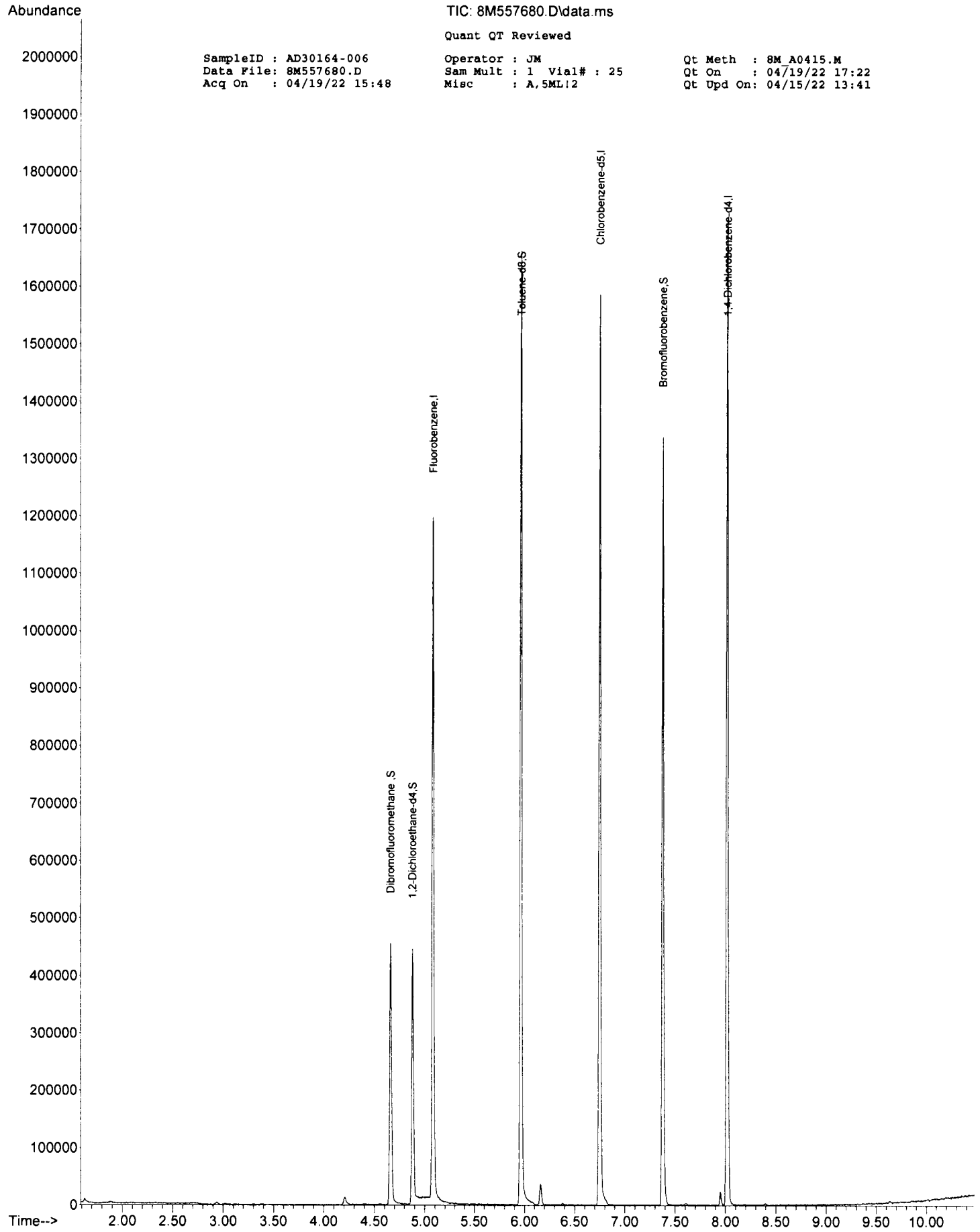
Quantitation Report (QT Reviewed)

SampleID : AD30164-006 Operator : JM Qt Meth : 8M_A0415.M
Data File: 8M557680.D Sam Mult : 1 Vial# : 25 Qt On : 04/19/22 17:22
Acq On : 04/19/22 15:48 Misc : A,5ML!2 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-19-22\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.082	96	719708	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.751	117	649500	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.018	152	349163	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	192470	29.09	ug/l	0.00
Spiked Amount 30.000			Recovery = 96.97%			
39) 1,2-Dichloroethane-d4	4.880	67	104669	29.74	ug/l	0.00
Spiked Amount 30.000			Recovery = 99.13%			
66) Toluene-d8	5.963	98	738686	30.34	ug/l	0.00
Spiked Amount 30.000			Recovery = 101.13%			
76) Bromofluorobenzene	7.378	174	274526	29.37	ug/l	0.00
Spiked Amount 30.000			Recovery = 97.90%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M557680.D\data.ms
Quant QT Reviewed
SampleID : AD30164-006
Data File: 8M557680.D
Acq On : 04/19/22 15:48
Operator : JM
Sam Mult : 1 Vial# : 25
Misc : A,5ML!2
Qt Meth : 8M_A0415.M
Qt On : 04/19/22 17:22
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD30164-007
Client Id: TRIP BLANK
Data File: 8M557681.D
Analysis Date: 04/19/22 16:06
Date Rec/Extracted: 04/14/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U	1330-20-7	Xylenes (Total)	1.0	U

Worksheet #: 636559

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used

Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

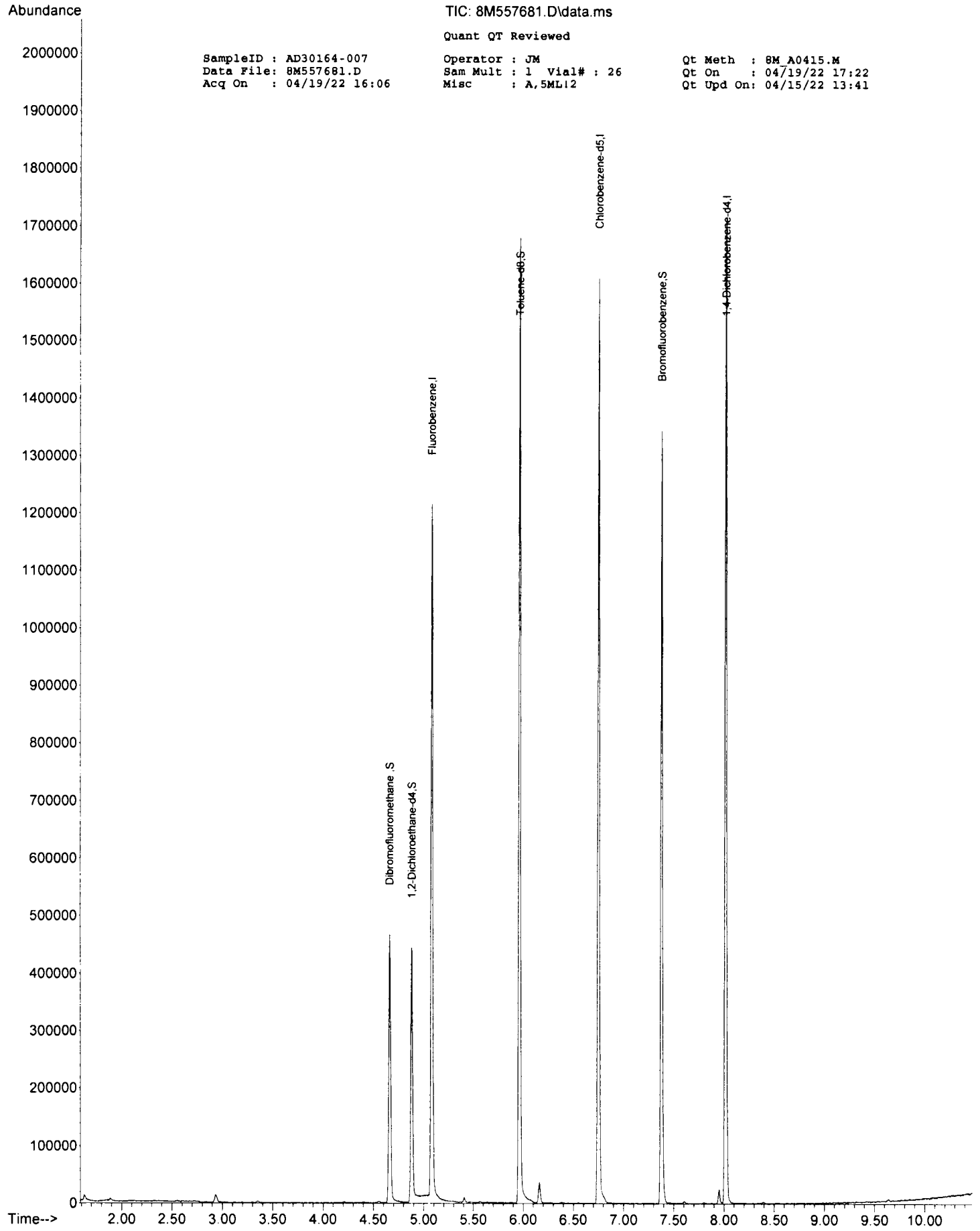
Quantitation Report (QT Reviewed)

SampleID : AD30164-007 Operator : JM Qt Meth : 8M_A0415.M
Data File: 8M557681.D Sam Mult : 1 Vial# : 26 Qt On : 04/19/22 17:22
Acq On : 04/19/22 16:06 Misc : A,5ML!2 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-19-22\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	725018	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.751	117	652132	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.018	152	344635	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	195316	29.30	ug/l	0.00
Spiked Amount 30.000			Recovery = 97.67%			
39) 1,2-Dichloroethane-d4	4.883	67	107257	30.25	ug/l	0.00
Spiked Amount 30.000			Recovery = 100.83%			
66) Toluene-d8	5.963	98	753252	30.82	ug/l	0.00
Spiked Amount 30.000			Recovery = 102.73%			
76) Bromofluorobenzene	7.378	174	280818	30.44	ug/l	0.00
Spiked Amount 30.000			Recovery = 101.47%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M557681.D\data.ms
Quant QT Reviewed
SampleID : AD30164-007
Data File: 8M557681.D
Acq On : 04/19/22 16:06
Operator : JM
Sam Mult : 1 Vial# : 26
Misc : A,5ML;2
Qt Meth : 8M_A0415.M
Qt On : 04/19/22 17:22
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: DAILY BLANK
Client Id:
Data File: 8M557662.D
Analysis Date: 04/19/22 10:33
Date Rec/Extracted:
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U				

Worksheet #: 636559

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used
Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

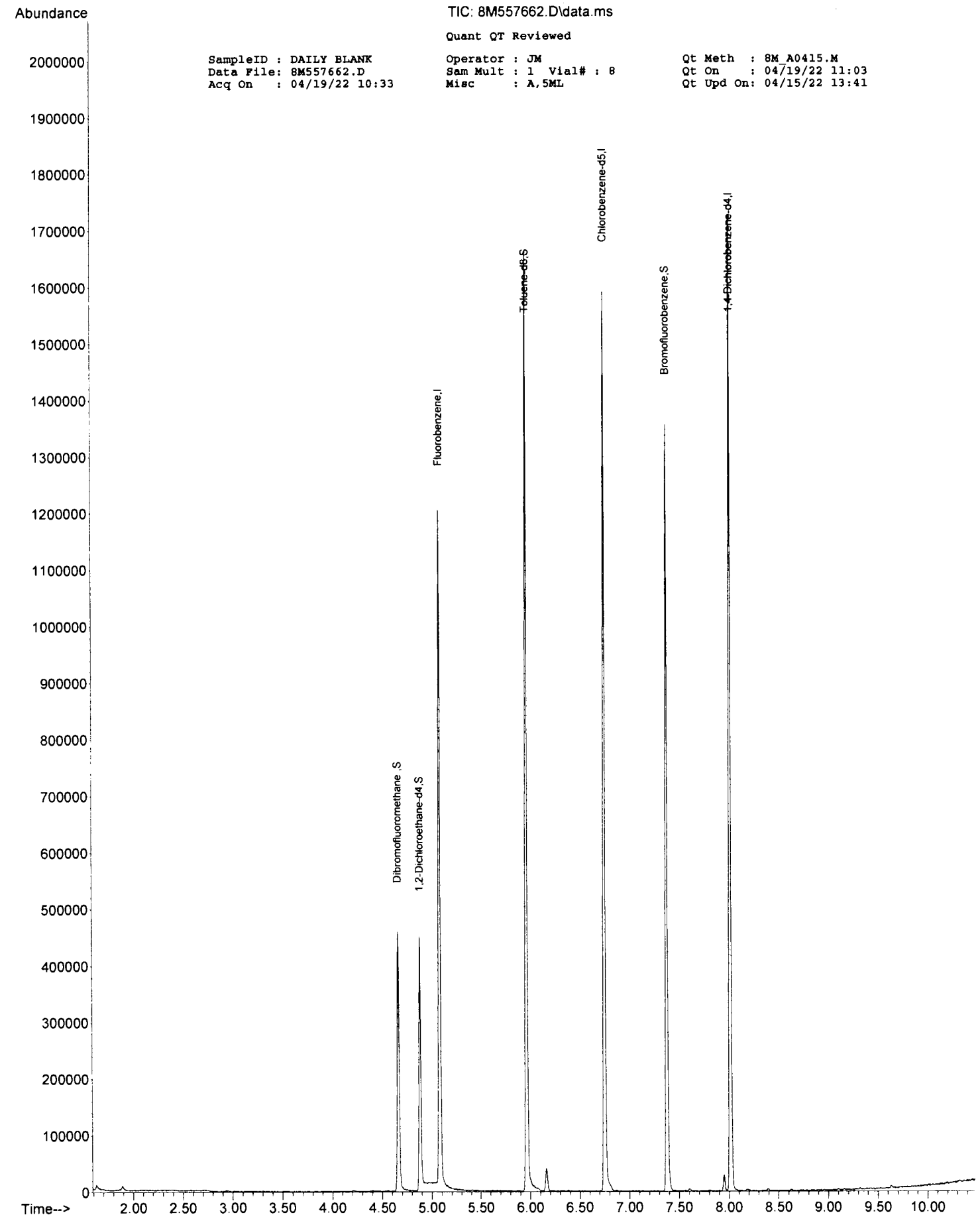
Quantitation Report (QT Reviewed)

SampleID : DAILY BLANK Operator : JM Qt Meth : 8M_A0415.M
Data File: 8M557662.D Sam Mult : 1 Vial# : 8 Qt On : 04/19/22 11:03
Acq On : 04/19/22 10:33 Misc : A,5ML Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-19-22\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.082	96	716658	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.751	117	650033	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.018	152	352657	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	193459	29.36	ug/l	0.00
Spiked Amount 30.000			Recovery =	97.87%		
39) 1,2-Dichloroethane-d4	4.883	67	103931	29.65	ug/l	0.00
Spiked Amount 30.000			Recovery =	98.83%		
66) Toluene-d8	5.963	98	743772	30.53	ug/l	0.00
Spiked Amount 30.000			Recovery =	101.77%		
76) Bromofluorobenzene	7.378	174	277658	29.41	ug/l	0.00
Spiked Amount 30.000			Recovery =	98.03%		
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M557662.D\data.ms
Quant QT Reviewed
SampleID : DAILY BLANK
Data File: 8M557662.D
Acq On : 04/19/22 10:33
Operator : JM
Sam Mult : 1 Vial# : 8
Misc : A,5ML
Qt Meth : 8M_A0415.M
Qt On : 04/19/22 11:03
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: DAILY BLANK
Client Id:
Data File: 8M557702.D
Analysis Date: 04/19/22 22:31
Date Rec/Extracted:
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U				

Worksheet #: 636559

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

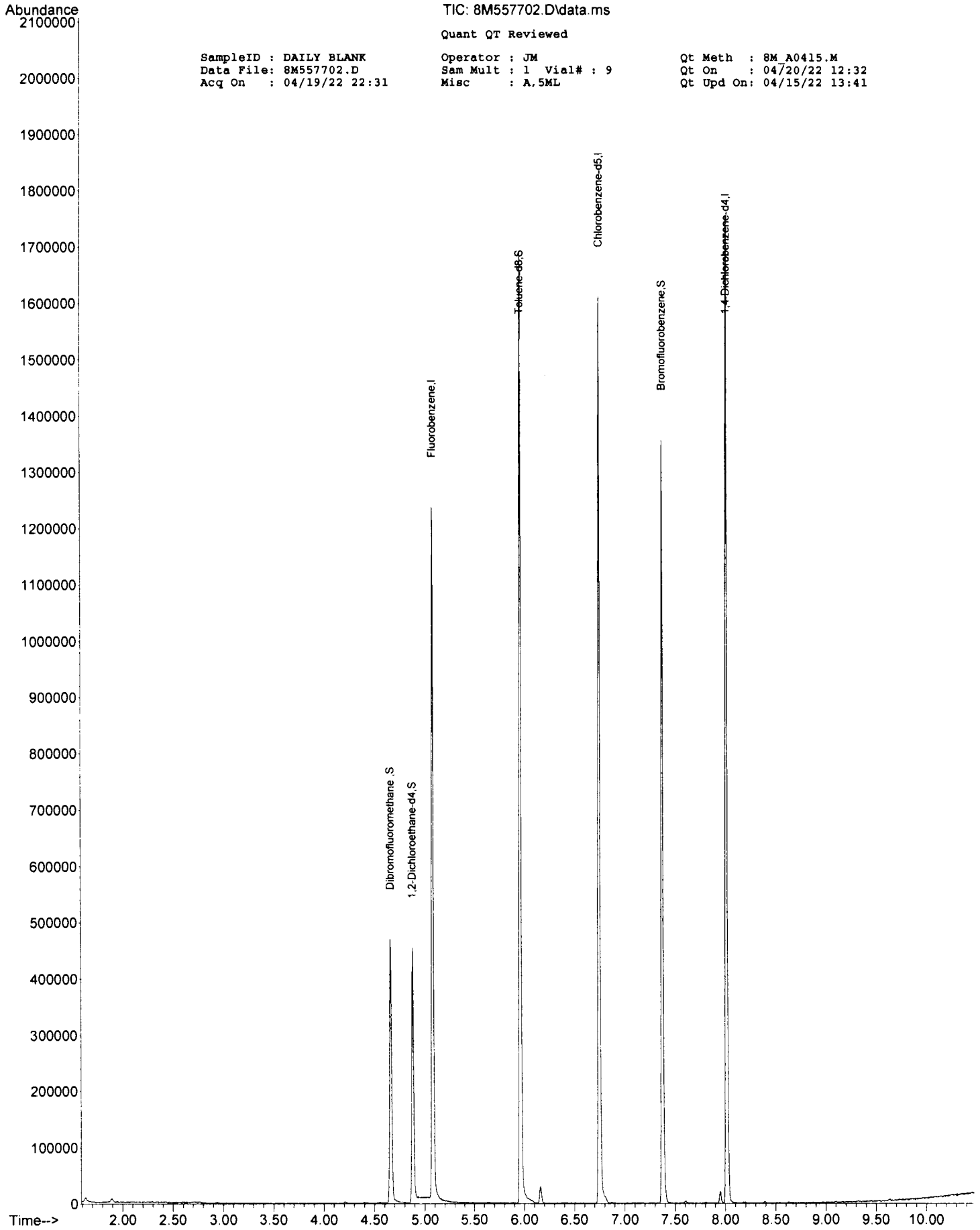
U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used
Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

SampleID : DAILY BLANK Operator : JM Qt Meth : 8M_A0415.M
Data File: 8M557702.D Sam Mult : 1 Vial# : 9 Qt On : 04/20/22 12:32
Acq On : 04/19/22 22:31 Misc : A,5ML Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-1922\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	733251	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.751	117	662118	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.015	152	355710	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	199419	29.58	ug/l	0.00
Spiked Amount 30.000			Recovery = 98.60%			
39) 1,2-Dichloroethane-d4	4.880	67	106429	29.68	ug/l	0.00
Spiked Amount 30.000			Recovery = 98.93%			
66) Toluene-d8	5.960	98	759624	30.61	ug/l	0.00
Spiked Amount 30.000			Recovery = 102.03%			
76) Bromofluorobenzene	7.378	174	282128	29.63	ug/l	0.00
Spiked Amount 30.000			Recovery = 98.77%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


TIC: 8M557702.D\data.ms
Quant QT Reviewed
SampleID : DAILY BLANK
Data File: 8M557702.D
Acq On : 04/19/22 22:31
Operator : JM
Sam Mult : 1 Vial# : 9
Misc : A,5ML
Qt Meth : 8M_A0415.M
Qt On : 04/20/22 12:32
Qt Upd On: 04/15/22 13:41
Abundance
Time-->
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I

FORM2

Surrogate Recovery

Method: EPA 8260D

Dfile	Sample#	Matrix	Date/Time	Surr Dil	Dilute Out Flag	Column1 S1 Recov	Column1 S2 Recov	Column1 S3 Recov	Column1 S4 Recov	Column0 S5 Recov	Column0 S6 Recov
8M557662.D	DAILY BLANK	A	04/19/22 10:33	1		98	99	102	98		
8M557702.D	DAILY BLANK	A	04/19/22 22:31	1		99	99	102	99		
8M557716.D	AD30164-001	A	04/20/22 02:46	1		96	98	102	100		
8M557717.D	AD30164-002	A	04/20/22 03:05	1		98	101	101	99		
8M557718.D	AD30164-003	A	04/20/22 03:23	1		99	99	103	97		
8M557719.D	AD30164-004	A	04/20/22 03:41	1		97	99	102	99		
8M557720.D	AD30164-005	A	04/20/22 04:00	1		98	99	101	98		
8M557680.D	AD30164-006	A	04/19/22 15:48	1		97	99	101	98		
8M557681.D	AD30164-007	A	04/19/22 16:06	1		98	101	103	101		
8M557664.D	AD30072-005	A	04/19/22 11:10	1		97	101	101	99		
8M557665.D	MBS101376	A	04/19/22 11:28	1		98	99	103	98		
8M557703.D	MBS101380	A	04/19/22 22:49	1		101	103	102	99		
8M557705.D	AD30072-005(MS)	A	04/19/22 23:25	1		100	98	102	99		
8M557706.D	AD30072-005(MSD)	A	04/19/22 23:43	1		99	101	102	99		

Flags: SD=Surrogate diluted out
*=Surrogate out

Method: EPA 8260D

Aqueous Laboratory Limits

Compound	Spike Amt	Limits
S1=Dibromofluoromethane	30	73-131
S2=1,2-Dichloroethane-d4	30	78-128
S3=Toluene-d8	30	79-111
S4=Bromofluorobenzene	30	82-112

FORM2

Surrogate Recovery

Method: EPA 8260D

Dfile	Sample#	Matrix	Date/Time	Surr Dil	Dilute Out Flag	Column1 S1 Recov	Column1 S2 Recov	Column1 S3 Recov	Column1 S4 Recov	Column0 S5 Recov	Column0 S6 Recov
8M557662.D	DAILY BLANK	A	04/19/22 10:33	1		98	99	102	98		
8M557702.D	DAILY BLANK	A	04/19/22 22:31	1		99	99	102	99		
8M557716.D	AD30164-001	A	04/20/22 02:46	1		96	98	102	100		
8M557717.D	AD30164-002	A	04/20/22 03:05	1		98	101	101	99		
8M557718.D	AD30164-003	A	04/20/22 03:23	1		99	99	103	97		
8M557719.D	AD30164-004	A	04/20/22 03:41	1		97	99	102	99		
8M557720.D	AD30164-005	A	04/20/22 04:00	1		98	99	101	98		
8M557680.D	AD30164-006	A	04/19/22 15:48	1		97	99	101	98		
8M557681.D	AD30164-007	A	04/19/22 16:06	1		98	101	103	101		
8M557664.D	AD30072-005	A	04/19/22 11:10	1		97	101	101	99		
8M557665.D	MBS101376	A	04/19/22 11:28	1		98	99	103	98		
8M557703.D	MBS101380	A	04/19/22 22:49	1		101	103	102	99		
8M557705.D	AD30072-005(MS)	A	04/19/22 23:25	1		100	98	102	99		
8M557706.D	AD30072-005(MSD)	A	04/19/22 23:43	1		99	101	102	99		

Flags: SD=Surrogate diluted out
*=Surrogate out

Method: EPA 8260D

Aqueous DKQP Limits

Compound	Spike Amt	Limits
S1=Dibromofluoromethane	30	70-130
S2=1,2-Dichloroethane-d4	30	70-130
S3=Toluene-d8	30	70-130
S4=Bromofluorobenzene	30	70-130

Form3
Recovery Data Laboratory Limits
QC Batch: MBS101376

Data File: Spike or Dup: 8M557665.D
Sample ID: MBS101376
Analysis Date: 4/19/2022 11:28:00 AM
Non Spike(If applicable):
Inst Blank(If applicable):

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	16.842	0	20	84	50	150
Dichlorodifluoromethane	1	18.361	0	20	92	50	150
Chloromethane	1	21.4106	0	20	107	50	150
Bromomethane	1	18.3437	0	20	92	50	150
Vinyl Chloride	1	21.5999	0	20	108	50	150
Chloroethane	1	21.7886	0	20	109	50	150
Trichlorofluoromethane	1	20.3358	0	20	102	50	150
Ethyl ether	1	21.7002	0	20	109	50	150
Furan	1	22.6498	0	20	113	50	150
1,1,2-Trichloro-1,2,2-trifluoroethane	1	20.5588	0	20	103	50	150
Methylene Chloride	1	21.9934	0	20	110	70	130
Acrolein	1	79.0048	0	100	79	50	150
Acrylonitrile	1	22.5681	0	20	113	50	150
Iodomethane	1	15.5158	0	20	78	50	150
Acetone	1	112.5914	0	100	113	50	150
Carbon Disulfide	1	22.0523	0	20	110	50	150
t-Butyl Alcohol	1	108.4122	0	100	108	50	150
n-Hexane	1	20.9316	0	20	105	70	130
Di-isopropyl-ether	1	23.2954	0	20	116	70	130
1,1-Dichloroethene	1	21.8078	0	20	109	70	130
Methyl Acetate	1	21.9695	0	20	110	50	150
Methyl-t-butyl ether	1	21.3056	0	20	107	70	130
1,1-Dichloroethane	1	21.9378	0	20	110	70	130
trans-1,2-Dichloroethene	1	21.08	0	20	105	70	130
Ethyl-t-butyl ether	1	22.0035	0	20	110	70	130
cis-1,2-Dichloroethene	1	21.6271	0	20	108	70	130
Bromochloromethane	1	24.4669	0	20	122	70	130
2,2-Dichloropropane	1	14.9658	0	20	75	70	130
Ethyl acetate	1	20.7991	0	20	104	50	150
1,4-Dioxane	1	1055.039	0	1000	106	50	150
1,1-Dichloropropene	1	21.6535	0	20	108	70	130
Chloroform	1	21.3384	0	20	107	70	130
Cyclohexane	1	23.1452	0	20	116	70	130
1,2-Dichloroethane	1	21.6605	0	20	108	70	130
2-Butanone	1	21.9068	0	20	110	50	150
1,1,1-Trichloroethane	1	20.7286	0	20	104	70	130
Carbon Tetrachloride	1	20.7936	0	20	104	50	150
Vinyl Acetate	1	22.7927	0	20	114	50	150
Bromodichloromethane	1	20.9846	0	20	105	70	130
Methylcyclohexane	1	21.1952	0	20	106	70	130
Dibromomethane	1	19.8809	0	20	99	70	130
1,2-Dichloropropane	1	22.7324	0	20	114	70	130
Trichloroethene	1	20.3199	0	20	102	70	130
Benzene	**1**	**22.1132**	**0**	**20**	**111**	**70**	**130**
tert-Amyl methyl ether	1	21.5995	0	20	108	70	130
Iso-propylacetate	1	20.6905	0	20	103	70	130
Methyl methacrylate	1	22.207	0	20	111	70	130
Dibromochloromethane	1	21.0043	0	20	105	70	130
2-Chloroethylvinylether	1	24.1332	0	20	121	70	130
cis-1,3-Dichloropropene	1	20.9284	0	20	105	70	130
trans-1,3-Dichloropropene	1	21.1327	0	20	106	70	130
Ethyl methacrylate	1	22.3265	0	20	112	70	130
1,1,2-Trichloroethane	1	21.7736	0	20	109	70	130
1,2-Dibromoethane	1	21.0639	0	20	105	70	130
1,3-Dichloropropane	1	22.271	0	20	111	70	130
4-Methyl-2-Pentanone	1	23.0844	0	20	115	50	150
2-Hexanone	1	23.3034	0	20	117	50	150
Tetrachloroethene	1	20.3903	0	20	102	50	150
Toluene	**1**	**22.0699**	**0**	**20**	**110**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	21.2027	0	20	106	70	130
Chlorobenzene	1	21.5815	0	20	108	70	130

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS101376

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	22.4702	0	20	112	70	130
n-Amyl acetate	1	22.9779	0	20	115	70	130
Bromoform	1	20.5746	0	20	103	70	130
Ethylbenzene	**1**	**22.1517**	**0**	**20**	**111**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	22.6974	0	20	113	70	130
Styrene	1	22.4588	0	20	112	70	130
m&p-Xylenes	**1**	**45.3233**	**0**	**40**	**113**	**70**	**130**
o-Xylene	**1**	**22.3991**	**0**	**20**	**112**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	21.1332	0	20	106	50	150
1,3-Dichlorobenzene	1	20.9728	0	20	105	70	130
1,4-Dichlorobenzene	1	21.012	0	20	105	70	130
1,2-Dichlorobenzene	1	21.2668	0	20	106	70	130
Isopropylbenzene	1	22.9563	0	20	115	70	130
Cyclohexanone	1	110.8427	0	100	111	50	150
Camphene	1	21.4776	0	20	107	70	130
1,2,3-Trichloropropane	1	22.1447	0	20	111	70	130
2-Chlorotoluene	1	22.8319	0	20	114	70	130
p-Ethyltoluene	1	23.3631	0	20	117	70	130
4-Chlorotoluene	1	23.1015	0	20	116	70	130
n-Propylbenzene	1	23.3852	0	20	117	70	130
Bromobenzene	1	23.6247	0	20	118	70	130
1,3,5-Trimethylbenzene	1	21.7813	0	20	109	70	130
Butyl methacrylate	1	23.6443	0	20	118	70	130
t-Butylbenzene	1	21.7839	0	20	109	70	130
1,2,4-Trimethylbenzene	1	22.3753	0	20	112	70	130
sec-Butylbenzene	1	22.2552	0	20	111	70	130
4-Isopropyltoluene	1	21.902	0	20	110	70	130
n-Butylbenzene	1	22.0097	0	20	110	70	130
p-Diethylbenzene	1	21.3598	0	20	107	70	130
1,2,4,5-Tetramethylbenzene	1	21.6798	0	20	108	70	130
1,2-Dibromo-3-Chloropropane	1	20.0718	0	20	100	50	150
Camphor	1	176.3557	0	200	88	20	150
Hexachlorobutadiene	1	19.3315	0	20	97	50	150
1,2,4-Trichlorobenzene	1	19.5931	0	20	98	70	130
1,2,3-Trichlorobenzene	1	19.6935	0	20	98	70	130
Naphthalene	1	20.9555	0	20	105	50	150

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS101380

Data File	Sample ID:	Analysis Date
Spike or Dup: 8M557703.D	MBS101380	4/19/2022 10:49:00 PM
Non Spike(If applicable):		
Inst Blank(If applicable):		

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	16.3483	0	20	82	50	150
Dichlorodifluoromethane	1	16.9492	0	20	85	50	150
Chloromethane	1	20.8949	0	20	104	50	150
Bromomethane	1	16.6103	0	20	83	50	150
Vinyl Chloride	1	21.217	0	20	106	50	150
Chloroethane	1	21.8596	0	20	109	50	150
Trichlorofluoromethane	1	20.4598	0	20	102	50	150
Ethyl ether	1	22.3391	0	20	112	50	150
Furan	1	22.7051	0	20	114	50	150
1,1,2-Trichloro-1,2,2-trifluoroethane	1	20.8652	0	20	104	50	150
Methylene Chloride	1	22.1045	0	20	111	70	130
Acrolein	1	87.4233	0	100	87	50	150
Acrylonitrile	1	23.4532	0	20	117	50	150
Iodomethane	1	16.0702	0	20	80	50	150
Acetone	1	118.1351	0	100	118	50	150
Carbon Disulfide	1	23.1995	0	20	116	50	150
t-Butyl Alcohol	1	111.6044	0	100	112	50	150
n-Hexane	1	23.3195	0	20	117	70	130
Di-isopropyl-ether	1	23.6639	0	20	118	70	130
1,1-Dichloroethene	1	21.8856	0	20	109	70	130
Methyl Acetate	1	22.2188	0	20	111	50	150
Methyl-t-butyl ether	1	21.9548	0	20	110	70	130
1,1-Dichloroethane	1	22.622	0	20	113	70	130
trans-1,2-Dichloroethene	1	22.1067	0	20	111	70	130
Ethyl-t-butyl ether	1	22.4667	0	20	112	70	130
cis-1,2-Dichloroethene	1	22.8173	0	20	114	70	130
Bromochloromethane	1	25.0122	0	20	125	70	130
2,2-Dichloropropane	1	19.6932	0	20	98	70	130
Ethyl acetate	1	21.8298	0	20	109	50	150
1,4-Dioxane	1	1068.952	0	1000	107	50	150
1,1-Dichloropropene	1	22.2602	0	20	111	70	130
Chloroform	1	21.9615	0	20	110	70	130
Cyclohexane	1	23.0666	0	20	115	70	130
1,2-Dichloroethane	1	22.3071	0	20	112	70	130
2-Butanone	1	22.052	0	20	110	50	150
1,1,1-Trichloroethane	1	21.2701	0	20	106	70	130
Carbon Tetrachloride	1	20.8753	0	20	104	50	150
Vinyl Acetate	1	24.0692	0	20	120	50	150
Bromodichloromethane	1	21.6765	0	20	108	70	130
Methylcyclohexane	1	21.7462	0	20	109	70	130
Dibromomethane	1	20.1722	0	20	101	70	130
1,2-Dichloropropane	1	22.9567	0	20	115	70	130
Trichloroethene	1	21.0724	0	20	105	70	130
Benzene	**1**	**22.4982**	**0**	**20**	**112**	**70**	**130**
tert-Amyl methyl ether	1	21.8278	0	20	109	70	130
Iso-propylacetate	1	20.911	0	20	105	70	130
Methyl methacrylate	1	23.4327	0	20	117	70	130
Dibromochloromethane	1	20.9207	0	20	105	70	130
2-Chloroethylvinylether	1	26.1496	0	20	131*	70	130
cis-1,3-Dichloropropene	1	22.0063	0	20	110	70	130
trans-1,3-Dichloropropene	1	22.0606	0	20	110	70	130
Ethyl methacrylate	1	22.9407	0	20	115	70	130
1,1,2-Trichloroethane	1	21.7679	0	20	109	70	130
1,2-Dibromoethane	1	21.7129	0	20	109	70	130
1,3-Dichloropropane	1	22.3915	0	20	112	70	130
4-Methyl-2-Pentanone	1	23.742	0	20	119	50	150
2-Hexanone	1	24.2635	0	20	121	50	150
Tetrachloroethene	1	20.5383	0	20	103	50	150
Toluene	**1**	**22.2257**	**0**	**20**	**111**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	20.7476	0	20	104	70	130
Chlorobenzene	1	21.9226	0	20	110	70	130

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Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS101380

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	22.5389	0	20	113	70	130
n-Amyl acetate	1	23.6862	0	20	118	70	130
Bromoform	1	20.7487	0	20	104	70	130
Ethylbenzene	**1**	**22.6737**	**0**	**20**	**113**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	23.0294	0	20	115	70	130
Styrene	1	22.926	0	20	115	70	130
m&p-Xylenes	**1**	**46.4401**	**0**	**40**	**116**	**70**	**130**
o-Xylene	**1**	**22.5901**	**0**	**20**	**113**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	22.7476	0	20	114	50	150
1,3-Dichlorobenzene	1	21.4809	0	20	107	70	130
1,4-Dichlorobenzene	1	21.3785	0	20	107	70	130
1,2-Dichlorobenzene	1	21.4224	0	20	107	70	130
Isopropylbenzene	1	23.0068	0	20	115	70	130
Cyclohexanone	1	149.0264	0	100	149	50	150
Camphene	1	21.7885	0	20	109	70	130
1,2,3-Trichloropropane	1	22.4344	0	20	112	70	130
2-Chlorotoluene	1	23.133	0	20	116	70	130
p-Ethyltoluene	1	23.2053	0	20	116	70	130
4-Chlorotoluene	1	22.577	0	20	113	70	130
n-Propylbenzene	1	23.8316	0	20	119	70	130
Bromobenzene	1	24.2285	0	20	121	70	130
1,3,5-Trimethylbenzene	1	22.9004	0	20	115	70	130
Butyl methacrylate	1	23.9885	0	20	120	70	130
t-Butylbenzene	1	22.2624	0	20	111	70	130
1,2,4-Trimethylbenzene	1	22.6211	0	20	113	70	130
sec-Butylbenzene	1	22.8012	0	20	114	70	130
4-Isopropyltoluene	1	22.3864	0	20	112	70	130
n-Butylbenzene	1	22.8611	0	20	114	70	130
p-Diethylbenzene	1	22.6072	0	20	113	70	130
1,2,4,5-Tetramethylbenzene	1	22.0767	0	20	110	70	130
1,2-Dibromo-3-Chloropropane	1	20.2347	0	20	101	50	150
Camphor	1	181.4501	0	200	91	20	150
Hexachlorobutadiene	1	20.7322	0	20	104	50	150
1,2,4-Trichlorobenzene	1	20.459	0	20	102	70	130
1,2,3-Trichlorobenzene	1	20.6784	0	20	103	70	130
Naphthalene	1	21.2145	0	20	106	50	150

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Form3
Recovery Data Laboratory Limits
QC Batch: MBS101380

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M557705.D	AD30072-005(MS)	4/19/2022 11:25:00 PM
Non Spike(If applicable):	8M557664.D	AD30072-005	4/19/2022 11:10:00 AM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	15.9742	0	20	80	50	150
Dichlorodifluoromethane	1	17.1979	0	20	86	50	150
Chloromethane	1	21.1	0	20	106	50	150
Bromomethane	1	17.4561	0	20	87	50	150
Vinyl Chloride	1	21.889	0	20	109	50	150
Chloroethane	1	21.593	0	20	108	50	150
Trichlorofluoromethane	1	20.6349	0	20	103	50	150
Ethyl ether	1	20.6857	0	20	103	50	150
Furan	1	20.8567	0	20	104	50	150
1,1,2-Trichloro-1,2,2-trifluoroethane	1	21.4428	0	20	107	50	150
Methylene Chloride	1	21.4805	0	20	107	70	130
Acrolein	1	83.9688	0	100	84	50	150
Acrylonitrile	1	21.1666	0	20	106	50	150
Iodomethane	1	16.792	0	20	84	50	150
Acetone	1	102.5937	0	100	103	50	150
Carbon Disulfide	1	23.4701	0	20	117	50	150
t-Butyl Alcohol	1	103.3438	0	100	103	50	150
n-Hexane	1	23.2273	0	20	116	70	130
Di-isopropyl-ether	1	22.6633	0	20	113	70	130
1,1-Dichloroethene	1	21.8069	0	20	109	70	130
Methyl Acetate	1	18.7796	0	20	94	50	150
Methyl-t-butyl ether	1	20.4025	0	20	102	70	130
1,1-Dichloroethane	1	22.2699	0	20	111	70	130
trans-1,2-Dichloroethene	1	21.4455	0	20	107	70	130
Ethyl-t-butyl ether	1	21.1509	0	20	106	70	130
cis-1,2-Dichloroethene	1	22.1242	0	20	111	70	130
Bromochloromethane	1	23.4726	0	20	117	70	130
2,2-Dichloropropane	1	20.0165	0	20	100	70	130
Ethyl acetate	1	19.7984	0	20	99	50	150
1,4-Dioxane	1	987.7615	0	1000	99	50	150
1,1-Dichloropropene	1	22.5113	0	20	113	70	130
Chloroform	1	21.3921	0	20	107	70	130
Cyclohexane	1	23.6178	0	20	118	70	130
1,2-Dichloroethane	1	20.8618	0	20	104	70	130
2-Butanone	1	20.7276	0	20	104	50	150
1,1,1-Trichloroethane	1	21.3816	0	20	107	70	130
Carbon Tetrachloride	1	20.7146	0	20	104	50	150
Vinyl Acetate	1	22.3562	0	20	112	50	150
Bromodichloromethane	1	20.5564	0	20	103	70	130
Methylcyclohexane	1	22.1122	0	20	111	70	130
Dibromomethane	1	19.5203	0	20	98	70	130
1,2-Dichloropropane	1	21.8186	0	20	109	70	130
Trichloroethene	1	20.1099	0	20	101	70	130
Benzene	**1**	**22.1287**	**0**	**20**	**111**	**70**	**130**
tert-Amyl methyl ether	1	20.4769	0	20	102	70	130
Iso-propylacetate	1	18.8039	0	20	94	70	130
Methyl methacrylate	1	19.8078	0	20	99	70	130
Dibromochloromethane	1	19.5467	0	20	98	70	130
2-Chloroethylvinylether	1	0	0	20	0*	70	130
cis-1,3-Dichloropropene	1	20.8888	0	20	104	70	130
trans-1,3-Dichloropropene	1	20.7444	0	20	104	70	130
Ethyl methacrylate	1	21.4175	0	20	107	70	130
1,1,2-Trichloroethane	1	20.989	0	20	105	70	130
1,2-Dibromoethane	1	20.4519	0	20	102	70	130
1,3-Dichloropropane	1	21.5885	0	20	108	70	130
4-Methyl-2-Pentanone	1	21.5983	0	20	108	50	150
2-Hexanone	1	22.6	0	20	113	50	150
Tetrachloroethene	1	20.8419	0	20	104	50	150
Toluene	**1**	**21.4877**	**0**	**20**	**107**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	20.2434	0	20	101	70	130
Chlorobenzene	1	21.0486	0	20	105	70	130

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Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS101380

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	21.8739	0	20	109	70	130
n-Amyl acetate	1	21.7943	0	20	109	70	130
Bromoform	1	19.2893	0	20	96	70	130
Ethylbenzene	**1**	**22.1287**	**0**	**20**	**111**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	21.3581	0	20	107	70	130
Styrene	1	21.665	0	20	108	70	130
m&p-Xylenes	**1**	**44.5833**	**0**	**40**	**111**	**70**	**130**
o-Xylene	**1**	**22.0129**	**0**	**20**	**110**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	15.7609	0	20	79	50	150
1,3-Dichlorobenzene	1	20.7234	0	20	104	70	130
1,4-Dichlorobenzene	1	20.6004	0	20	103	70	130
1,2-Dichlorobenzene	1	20.7731	0	20	104	70	130
Isopropylbenzene	1	22.8031	0	20	114	70	130
Cyclohexanone	1	100.4539	0	100	100	50	150
Camphene	1	3.3681	0	20	17*	70	130
1,2,3-Trichloropropane	1	21.0435	0	20	105	70	130
2-Chlorotoluene	1	22.6008	0	20	113	70	130
p-Ethyltoluene	1	23.4095	0	20	117	70	130
4-Chlorotoluene	1	22.6912	0	20	113	70	130
n-Propylbenzene	1	23.5944	0	20	118	70	130
Bromobenzene	1	21.0743	0	20	105	70	130
1,3,5-Trimethylbenzene	1	22.124	0	20	111	70	130
Butyl methacrylate	1	23.3528	0	20	117	70	130
t-Butylbenzene	1	22.2049	0	20	111	70	130
1,2,4-Trimethylbenzene	1	22.9679	2.0691	20	104	70	130
sec-Butylbenzene	1	22.8923	0	20	114	70	130
4-Isopropyltoluene	1	22.0845	0	20	110	70	130
n-Butylbenzene	1	22.9743	0	20	115	70	130
p-Diethylbenzene	1	22.4316	0	20	112	70	130
1,2,4,5-Tetramethylbenzene	1	21.4724	0	20	107	70	130
1,2-Dibromo-3-Chloropropane	1	19.2503	0	20	96	50	150
Camphor	1	196.9115	0	200	98	20	150
Hexachlorobutadiene	1	21.3558	0	20	107	50	150
1,2,4-Trichlorobenzene	1	19.822	0	20	99	70	130
1,2,3-Trichlorobenzene	1	20.9343	0	20	105	70	130
Naphthalene	1	21.373	1.1433	20	101	50	150

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Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS101380

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M557706.D	AD30072-005(MSD)	4/19/2022 11:43:00 PM
Non Spike(If applicable):	8M557664.D	AD30072-005	4/19/2022 11:10:00 AM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MSD

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	14.1522	0	20	71	50	150
Dichlorodifluoromethane	1	15.2238	0	20	76	50	150
Chloromethane	1	18.7958	0	20	94	50	150
Bromomethane	1	17.1479	0	20	86	50	150
Vinyl Chloride	1	19.274	0	20	96	50	150
Chloroethane	1	19.4182	0	20	97	50	150
Trichlorofluoromethane	1	18.9487	0	20	95	50	150
Ethyl ether	1	19.488	0	20	97	50	150
Furan	1	18.7289	0	20	94	50	150
1,1,2-Trichloro-1,2,2-trifluoroethane	1	19.5493	0	20	98	50	150
Methylene Chloride	1	19.3169	0	20	97	70	130
Acrolein	1	78.1474	0	100	78	50	150
Acrylonitrile	1	20.1001	0	20	101	50	150
Iodomethane	1	14.5709	0	20	73	50	150
Acetone	1	100.6553	0	100	101	50	150
Carbon Disulfide	1	20.8867	0	20	104	50	150
t-Butyl Alcohol	1	97.0027	0	100	97	50	150
n-Hexane	1	21.7096	0	20	109	70	130
Di-isopropyl-ether	1	20.7655	0	20	104	70	130
1,1-Dichloroethene	1	19.9924	0	20	100	70	130
Methyl Acetate	1	18.1686	0	20	91	50	150
Methyl-t-butyl ether	1	19.0771	0	20	95	70	130
1,1-Dichloroethane	1	19.896	0	20	99	70	130
trans-1,2-Dichloroethene	1	19.5535	0	20	98	70	130
Ethyl-t-butyl ether	1	19.8061	0	20	99	70	130
cis-1,2-Dichloroethene	1	19.8689	0	20	99	70	130
Bromochloromethane	1	21.4503	0	20	107	70	130
2,2-Dichloropropane	1	17.3884	0	20	87	70	130
Ethyl acetate	1	18.6184	0	20	93	50	150
1,4-Dioxane	1	911.2892	0	1000	91	50	150
1,1-Dichloropropene	1	20.1367	0	20	101	70	130
Chloroform	1	19.4996	0	20	97	70	130
Cyclohexane	1	22.254	0	20	111	70	130
1,2-Dichloroethane	1	19.1144	0	20	96	70	130
2-Butanone	1	19.9885	0	20	100	50	150
1,1,1-Trichloroethane	1	19.1828	0	20	96	70	130
Carbon Tetrachloride	1	19.0497	0	20	95	50	150
Vinyl Acetate	1	20.8579	0	20	104	50	150
Bromodichloromethane	1	18.8309	0	20	94	70	130
Methylcyclohexane	1	21.334	0	20	107	70	130
Dibromomethane	1	17.6114	0	20	88	70	130
1,2-Dichloropropane	1	20.1041	0	20	101	70	130
Trichloroethene	1	18.4812	0	20	92	70	130
Benzene	**1**	**20.1695**	**0**	**20**	**101**	**70**	**130**
tert-Amyl methyl ether	1	19.5035	0	20	98	70	130
Iso-propylacetate	1	17.7763	0	20	89	70	130
Methyl methacrylate	1	19.3402	0	20	97	70	130
Dibromochloromethane	1	18.5508	0	20	93	70	130
2-Chloroethylvinylether	1	0	0	20	0*	70	130
cis-1,3-Dichloropropene	1	19.6073	0	20	98	70	130
trans-1,3-Dichloropropene	1	19.3107	0	20	97	70	130
Ethyl methacrylate	1	20.1428	0	20	101	70	130
1,1,2-Trichloroethane	1	19.1556	0	20	96	70	130
1,2-Dibromoethane	1	19.1208	0	20	96	70	130
1,3-Dichloropropane	1	20.0891	0	20	100	70	130
4-Methyl-2-Pentanone	1	20.9856	0	20	105	50	150
2-Hexanone	1	21.7194	0	20	109	50	150
Tetrachloroethene	1	19.0597	0	20	95	50	150
Toluene	**1**	**19.7904**	**0**	**20**	**99**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	18.5214	0	20	93	70	130
Chlorobenzene	1	19.597	0	20	98	70	130

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Form3
Recovery Data Laboratory Limits
QC Batch: MBS101380

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MSD

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	20.9315	0	20	105	70	130
n-Amyl acetate	1	20.7449	0	20	104	70	130
Bromoform	1	17.9366	0	20	90	70	130
Ethylbenzene	**1**	**20.8544**	**0**	**20**	**104**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	20.0616	0	20	100	70	130
Styrene	1	20.0093	0	20	100	70	130
m&p-Xylenes	**1**	**42.407**	**0**	**40**	**106**	**70**	**130**
o-Xylene	**1**	**20.0264**	**0**	**20**	**100**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	14.47	0	20	72	50	150
1,3-Dichlorobenzene	1	19.3612	0	20	97	70	130
1,4-Dichlorobenzene	1	19.2343	0	20	96	70	130
1,2-Dichlorobenzene	1	19.5827	0	20	98	70	130
Isopropylbenzene	1	21.495	0	20	107	70	130
Cyclohexanone	1	96.0075	0	100	96	50	150
Camphene	1	3.316	0	20	17*	70	130
1,2,3-Trichloropropane	1	19.54	0	20	98	70	130
2-Chlorotoluene	1	20.7366	0	20	104	70	130
p-Ethyltoluene	1	21.1772	0	20	106	70	130
4-Chlorotoluene	1	21.1443	0	20	106	70	130
n-Propylbenzene	1	22.0671	0	20	110	70	130
Bromobenzene	1	18.2434	0	20	91	70	130
1,3,5-Trimethylbenzene	1	22.1414	0	20	111	70	130
Butyl methacrylate	1	21.9035	0	20	110	70	130
t-Butylbenzene	1	21.1675	0	20	106	70	130
1,2,4-Trimethylbenzene	1	21.4785	2.0691	20	97	70	130
sec-Butylbenzene	1	22.0972	0	20	110	70	130
4-Isopropyltoluene	1	21.4962	0	20	107	70	130
n-Butylbenzene	1	22.086	0	20	110	70	130
p-Diethylbenzene	1	21.5217	0	20	108	70	130
1,2,4,5-Tetramethylbenzene	1	20.9279	0	20	105	70	130
1,2-Dibromo-3-Chloropropane	1	17.9783	0	20	90	50	150
Camphor	1	195.0086	0	200	98	20	150
Hexachlorobutadiene	1	18.977	0	20	95	50	150
1,2,4-Trichlorobenzene	1	19.8898	0	20	99	70	130
1,2,3-Trichlorobenzene	1	20.1434	0	20	101	70	130
Naphthalene	1	21.1798	1.1433	20	100	50	150

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
RPD Data Laboratory Limits
QC Batch: MBS101380

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M557706.D	AD30072-005(MSD)	4/19/2022 11:43:00 PM
Duplicate(If applicable):	8M557705.D	AD30072-005(MS)	4/19/2022 11:25:00 PM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MSD

Analyte:	Column	Dup/MSD/MBSD Conc	Sample/MS/MBS Conc	RPD	Limit
Chlorodifluoromethane	1	14.1522	15.9742	12	30
Dichlorodifluoromethane	1	15.2238	17.1979	12	30
Chloromethane	1	18.7958	21.1	12	30
Bromomethane	1	17.1479	17.4561	1.8	30
Vinyl Chloride	1	19.274	21.889	13	40
Chloroethane	1	19.4182	21.593	11	30
Trichlorofluoromethane	1	18.9487	20.6349	8.5	30
Ethyl ether	1	19.488	20.6857	6	30
Furan	1	18.7289	20.8567	11	30
1,1,2-Trichloro-1,2,2-trifluoroethane	1	19.5493	21.4428	9.2	30
Methylene Chloride	1	19.3169	21.4805	11	30
Acrolein	1	78.1474	83.9688	7.2	30
Acrylonitrile	1	20.1001	21.1666	5.2	30
Iodomethane	1	14.5709	16.792	14	30
Acetone	1	100.6553	102.5937	1.9	30
Carbon Disulfide	1	20.8867	23.4701	12	30
t-Butyl Alcohol	1	97.0027	103.3438	6.3	30
n-Hexane	1	21.7096	23.2273	6.8	30
Di-isopropyl-ether	1	20.7655	22.6633	8.7	30
1,1-Dichloroethene	1	19.9924	21.8069	8.7	40
Methyl Acetate	1	18.1686	18.7796	3.3	30
Methyl-t-butyl ether	1	19.0771	20.4025	6.7	30
1,1-Dichloroethane	1	19.896	22.2699	11	40
trans-1,2-Dichloroethene	1	19.5535	21.4455	9.2	30
Ethyl-t-butyl ether	1	19.8061	21.1509	6.6	30
cis-1,2-Dichloroethene	1	19.8689	22.1242	11	30
Bromochloromethane	1	21.4503	23.4726	9	30
2,2-Dichloropropane	1	17.3884	20.0165	14	30
Ethyl acetate	1	18.6184	19.7984	6.1	30
1,4-Dioxane	1	911.2892	987.7615	8.1	30
1,1-Dichloropropene	1	20.1367	22.5113	11	30
Chloroform	1	19.4996	21.3921	9.3	40
Cyclohexane	1	22.254	23.6178	5.9	30
1,2-Dichloroethane	1	19.1144	20.8618	8.7	40
2-Butanone	1	19.9885	20.7276	3.6	40
1,1,1-Trichloroethane	1	19.1828	21.3816	11	30
Carbon Tetrachloride	1	19.0497	20.7146	8.4	40
Vinyl Acetate	1	20.8579	22.3562	6.9	30
Bromodichloromethane	1	18.8309	20.5564	8.8	30
Methylcyclohexane	1	21.334	22.1122	3.6	30
Dibromomethane	1	17.6114	19.5203	10	30
1,2-Dichloropropane	1	20.1041	21.8186	8.2	30
Trichloroethene	1	18.4812	20.1099	8.4	40
Benzene	**1**	**20.1695**	**22.1287**	**9.3**	**40**
tert-Amyl methyl ether	1	19.5035	20.4769	4.9	30
Iso-propylacetate	1	17.7763	18.8039	5.6	30
Methyl methacrylate	1	19.3402	19.8078	2.4	30
Dibromochloromethane	1	18.5508	19.5467	5.2	30
2-Chloroethylvinylether	1	0	0	NA	30
cis-1,3-Dichloropropene	1	19.6073	20.8888	6.3	30
trans-1,3-Dichloropropene	1	19.3107	20.7444	7.2	30
Ethyl methacrylate	1	20.1428	21.4175	6.1	30
1,1,2-Trichloroethane	1	19.1556	20.989	9.1	30
1,2-Dibromoethane	1	19.1208	20.4519	6.7	30
1,3-Dichloropropane	1	20.0891	21.5885	7.2	30
4-Methyl-2-Pentanone	1	20.9856	21.5983	2.9	30
2-Hexanone	1	21.7194	22.6	4	30
Tetrachloroethene	1	19.0597	20.8419	8.9	40
Toluene	**1**	**19.7904**	**21.4877**	**8.2**	**40**
1,1,1,2-Tetrachloroethane	1	18.5214	20.2434	8.9	30
Chlorobenzene	1	19.597	21.0486	7.1	40

* - Indicates outside of limits NA - Both concentrations=0... no result can be calculated

Bold and underline - Indicates the compounds reported on form1

Form3
RPD Data Laboratory Limits

QC Batch: MBS101380

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MSD

Analyte:	Column	Dup/MSD/MBSD Conc	Sample/MS/MBS Conc	RPD	Limit
n-Butyl acrylate	1	20.9315	21.8739	4.4	30
n-Amyl acetate	1	20.7449	21.7943	4.9	30
Bromoform	1	17.9366	19.2893	7.3	30
Ethylbenzene	**1**	**20.8544**	**22.1287**	**5.9**	**30**
1,1,2,2-Tetrachloroethane	1	20.0616	21.3581	6.3	30
Styrene	1	20.0093	21.665	7.9	30
m&p-Xylenes	**1**	**42.407**	**44.5833**	**5**	**30**
o-Xylene	**1**	**20.0264**	**22.0129**	**9.5**	**30**
trans-1,4-Dichloro-2-butene	1	14.47	15.7609	8.5	30
1,3-Dichlorobenzene	1	19.3612	20.7234	6.8	30
1,4-Dichlorobenzene	1	19.2343	20.6004	6.9	40
1,2-Dichlorobenzene	1	19.5827	20.7731	5.9	40
Isopropylbenzene	1	21.495	22.8031	5.9	30
Cyclohexanone	1	96.0075	100.4539	4.5	30
Camphene	1	3.316	3.3681	1.6	30
1,2,3-Trichloropropane	1	19.54	21.0435	7.4	30
2-Chlorotoluene	1	20.7366	22.6008	8.6	30
p-Ethyltoluene	1	21.1772	23.4095	10	30
4-Chlorotoluene	1	21.1443	22.6912	7.1	30
n-Propylbenzene	1	22.0671	23.5944	6.7	40
Bromobenzene	1	18.2434	21.0743	14	30
1,3,5-Trimethylbenzene	1	22.1414	22.124	0.08	30
Butyl methacrylate	1	21.9035	23.3528	6.4	30
t-Butylbenzene	1	21.1675	22.2049	4.8	30
1,2,4-Trimethylbenzene	1	21.4785	22.9679	6.7	30
sec-Butylbenzene	1	22.0972	22.8923	3.5	40
4-Isopropyltoluene	1	21.4962	22.0845	2.7	30
n-Butylbenzene	1	22.086	22.9743	3.9	30
p-Diethylbenzene	1	21.5217	22.4316	4.1	30
1,2,4,5-Tetramethylbenzene	1	20.9279	21.4724	2.6	30
1,2-Dibromo-3-Chloropropane	1	17.9783	19.2503	6.8	30
Camphor	1	195.0086	196.9115	0.97	30
Hexachlorobutadiene	1	18.977	21.3558	12	30
1,2,4-Trichlorobenzene	1	19.8898	19.822	0.34	30
1,2,3-Trichlorobenzene	1	20.1434	20.9343	3.9	30
Naphthalene	1	21.1798	21.373	0.91	30

* - Indicates outside of limits NA - Both concentrations=0... no result can be calculated

Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS101376

Data File | Sample ID: | Analysis Date
Spike or Dup: 8M557665.D | MBS101376 | 4/19/2022 11:28:00 AM
Non Spike(If applicable):
Inst Blank(If applicable):

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	16.842	0	20	84	70	130
Dichlorodifluoromethane	1	18.361	0	20	92	40	160
Chloromethane	1	21.4106	0	20	107	40	160
Bromomethane	1	18.3437	0	20	92	40	160
Vinyl Chloride	1	21.5999	0	20	108	70	130
Chloroethane	1	21.7886	0	20	109	40	160
Trichlorofluoromethane	1	20.3358	0	20	102	40	160
Ethyl ether	1	21.7002	0	20	109	70	130
Furan	1	22.6498	0	20	113	70	130
1,1,2-Trichloro-1,2,2-trifluoroethane	1	20.5588	0	20	103	70	130
Methylene Chloride	1	21.9934	0	20	110	70	130
Acrolein	1	79.0048	0	100	79	70	130
Acrylonitrile	1	22.5681	0	20	113	70	130
Iodomethane	1	15.5158	0	20	78	70	130
Acetone	1	112.5914	0	100	113	40	160
Carbon Disulfide	1	22.0523	0	20	110	40	160
t-Butyl Alcohol	1	108.4122	0	100	108	70	130
n-Hexane	1	20.9316	0	20	105	70	130
Di-isopropyl-ether	1	23.2954	0	20	116	70	130
1,1-Dichloroethene	1	21.8078	0	20	109	70	130
Methyl Acetate	1	21.9695	0	20	110	70	130
Methyl-t-butyl ether	1	21.3056	0	20	107	70	130
1,1-Dichloroethane	1	21.9378	0	20	110	70	130
trans-1,2-Dichloroethene	1	21.08	0	20	105	70	130
Ethyl-t-butyl ether	1	22.0035	0	20	110	70	130
cis-1,2-Dichloroethene	1	21.6271	0	20	108	70	130
Bromochloromethane	1	24.4669	0	20	122	70	130
2,2-Dichloropropane	1	14.9658	0	20	75	70	130
Ethyl acetate	1	20.7991	0	20	104	70	130
1,4-Dioxane	1	1055.039	0	1000	106	40	160
1,1-Dichloropropene	1	21.6535	0	20	108	70	130
Chloroform	1	21.3384	0	20	107	70	130
Cyclohexane	1	23.1452	0	20	116	70	130
1,2-Dichloroethane	1	21.6605	0	20	108	70	130
2-Butanone	1	21.9068	0	20	110	70	130
1,1,1-Trichloroethane	1	20.7286	0	20	104	70	130
Carbon Tetrachloride	1	20.7936	0	20	104	70	130
Vinyl Acetate	1	22.7927	0	20	114	70	130
Bromodichloromethane	1	20.9846	0	20	105	70	130
Methylcyclohexane	1	21.1952	0	20	106	70	130
Dibromomethane	1	19.8809	0	20	99	70	130
1,2-Dichloropropane	1	22.7324	0	20	114	70	130
Trichloroethene	1	20.3199	0	20	102	70	130
Benzene	**1**	**22.1132**	**0**	**20**	**111**	**70**	**130**
tert-Amyl methyl ether	1	21.5995	0	20	108	70	130
Iso-propylacetate	1	20.6905	0	20	103	70	130
Methyl methacrylate	1	22.207	0	20	111	70	130
Dibromochloromethane	1	21.0043	0	20	105	70	130
2-Chloroethylvinylether	1	24.1332	0	20	121	70	130
cis-1,3-Dichloropropene	1	20.9284	0	20	105	70	130
trans-1,3-Dichloropropene	1	21.1327	0	20	106	70	130
Ethyl methacrylate	1	22.3265	0	20	112	70	130
1,1,2-Trichloroethane	1	21.7736	0	20	109	70	130
1,2-Dibromoethane	1	21.0639	0	20	105	70	130
1,3-Dichloropropane	1	22.271	0	20	111	70	130
4-Methyl-2-Pentanone	1	23.0844	0	20	115	40	160
2-Hexanone	1	23.3034	0	20	117	40	160
Tetrachloroethene	1	20.3903	0	20	102	70	130
Toluene	**1**	**22.0699**	**0**	**20**	**110**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	21.2027	0	20	106	70	130
Chlorobenzene	1	21.5815	0	20	108	70	130

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS101376

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	22.4702	0	20	112	70	130
n-Amyl acetate	1	22.9779	0	20	115	70	130
Bromoform	1	20.5746	0	20	103	70	130
Ethylbenzene	**1**	**22.1517**	**0**	**20**	**111**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	22.6974	0	20	113	70	130
Styrene	1	22.4588	0	20	112	70	130
m&p-Xylenes	**1**	**45.3233**	**0**	**40**	**113**	**70**	**130**
o-Xylene	**1**	**22.3991**	**0**	**20**	**112**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	21.1332	0	20	106	70	130
1,3-Dichlorobenzene	1	20.9728	0	20	105	70	130
1,4-Dichlorobenzene	1	21.012	0	20	105	70	130
1,2-Dichlorobenzene	1	21.2668	0	20	106	70	130
Isopropylbenzene	1	22.9563	0	20	115	70	130
Cyclohexanone	1	110.8427	0	100	111	70	130
Camphene	1	21.4776	0	20	107	70	130
1,2,3-Trichloropropane	1	22.1447	0	20	111	70	130
2-Chlorotoluene	1	22.8319	0	20	114	70	130
p-Ethyltoluene	1	23.3631	0	20	117	70	130
4-Chlorotoluene	1	23.1015	0	20	116	70	130
n-Propylbenzene	1	23.3852	0	20	117	70	130
Bromobenzene	1	23.6247	0	20	118	70	130
1,3,5-Trimethylbenzene	1	21.7813	0	20	109	70	130
Butyl methacrylate	1	23.6443	0	20	118	70	130
t-Butylbenzene	1	21.7839	0	20	109	70	130
1,2,4-Trimethylbenzene	1	22.3753	0	20	112	70	130
sec-Butylbenzene	1	22.2552	0	20	111	70	130
4-Isopropyltoluene	1	21.902	0	20	110	70	130
n-Butylbenzene	1	22.0097	0	20	110	70	130
p-Diethylbenzene	1	21.3598	0	20	107	70	130
1,2,4,5-Tetramethylbenzene	1	21.6798	0	20	108	70	130
1,2-Dibromo-3-Chloropropane	1	20.0718	0	20	100	40	160
Camphor	1	176.3557	0	200	88	70	130
Hexachlorobutadiene	1	19.3315	0	20	97	70	130
1,2,4-Trichlorobenzene	1	19.5931	0	20	98	70	130
1,2,3-Trichlorobenzene	1	19.6935	0	20	98	70	130
Naphthalene	1	20.9555	0	20	105	40	160

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS101380

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M557703.D	MBS101380	4/19/2022 10:49:00 PM
Non Spike(If applicable):			
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	16.3483	0	20	82	70	130
Dichlorodifluoromethane	1	16.9492	0	20	85	40	160
Chloromethane	1	20.8949	0	20	104	40	160
Bromomethane	1	16.6103	0	20	83	40	160
Vinyl Chloride	1	21.217	0	20	106	70	130
Chloroethane	1	21.8596	0	20	109	40	160
Trichlorofluoromethane	1	20.4598	0	20	102	40	160
Ethyl ether	1	22.3391	0	20	112	70	130
Furan	1	22.7051	0	20	114	70	130
1,1,2-Trichloro-1,2,2-trifluoroethane	1	20.8652	0	20	104	70	130
Methylene Chloride	1	22.1045	0	20	111	70	130
Acrolein	1	87.4233	0	100	87	70	130
Acrylonitrile	1	23.4532	0	20	117	70	130
Iodomethane	1	16.0702	0	20	80	70	130
Acetone	1	118.1351	0	100	118	40	160
Carbon Disulfide	1	23.1995	0	20	116	40	160
t-Butyl Alcohol	1	111.6044	0	100	112	70	130
n-Hexane	1	23.3195	0	20	117	70	130
Di-isopropyl-ether	1	23.6639	0	20	118	70	130
1,1-Dichloroethene	1	21.8856	0	20	109	70	130
Methyl Acetate	1	22.2188	0	20	111	70	130
Methyl-t-butyl ether	1	21.9548	0	20	110	70	130
1,1-Dichloroethane	1	22.622	0	20	113	70	130
trans-1,2-Dichloroethene	1	22.1067	0	20	111	70	130
Ethyl-t-butyl ether	1	22.4667	0	20	112	70	130
cis-1,2-Dichloroethene	1	22.8173	0	20	114	70	130
Bromochloromethane	1	25.0122	0	20	125	70	130
2,2-Dichloropropane	1	19.6932	0	20	98	70	130
Ethyl acetate	1	21.8298	0	20	109	70	130
1,4-Dioxane	1	1068.952	0	1000	107	40	160
1,1-Dichloropropene	1	22.2602	0	20	111	70	130
Chloroform	1	21.9615	0	20	110	70	130
Cyclohexane	1	23.0666	0	20	115	70	130
1,2-Dichloroethane	1	22.3071	0	20	112	70	130
2-Butanone	1	22.052	0	20	110	70	130
1,1,1-Trichloroethane	1	21.2701	0	20	106	70	130
Carbon Tetrachloride	1	20.8753	0	20	104	70	130
Vinyl Acetate	1	24.0692	0	20	120	70	130
Bromodichloromethane	1	21.6765	0	20	108	70	130
Methylcyclohexane	1	21.7462	0	20	109	70	130
Dibromomethane	1	20.1722	0	20	101	70	130
1,2-Dichloropropane	1	22.9567	0	20	115	70	130
Trichloroethene	1	21.0724	0	20	105	70	130
Benzene	**1**	**22.4982**	**0**	**20**	**112**	**70**	**130**
tert-Amyl methyl ether	1	21.8278	0	20	109	70	130
Iso-propylacetate	1	20.911	0	20	105	70	130
Methyl methacrylate	1	23.4327	0	20	117	70	130
Dibromochloromethane	1	20.9207	0	20	105	70	130
2-Chloroethylvinylether	1	26.1496	0	20	131*	70	130
cis-1,3-Dichloropropene	1	22.0063	0	20	110	70	130
trans-1,3-Dichloropropene	1	22.0606	0	20	110	70	130
Ethyl methacrylate	1	22.9407	0	20	115	70	130
1,1,2-Trichloroethane	1	21.7679	0	20	109	70	130
1,2-Dibromoethane	1	21.7129	0	20	109	70	130
1,3-Dichloropropane	1	22.3915	0	20	112	70	130
4-Methyl-2-Pentanone	1	23.742	0	20	119	40	160
2-Hexanone	1	24.2635	0	20	121	40	160
Tetrachloroethene	1	20.5383	0	20	103	70	130
Toluene	**1**	**22.2257**	**0**	**20**	**111**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	20.7476	0	20	104	70	130
Chlorobenzene	1	21.9226	0	20	110	70	130

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS101380

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	22.5389	0	20	113	70	130
n-Amyl acetate	1	23.6862	0	20	118	70	130
Bromoform	1	20.7487	0	20	104	70	130
Ethylbenzene	**1**	**22.6737**	**0**	**20**	**113**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	23.0294	0	20	115	70	130
Styrene	1	22.926	0	20	115	70	130
m&p-Xylenes	**1**	**46.4401**	**0**	**40**	**116**	**70**	**130**
o-Xylene	**1**	**22.5901**	**0**	**20**	**113**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	22.7476	0	20	114	70	130
1,3-Dichlorobenzene	1	21.4809	0	20	107	70	130
1,4-Dichlorobenzene	1	21.3785	0	20	107	70	130
1,2-Dichlorobenzene	1	21.4224	0	20	107	70	130
Isopropylbenzene	1	23.0068	0	20	115	70	130
Cyclohexanone	1	149.0264	0	100	149*	70	130
Camphene	1	21.7885	0	20	109	70	130
1,2,3-Trichloropropane	1	22.4344	0	20	112	70	130
2-Chlorotoluene	1	23.133	0	20	116	70	130
p-Ethyltoluene	1	23.2053	0	20	116	70	130
4-Chlorotoluene	1	22.577	0	20	113	70	130
n-Propylbenzene	1	23.8316	0	20	119	70	130
Bromobenzene	1	24.2285	0	20	121	70	130
1,3,5-Trimethylbenzene	1	22.9004	0	20	115	70	130
Butyl methacrylate	1	23.9885	0	20	120	70	130
t-Butylbenzene	1	22.2624	0	20	111	70	130
1,2,4-Trimethylbenzene	1	22.6211	0	20	113	70	130
sec-Butylbenzene	1	22.8012	0	20	114	70	130
4-Isopropyltoluene	1	22.3864	0	20	112	70	130
n-Butylbenzene	1	22.8611	0	20	114	70	130
p-Diethylbenzene	1	22.6072	0	20	113	70	130
1,2,4,5-Tetramethylbenzene	1	22.0767	0	20	110	70	130
1,2-Dibromo-3-Chloropropane	1	20.2347	0	20	101	40	160
Camphor	1	181.4501	0	200	91	70	130
Hexachlorobutadiene	1	20.7322	0	20	104	70	130
1,2,4-Trichlorobenzene	1	20.459	0	20	102	70	130
1,2,3-Trichlorobenzene	1	20.6784	0	20	103	70	130
Naphthalene	1	21.2145	0	20	106	40	160

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Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS101380

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M557705.D	AD30072-005(MS)	4/19/2022 11:25:00 PM
Non Spike(If applicable):	8M557664.D	AD30072-005	4/19/2022 11:10:00 AM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	15.9742	0	20	80	70	130
Dichlorodifluoromethane	1	17.1979	0	20	86	40	160
Chloromethane	1	21.1	0	20	106	40	160
Bromomethane	1	17.4561	0	20	87	40	160
Vinyl Chloride	1	21.889	0	20	109	70	130
Chloroethane	1	21.593	0	20	108	40	160
Trichlorofluoromethane	1	20.6349	0	20	103	40	160
Ethyl ether	1	20.6857	0	20	103	70	130
Furan	1	20.8567	0	20	104	70	130
1,1,2-Trichloro-1,2,2-trifluoroethane	1	21.4428	0	20	107	70	130
Methylene Chloride	1	21.4805	0	20	107	70	130
Acrolein	1	83.9688	0	100	84	70	130
Acrylonitrile	1	21.1666	0	20	106	70	130
Iodomethane	1	16.792	0	20	84	70	130
Acetone	1	102.5937	0	100	103	40	160
Carbon Disulfide	1	23.4701	0	20	117	40	160
t-Butyl Alcohol	1	103.3438	0	100	103	70	130
n-Hexane	1	23.2273	0	20	116	70	130
Di-isopropyl-ether	1	22.6633	0	20	113	70	130
1,1-Dichloroethene	1	21.8069	0	20	109	70	130
Methyl Acetate	1	18.7796	0	20	94	70	130
Methyl-t-butyl ether	1	20.4025	0	20	102	70	130
1,1-Dichloroethane	1	22.2699	0	20	111	70	130
trans-1,2-Dichloroethene	1	21.4455	0	20	107	70	130
Ethyl-t-butyl ether	1	21.1509	0	20	106	70	130
cis-1,2-Dichloroethene	1	22.1242	0	20	111	70	130
Bromochloromethane	1	23.4726	0	20	117	70	130
2,2-Dichloropropane	1	20.0165	0	20	100	70	130
Ethyl acetate	1	19.7984	0	20	99	70	130
1,4-Dioxane	1	987.7615	0	1000	99	40	160
1,1-Dichloropropene	1	22.5113	0	20	113	70	130
Chloroform	1	21.3921	0	20	107	70	130
Cyclohexane	1	23.6178	0	20	118	70	130
1,2-Dichloroethane	1	20.8618	0	20	104	70	130
2-Butanone	1	20.7276	0	20	104	70	130
1,1,1-Trichloroethane	1	21.3816	0	20	107	70	130
Carbon Tetrachloride	1	20.7146	0	20	104	70	130
Vinyl Acetate	1	22.3562	0	20	112	70	130
Bromodichloromethane	1	20.5564	0	20	103	70	130
Methylcyclohexane	1	22.1122	0	20	111	70	130
Dibromomethane	1	19.5203	0	20	98	70	130
1,2-Dichloropropane	1	21.8186	0	20	109	70	130
Trichloroethene	1	20.1099	0	20	101	70	130
Benzene	**1**	**22.1287**	**0**	**20**	**111**	**70**	**130**
tert-Amyl methyl ether	1	20.4769	0	20	102	70	130
Iso-propylacetate	1	18.8039	0	20	94	70	130
Methyl methacrylate	1	19.8078	0	20	99	70	130
Dibromochloromethane	1	19.5467	0	20	98	70	130
2-Chloroethylvinylether	1	0	0	20	0*	70	130
cis-1,3-Dichloropropene	1	20.8888	0	20	104	70	130
trans-1,3-Dichloropropene	1	20.7444	0	20	104	70	130
Ethyl methacrylate	1	21.4175	0	20	107	70	130
1,1,2-Trichloroethane	1	20.989	0	20	105	70	130
1,2-Dibromoethane	1	20.4519	0	20	102	70	130
1,3-Dichloropropane	1	21.5885	0	20	108	70	130
4-Methyl-2-Pentanone	1	21.5983	0	20	108	40	160
2-Hexanone	1	22.6	0	20	113	40	160
Tetrachloroethene	1	20.8419	0	20	104	70	130
Toluene	**1**	**21.4877**	**0**	**20**	**107**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	20.2434	0	20	101	70	130
Chlorobenzene	1	21.0486	0	20	105	70	130

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Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS101380

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	21.8739	0	20	109	70	130
n-Amyl acetate	1	21.7943	0	20	109	70	130
Bromoform	1	19.2893	0	20	96	70	130
Ethylbenzene	**1**	**22.1287**	**0**	**20**	**111**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	21.3581	0	20	107	70	130
Styrene	1	21.665	0	20	108	70	130
m&p-Xylenes	**1**	**44.5833**	**0**	**40**	**111**	**70**	**130**
o-Xylene	**1**	**22.0129**	**0**	**20**	**110**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	15.7609	0	20	79	70	130
1,3-Dichlorobenzene	1	20.7234	0	20	104	70	130
1,4-Dichlorobenzene	1	20.6004	0	20	103	70	130
1,2-Dichlorobenzene	1	20.7731	0	20	104	70	130
Isopropylbenzene	1	22.8031	0	20	114	70	130
Cyclohexanone	1	100.4539	0	100	100	70	130
Camphene	1	3.3681	0	20	17*	70	130
1,2,3-Trichloropropane	1	21.0435	0	20	105	70	130
2-Chlorotoluene	1	22.6008	0	20	113	70	130
p-Ethyltoluene	1	23.4095	0	20	117	70	130
4-Chlorotoluene	1	22.6912	0	20	113	70	130
n-Propylbenzene	1	23.5944	0	20	118	70	130
Bromobenzene	1	21.0743	0	20	105	70	130
1,3,5-Trimethylbenzene	1	22.124	0	20	111	70	130
Butyl methacrylate	1	23.3528	0	20	117	70	130
t-Butylbenzene	1	22.2049	0	20	111	70	130
1,2,4-Trimethylbenzene	1	22.9679	2.0691	20	104	70	130
sec-Butylbenzene	1	22.8923	0	20	114	70	130
4-Isopropyltoluene	1	22.0845	0	20	110	70	130
n-Butylbenzene	1	22.9743	0	20	115	70	130
p-Diethylbenzene	1	22.4316	0	20	112	70	130
1,2,4,5-Tetramethylbenzene	1	21.4724	0	20	107	70	130
1,2-Dibromo-3-Chloropropane	1	19.2503	0	20	96	40	160
Camphor	1	196.9115	0	200	98	70	130
Hexachlorobutadiene	1	21.3558	0	20	107	70	130
1,2,4-Trichlorobenzene	1	19.822	0	20	99	70	130
1,2,3-Trichlorobenzene	1	20.9343	0	20	105	70	130
Naphthalene	1	21.373	1.1433	20	101	40	160

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Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS101380

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M557706.D	AD30072-005(MSD)	4/19/2022 11:43:00 PM
Non Spike(If applicable):	8M557664.D	AD30072-005	4/19/2022 11:10:00 AM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MSD

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	14.1522	0	20	71	70	130
Dichlorodifluoromethane	1	15.2238	0	20	76	40	160
Chloromethane	1	18.7958	0	20	94	40	160
Bromomethane	1	17.1479	0	20	86	40	160
Vinyl Chloride	1	19.274	0	20	96	70	130
Chloroethane	1	19.4182	0	20	97	40	160
Trichlorofluoromethane	1	18.9487	0	20	95	40	160
Ethyl ether	1	19.488	0	20	97	70	130
Furan	1	18.7289	0	20	94	70	130
1,1,2-Trichloro-1,2,2-trifluoroethane	1	19.5493	0	20	98	70	130
Methylene Chloride	1	19.3169	0	20	97	70	130
Acrolein	1	78.1474	0	100	78	70	130
Acrylonitrile	1	20.1001	0	20	101	70	130
Iodomethane	1	14.5709	0	20	73	70	130
Acetone	1	100.6553	0	100	101	40	160
Carbon Disulfide	1	20.8867	0	20	104	40	160
t-Butyl Alcohol	1	97.0027	0	100	97	70	130
n-Hexane	1	21.7096	0	20	109	70	130
Di-isopropyl-ether	1	20.7655	0	20	104	70	130
1,1-Dichloroethene	1	19.9924	0	20	100	70	130
Methyl Acetate	1	18.1686	0	20	91	70	130
Methyl-t-butyl ether	1	19.0771	0	20	95	70	130
1,1-Dichloroethane	1	19.896	0	20	99	70	130
trans-1,2-Dichloroethene	1	19.5535	0	20	98	70	130
Ethyl-t-butyl ether	1	19.8061	0	20	99	70	130
cis-1,2-Dichloroethene	1	19.8689	0	20	99	70	130
Bromochloromethane	1	21.4503	0	20	107	70	130
2,2-Dichloropropane	1	17.3884	0	20	87	70	130
Ethyl acetate	1	18.6184	0	20	93	70	130
1,4-Dioxane	1	911.2892	0	1000	91	40	160
1,1-Dichloropropene	1	20.1367	0	20	101	70	130
Chloroform	1	19.4996	0	20	97	70	130
Cyclohexane	1	22.254	0	20	111	70	130
1,2-Dichloroethane	1	19.1144	0	20	96	70	130
2-Butanone	1	19.9885	0	20	100	70	130
1,1,1-Trichloroethane	1	19.1828	0	20	96	70	130
Carbon Tetrachloride	1	19.0497	0	20	95	70	130
Vinyl Acetate	1	20.8579	0	20	104	70	130
Bromodichloromethane	1	18.8309	0	20	94	70	130
Methylcyclohexane	1	21.334	0	20	107	70	130
Dibromomethane	1	17.6114	0	20	88	70	130
1,2-Dichloropropane	1	20.1041	0	20	101	70	130
Trichloroethene	1	18.4812	0	20	92	70	130
Benzene	**1**	**20.1695**	**0**	**20**	**101**	**70**	**130**
tert-Amyl methyl ether	1	19.5035	0	20	98	70	130
Iso-propylacetate	1	17.7763	0	20	89	70	130
Methyl methacrylate	1	19.3402	0	20	97	70	130
Dibromochloromethane	1	18.5508	0	20	93	70	130
2-Chloroethylvinylether	1	0	0	20	0*	70	130
cis-1,3-Dichloropropene	1	19.6073	0	20	98	70	130
trans-1,3-Dichloropropene	1	19.3107	0	20	97	70	130
Ethyl methacrylate	1	20.1428	0	20	101	70	130
1,1,2-Trichloroethane	1	19.1556	0	20	96	70	130
1,2-Dibromoethane	1	19.1208	0	20	96	70	130
1,3-Dichloropropane	1	20.0891	0	20	100	70	130
4-Methyl-2-Pentanone	1	20.9856	0	20	105	40	160
2-Hexanone	1	21.7194	0	20	109	40	160
Tetrachloroethene	1	19.0597	0	20	95	70	130
Toluene	**1**	**19.7904**	**0**	**20**	**99**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	18.5214	0	20	93	70	130
Chlorobenzene	1	19.597	0	20	98	70	130

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Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS101380

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MSD

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	20.9315	0	20	105	70	130
n-Amyl acetate	1	20.7449	0	20	104	70	130
Bromoform	1	17.9366	0	20	90	70	130
Ethylbenzene	**1**	**20.8544**	**0**	**20**	**104**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	20.0616	0	20	100	70	130
Styrene	1	20.0093	0	20	100	70	130
m&p-Xylenes	**1**	**42.407**	**0**	**40**	**106**	**70**	**130**
o-Xylene	**1**	**20.0264**	**0**	**20**	**100**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	14.47	0	20	72	70	130
1,3-Dichlorobenzene	1	19.3612	0	20	97	70	130
1,4-Dichlorobenzene	1	19.2343	0	20	96	70	130
1,2-Dichlorobenzene	1	19.5827	0	20	98	70	130
Isopropylbenzene	1	21.495	0	20	107	70	130
Cyclohexanone	1	96.0075	0	100	96	70	130
Camphene	1	3.316	0	20	17*	70	130
1,2,3-Trichloropropane	1	19.54	0	20	98	70	130
2-Chlorotoluene	1	20.7366	0	20	104	70	130
p-Ethyltoluene	1	21.1772	0	20	106	70	130
4-Chlorotoluene	1	21.1443	0	20	106	70	130
n-Propylbenzene	1	22.0671	0	20	110	70	130
Bromobenzene	1	18.2434	0	20	91	70	130
1,3,5-Trimethylbenzene	1	22.1414	0	20	111	70	130
Butyl methacrylate	1	21.9035	0	20	110	70	130
t-Butylbenzene	1	21.1675	0	20	106	70	130
1,2,4-Trimethylbenzene	1	21.4785	2.0691	20	97	70	130
sec-Butylbenzene	1	22.0972	0	20	110	70	130
4-Isopropyltoluene	1	21.4962	0	20	107	70	130
n-Butylbenzene	1	22.086	0	20	110	70	130
p-Diethylbenzene	1	21.5217	0	20	108	70	130
1,2,4,5-Tetramethylbenzene	1	20.9279	0	20	105	70	130
1,2-Dibromo-3-Chloropropane	1	17.9783	0	20	90	40	160
Camphor	1	195.0086	0	200	98	70	130
Hexachlorobutadiene	1	18.977	0	20	95	70	130
1,2,4-Trichlorobenzene	1	19.8898	0	20	99	70	130
1,2,3-Trichlorobenzene	1	20.1434	0	20	101	70	130
Naphthalene	1	21.1798	1.1433	20	100	40	160

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Bold and underline - Indicates the compounds reported on form1

Form3
RPD DATA DKQP Limits
QC Batch: MBS101380

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M557706.D	AD30072-005(MSD)	4/19/2022 11:43:00 PM
Duplicate(If applicable):	8M557705.D	AD30072-005(MS)	4/19/2022 11:25:00 PM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MSD

Analyte:	Column	Dup/MSD/MBSD Conc	Sample/MS/MBS Conc	RPD	Limit
Chlorodifluoromethane	1	14.1522	15.9742	12	20
Dichlorodifluoromethane	1	15.2238	17.1979	12	20
Chloromethane	1	18.7958	21.1	12	20
Bromomethane	1	17.1479	17.4561	1.8	20
Vinyl Chloride	1	19.274	21.889	13	20
Chloroethane	1	19.4182	21.593	11	20
Trichlorofluoromethane	1	18.9487	20.6349	8.5	20
Ethyl ether	1	19.488	20.6857	6	20
Furan	1	18.7289	20.8567	11	20
1,1,2-Trichloro-1,2,2-trifluoroethane	1	19.5493	21.4428	9.2	20
Methylene Chloride	1	19.3169	21.4805	11	20
Acrolein	1	78.1474	83.9688	7.2	20
Acrylonitrile	1	20.1001	21.1666	5.2	20
Iodomethane	1	14.5709	16.792	14	20
Acetone	1	100.6553	102.5937	1.9	20
Carbon Disulfide	1	20.8867	23.4701	12	20
t-Butyl Alcohol	1	97.0027	103.3438	6.3	20
n-Hexane	1	21.7096	23.2273	6.8	20
Di-isopropyl-ether	1	20.7655	22.6633	8.7	20
1,1-Dichloroethene	1	19.9924	21.8069	8.7	20
Methyl Acetate	1	18.1686	18.7796	3.3	20
Methyl-t-butyl ether	1	19.0771	20.4025	6.7	20
1,1-Dichloroethane	1	19.896	22.2699	11	20
trans-1,2-Dichloroethene	1	19.5535	21.4455	9.2	20
Ethyl-t-butyl ether	1	19.8061	21.1509	6.6	20
cis-1,2-Dichloroethene	1	19.8689	22.1242	11	20
Bromochloromethane	1	21.4503	23.4726	9	20
2,2-Dichloropropane	1	17.3884	20.0165	14	20
Ethyl acetate	1	18.6184	19.7984	6.1	20
1,4-Dioxane	1	911.2892	987.7615	8.1	20
1,1-Dichloropropene	1	20.1367	22.5113	11	20
Chloroform	1	19.4996	21.3921	9.3	20
Cyclohexane	1	22.254	23.6178	5.9	20
1,2-Dichloroethane	1	19.1144	20.8618	8.7	20
2-Butanone	1	19.9885	20.7276	3.6	20
1,1,1-Trichloroethane	1	19.1828	21.3816	11	20
Carbon Tetrachloride	1	19.0497	20.7146	8.4	20
Vinyl Acetate	1	20.8579	22.3562	6.9	20
Bromodichloromethane	1	18.8309	20.5564	8.8	20
Methylcyclohexane	1	21.334	22.1122	3.6	20
Dibromomethane	1	17.6114	19.5203	10	20
1,2-Dichloropropane	1	20.1041	21.8186	8.2	20
Trichloroethene	1	18.4812	20.1099	8.4	20
Benzene	**1**	**20.1695**	**22.1287**	**9.3**	**20**
tert-Amyl methyl ether	1	19.5035	20.4769	4.9	20
Iso-propylacetate	1	17.7763	18.8039	5.6	20
Methyl methacrylate	1	19.3402	19.8078	2.4	20
Dibromochloromethane	1	18.5508	19.5467	5.2	20
2-Chloroethylvinylether	1	0	0	NA	20
cis-1,3-Dichloropropene	1	19.6073	20.8888	6.3	20
trans-1,3-Dichloropropene	1	19.3107	20.7444	7.2	20
Ethyl methacrylate	1	20.1428	21.4175	6.1	20
1,1,2-Trichloroethane	1	19.1556	20.989	9.1	20
1,2-Dibromoethane	1	19.1208	20.4519	6.7	20
1,3-Dichloropropane	1	20.0891	21.5885	7.2	20
4-Methyl-2-Pentanone	1	20.9856	21.5983	2.9	20
2-Hexanone	1	21.7194	22.6	4	20
Tetrachloroethene	1	19.0597	20.8419	8.9	20
Toluene	**1**	**19.7904**	**21.4877**	**8.2**	**20**
1,1,1,2-Tetrachloroethane	1	18.5214	20.2434	8.9	20
Chlorobenzene	1	19.597	21.0486	7.1	20

* - Indicates outside of limits NA - Both concentrations=0... no result can be calculated

Bold and underline - Indicates the compounds reported on form1

Form3
RPD DATA DKQP Limits

QC Batch: MBS101380

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MSD

Analyte:	Column	Dup/MSD/MBSD Conc	Sample/MS/MBS Conc	RPD	Limit
n-Butyl acrylate	1	20.9315	21.8739	4.4	20
n-Amyl acetate	1	20.7449	21.7943	4.9	20
Bromoform	1	17.9366	19.2893	7.3	20
Ethylbenzene	**1**	**20.8544**	**22.1287**	**5.9**	**20**
1,1,2,2-Tetrachloroethane	1	20.0616	21.3581	6.3	20
Styrene	1	20.0093	21.665	7.9	20
m&p-Xylenes	**1**	**42.407**	**44.5833**	**5**	**20**
o-Xylene	**1**	**20.0264**	**22.0129**	**9.5**	**20**
trans-1,4-Dichloro-2-butene	1	14.47	15.7609	8.5	20
1,3-Dichlorobenzene	1	19.3612	20.7234	6.8	20
1,4-Dichlorobenzene	1	19.2343	20.6004	6.9	20
1,2-Dichlorobenzene	1	19.5827	20.7731	5.9	20
Isopropylbenzene	1	21.495	22.8031	5.9	20
Cyclohexanone	1	96.0075	100.4539	4.5	20
Camphene	1	3.316	3.3681	1.6	20
1,2,3-Trichloropropane	1	19.54	21.0435	7.4	20
2-Chlorotoluene	1	20.7366	22.6008	8.6	20
p-Ethyltoluene	1	21.1772	23.4095	10	20
4-Chlorotoluene	1	21.1443	22.6912	7.1	20
n-Propylbenzene	1	22.0671	23.5944	6.7	20
Bromobenzene	1	18.2434	21.0743	14	20
1,3,5-Trimethylbenzene	1	22.1414	22.124	0.08	20
Butyl methacrylate	1	21.9035	23.3528	6.4	20
t-Butylbenzene	1	21.1675	22.2049	4.8	20
1,2,4-Trimethylbenzene	1	21.4785	22.9679	6.7	20
sec-Butylbenzene	1	22.0972	22.8923	3.5	20
4-Isopropyltoluene	1	21.4962	22.0845	2.7	20
n-Butylbenzene	1	22.086	22.9743	3.9	20
p-Diethylbenzene	1	21.5217	22.4316	4.1	20
1,2,4,5-Tetramethylbenzene	1	20.9279	21.4724	2.6	20
1,2-Dibromo-3-Chloropropane	1	17.9783	19.2503	6.8	20
Camphor	1	195.0086	196.9115	0.97	20
Hexachlorobutadiene	1	18.977	21.3558	12	20
1,2,4-Trichlorobenzene	1	19.8898	19.822	0.34	20
1,2,3-Trichlorobenzene	1	20.1434	20.9343	3.9	20
Naphthalene	1	21.1798	21.373	0.91	20

* - Indicates outside of limits NA - Both concentrations=0... no result can be calculated

Bold and underline - Indicates the compounds reported on form1

FORM 4
Blank Summary

Blank Number: DAILY BLANK
Blank Data File: 8M557662.D
Matrix: Aqueous

Blank Analysis Date: 04/19/22 10:33
Blank Extraction Date: NA
(If Applicable)
Method: EPA 8260D

Sample Number	Data File	Analysis Date
AD30164-006	8M557680.D	04/19/22 15:48
AD30164-007	8M557681.D	04/19/22 16:06
AD30072-005	8M557664.D	04/19/22 11:10
MBS101376	8M557665.D	04/19/22 11:28

FORM 4
Blank Summary

Blank Number: DAILY BLANK
Blank Data File: 8M557702.D
Matrix: Aqueous

Blank Analysis Date: 04/19/22 22:31
Blank Extraction Date: NA
(If Applicable)
Method: EPA 8260D

Sample Number	Data File	Analysis Date
AD30164-001	8M557716.D	04/20/22 02:46
AD30164-002	8M557717.D	04/20/22 03:05
AD30164-003	8M557718.D	04/20/22 03:23
AD30164-004	8M557719.D	04/20/22 03:41
AD30164-005	8M557720.D	04/20/22 04:00
AD30072-005(MS)	8M557705.D	04/19/22 23:25
MBS101380	8M557703.D	04/19/22 22:49
AD30072-005(MSD	8M557706.D	04/19/22 23:43

Form 5

Tune Name: BFB TUNE
Instrument: GCMS 8
Data File: 8M557497.D
Analysis Date: 04/15/22 08:43
Method: EPA 8260D

Tune Scan/Time Range: Average of 7.372 to 7.391 min

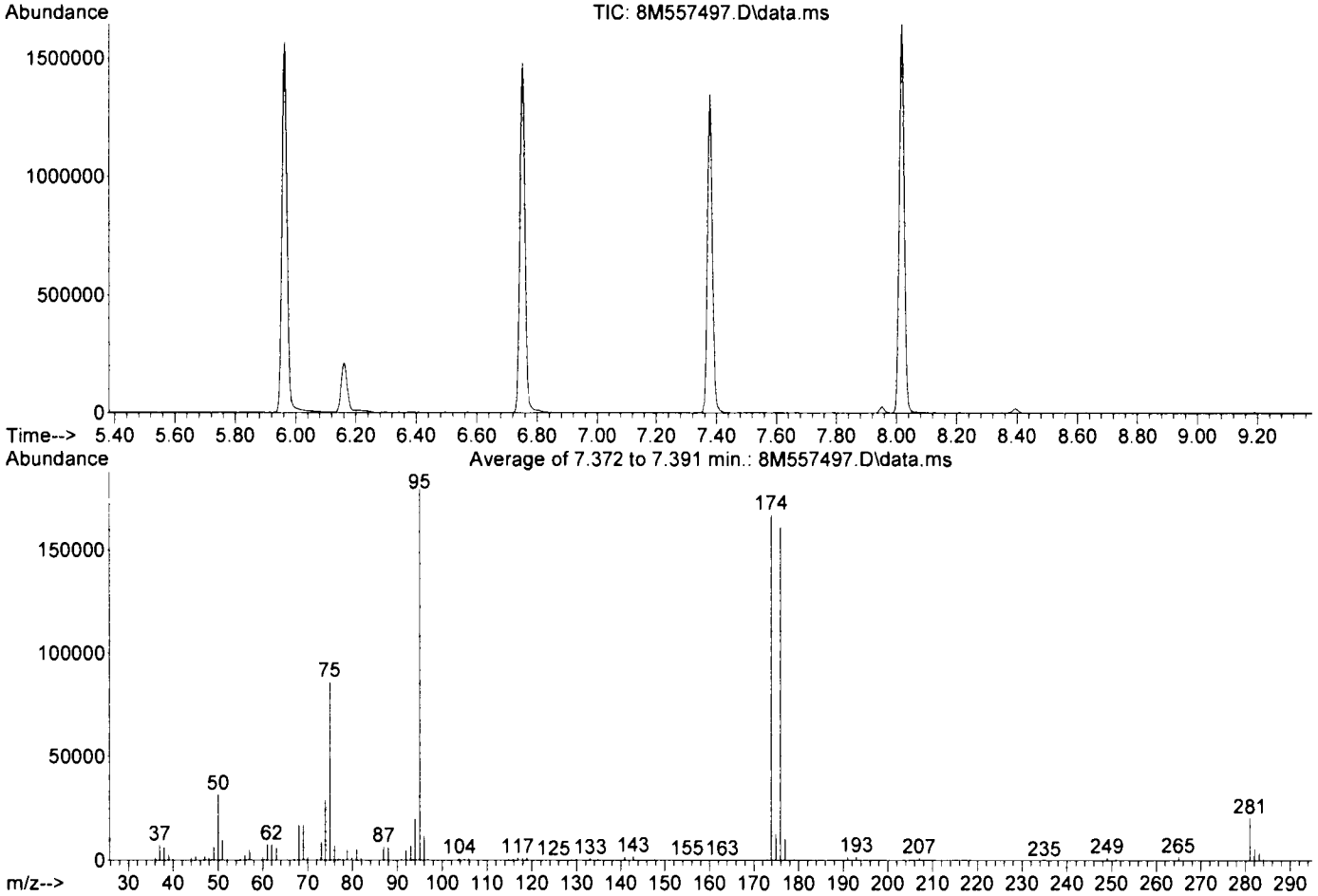
Tgt Mass	Rel Mass	Lo Lim	Hi Lim	Rel Abund	Raw Abund	Pass/ Fail
50	95	15	40	17.8	31924	PASS
75	95	30	60	48.1	86289	PASS
95	95	100	100	100.0	179525	PASS
96	95	5	9	6.6	11845	PASS
173	174	0.00	2	0.4	622	PASS
174	95	50	100	93.2	167402	PASS
175	174	5	9	7.6	12668	PASS
176	174	95	101	96.7	161833	PASS
177	176	5	9	6.6	10750	PASS

Data File	Sample Number	Analysis Date:
8M557498.D	CAL @ 0.5 PPB	04/15/22 09:02
8M557499.D	CAL @ 1 PPB	04/15/22 09:20
8M557500.D	CAL @ 5 PPB	04/15/22 09:38
8M557501.D	CAL @ 10 PPB	04/15/22 09:57
8M557502.D	CAL @ 20 PPB	04/15/22 10:15
8M557503.D	CAL @ 50 PPB	04/15/22 10:33
8M557504.D	CAL @ 100 PPB	04/15/22 10:51
8M557505.D	CAL @ 250 PPB	04/15/22 11:10
8M557506.D	CAL @ 500 PPB	04/15/22 11:28
8M557512.D	ICV	04/15/22 13:18

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-15-22\
Data File : 8M557497.D
Acq On : 15 Apr 2022 08:43
Operator : SG
Sample : BFB TUNE
Misc : A,5ML
ALS Vial : 7 Sample Multiplier: 1

Integration File: RTEINT.P

Method : G:\GcMsData\2022\GCMS_8\MethodQt\8M_A0415.M
Title : @GCMS_8,ug,624,8260
Last Update : Fri Apr 15 13:40:59 2022



Spectrum Information: Average of 7.372 to 7.391 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	17.8	31924	PASS
75	95	30	60	48.1	86289	PASS
95	95	100	100	100.0	179525	PASS
96	95	5	9	6.6	11845	PASS
173	174	0.00	2	0.4	622	PASS
174	95	50	100	93.2	167402	PASS
175	174	5	9	7.6	12668	PASS
176	174	95	101	96.7	161833	PASS
177	176	5	9	6.6	10750	PASS

Form 5

Tune Name: BFB TUNE
Instrument: GCMS 8
Data File: 8M557655.D
Analysis Date: 04/19/22 08:28
Method: EPA 8260D

Tune Scan/Time Range: Average of 7.362 to 7.368 min

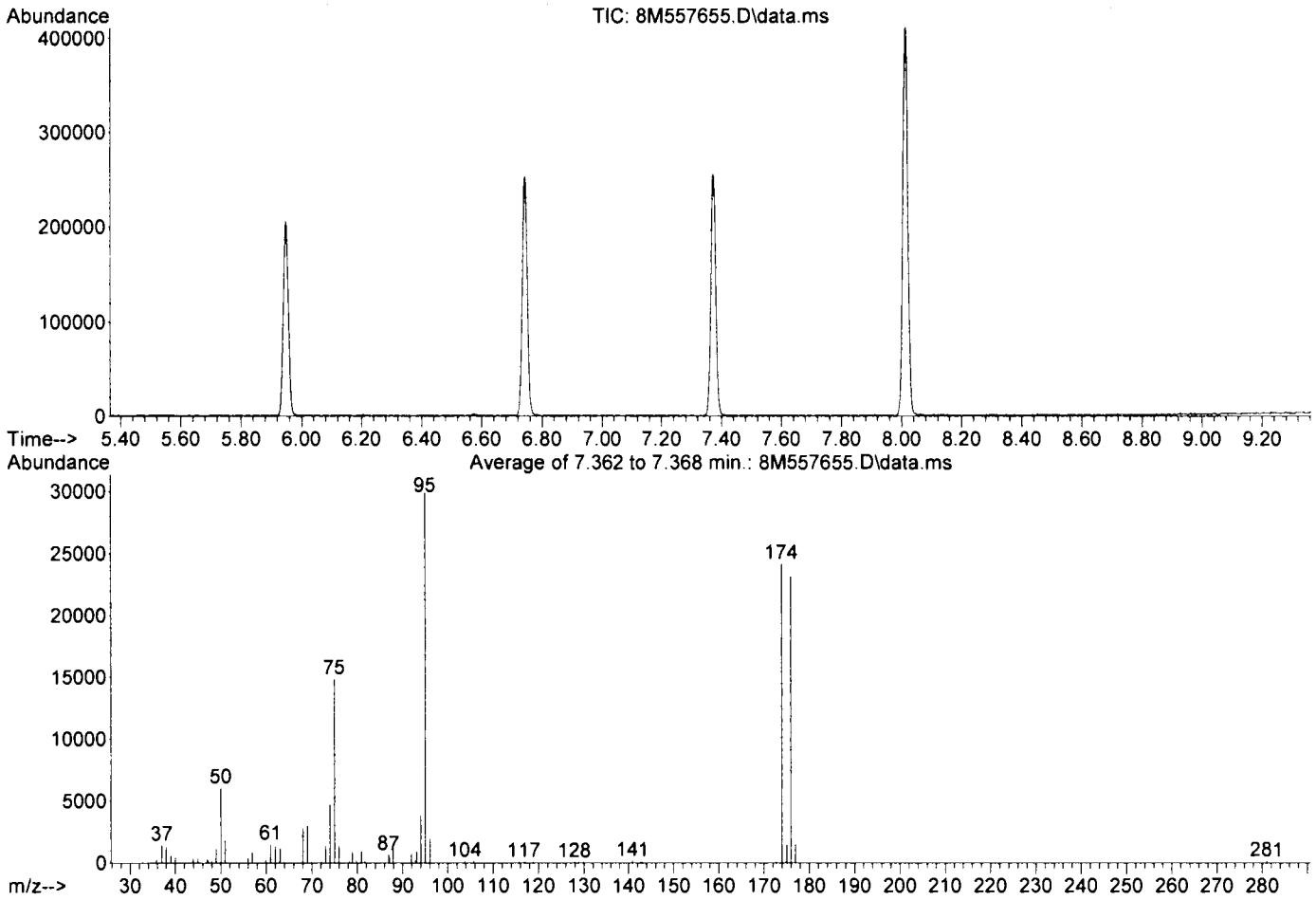
Tgt Mass	Rel Mass	Lo Lim	Hi Lim	Rel Abund	Raw Abund	Pass/ Fail
50	95	15	40	20.3	6076	PASS
75	95	30	60	49.7	14878	PASS
95	95	100	100	100.0	29931	PASS
96	95	5	9	6.6	1979	PASS
173	174	0.00	2	0.4	95	PASS
174	95	50	100	80.8	24190	PASS
175	174	5	9	6.3	1512	PASS
176	174	95	101	95.9	23189	PASS
177	176	5	9	6.7	1556	PASS

Data File	Sample Number	Analysis Date:
8M557657.D	CAL @ 20 PPB	04/19/22 09:02
8M557660.D	DI	04/19/22 09:57
8M557661.D	DAILY BLANK	04/19/22 10:15
8M557662.D	DAILY BLANK	04/19/22 10:33
8M557663.D	AD30072-002	04/19/22 10:52
8M557664.D	AD30072-005	04/19/22 11:10
8M557665.D	MBS101376	04/19/22 11:28
8M557666.D	MBS101377	04/19/22 11:47
8M557670.D	AD30117-007(5X)	04/19/22 12:43
8M557671.D	AD30117-005(5X)	04/19/22 13:02
8M557672.D	AD29993-007(50X)	04/19/22 13:20
8M557673.D	AD29993-007(50X)	04/19/22 13:38
8M557674.D	AD29993-007(50X)	04/19/22 13:57
8M557675.D	AD30154-001(50X)	04/19/22 14:16
8M557676.D	AD30154-002(50X)	04/19/22 14:34
8M557677.D	EF-1-V-370496(041	04/19/22 14:53
8M557678.D	AD30079-011	04/19/22 15:11
8M557679.D	AD30147-015	04/19/22 15:30
8M557680.D	AD30164-006	04/19/22 15:48
8M557681.D	AD30164-007	04/19/22 16:06
8M557682.D	AD30107-009	04/19/22 16:25
8M557683.D	AD30107-012	04/19/22 16:43
8M557684.D	AD30118-001	04/19/22 17:01
8M557685.D	AD30118-004	04/19/22 17:20
8M557686.D	AD30118-005	04/19/22 17:38
8M557687.D	AD30138-008	04/19/22 17:56
8M557688.D	AD30138-009	04/19/22 18:15
8M557689.D	AD30138-010	04/19/22 18:33
8M557690.D	AD30138-014	04/19/22 18:51
8M557691.D	AD30138-015	04/19/22 19:09
8M557692.D	AD30138-016	04/19/22 19:28
8M557693.D	AD30138-017	04/19/22 19:46

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-19-22\
Data File : 8M557655.D
Acq On : 19 Apr 2022 08:28
Operator : JM
Sample : BFB TUNE
Misc : A,5ML
ALS Vial : 1 Sample Multiplier: 1

Integration File: RTEINT.P

Method : G:\GcMsData\2022\GCMS_8\MethodQt\8M_A0415.M
Title : @GCMS_8,ug,624,8260
Last Update : Fri Apr 15 13:40:59 2022



Spectrum Information: Average of 7.362 to 7.368 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	20.3	6076	PASS
75	95	30	60	49.7	14878	PASS
95	95	100	100	100.0	29931	PASS
96	95	5	9	6.6	1979	PASS
173	174	0.00	2	0.4	95	PASS
174	95	50	100	80.8	24190	PASS
175	174	5	9	6.3	1512	PASS
176	174	95	101	95.9	23189	PASS
177	176	5	9	6.7	1556	PASS

Form 5

Tune Name: BFB TUNE
Instrument: GCMS 8
Data File: 8M557696.D
Analysis Date: 04/19/22 20:41
Method: EPA 8260D

Tune Scan/Time Range: Average of 7.365 to 7.384 min

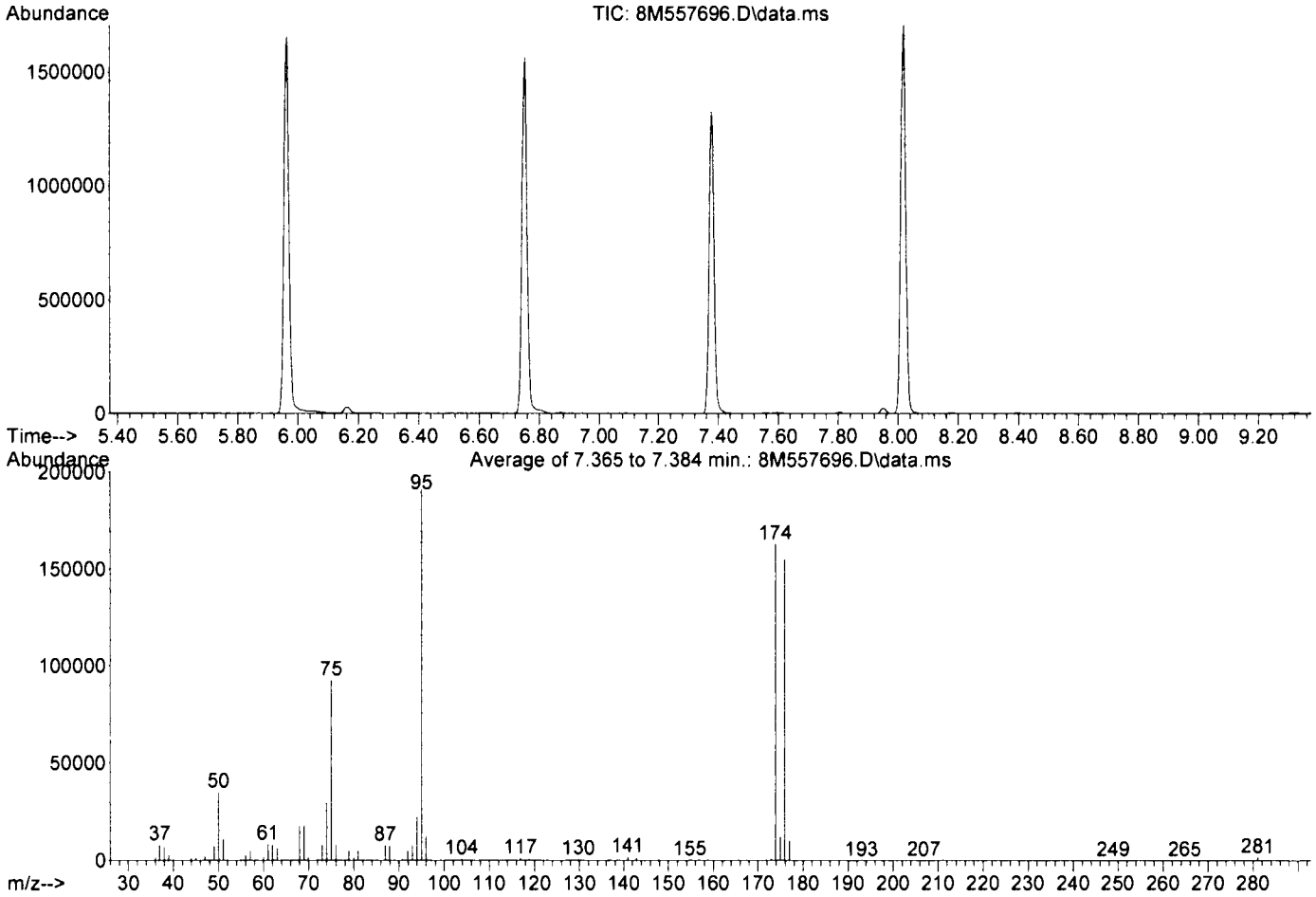
Tgt Mass	Rel Mass	Lo Lim	Hi Lim	Rel Abund	Raw Abund	Pass/ Fail
50	95	15	40	18.3	35035	PASS
75	95	30	60	48.6	92792	PASS
95	95	100	100	100.0	191018	PASS
96	95	5	9	6.6	12614	PASS
173	174	0.00	2	0.6	900	PASS
174	95	50	100	85.4	163173	PASS
175	174	5	9	7.5	12299	PASS
176	174	95	101	95.2	155334	PASS
177	176	5	9	6.7	10417	PASS

Data File	Sample Number	Analysis Date:
8M557697.D	CAL @ 20PPB	04/19/22 20:59
8M557700.D	BLK	04/19/22 21:54
8M557701.D	BLK	04/19/22 22:12
8M557702.D	DAILY BLANK	04/19/22 22:31
8M557703.D	MBS101380	04/19/22 22:49
8M557704.D	STD	04/19/22 23:07
8M557705.D	AD30072-005(MS)	04/19/22 23:25
8M557706.D	AD30072-005(MSD	04/19/22 23:43
8M557707.D	BLK	04/20/22 00:02
8M557708.D	BLK	04/20/22 00:20
8M557709.D	AD30199-008	04/20/22 00:38
8M557710.D	AD30199-009	04/20/22 00:56
8M557711.D	AD30156-007	04/20/22 01:15
8M557712.D	AD30166-001	04/20/22 01:33
8M557713.D	AD30166-002	04/20/22 01:52
8M557714.D	AD30170-001	04/20/22 02:10
8M557715.D	AD30170-002	04/20/22 02:28
8M557716.D	AD30164-001	04/20/22 02:46
8M557717.D	AD30164-002	04/20/22 03:05
8M557718.D	AD30164-003	04/20/22 03:23
8M557719.D	AD30164-004	04/20/22 03:41
8M557720.D	AD30164-005	04/20/22 04:00
8M557721.D	AD30138-003	04/20/22 04:18
8M557722.D	AD30138-004	04/20/22 04:36
8M557723.D	AD30138-005	04/20/22 04:55
8M557724.D	AD30138-006	04/20/22 05:13
8M557725.D	AD30138-007	04/20/22 05:31
8M557726.D	AD30138-011(10X)	04/20/22 05:50
8M557727.D	AD30138-012(20X)	04/20/22 06:08
8M557728.D	AD30138-013(50X)	04/20/22 06:26
8M557729.D	BLK	04/20/22 06:45

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-1922\
Data File : 8M557696.D
Acq On : 19 Apr 2022 20:41
Operator : JM
Sample : BFB TUNE
Misc : A,5ML
ALS Vial : 3 Sample Multiplier: 1

Integration File: RTEINT.P

Method : G:\GcMsData\2022\GCMS_8\MethodQt\8M_A0415.M
Title : @GCMS_8,ug,624,8260
Last Update : Fri Apr 15 13:40:59 2022



Spectrum Information: Average of 7.365 to 7.384 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	18.3	35035	PASS
75	95	30	60	48.6	92792	PASS
95	95	100	100	100.0	191018	PASS
96	95	5	9	6.6	12614	PASS
173	174	0.00	2	0.6	900	PASS
174	95	50	100	85.4	163173	PASS
175	174	5	9	7.5	12299	PASS
176	174	95	101	95.2	155334	PASS
177	176	5	9	6.7	10417	PASS

2041509 0079

Method: EPA 8260D

Form 6
Initial Calibration

Instrument: GCMS_8

Level #	Data File:	Cal Identifier:	Analysis Date/Time	Level #	Data File:	Cal Identifier:	Analysis Date/Time
1	8M557502.D	CAL @ 20 PPB	04/15/22 10:15	2	8M557500.D	CAL @ 5 PPB	04/15/22 09:38
3	8M557501.D	CAL @ 10 PPB	04/15/22 09:57	4	8M557503.D	CAL @ 50 PPB	04/15/22 10:33
5	8M557504.D	CAL @ 100 PPB	04/15/22 10:51	6	8M557505.D	CAL @ 250 PPB	04/15/22 11:10
7	8M557506.D	CAL @ 500 PPB	04/15/22 11:28	8	8M557499.D	CAL @ 1 PPB	04/15/22 09:20
9	8M557498.D	CAL @ 0.5 PPB	04/15/22 09:02				

Compound	Col	Mr	Fit:	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8	RF9	AvgRf	RT	Corr1	Corr2	%Rsd		Calibration Level Concentrations Lvl1	Lvl2	Lvl3	Lvl4	Lvl5	Lvl6	Lvl7	Lvl8	Lvl9
Chlorodifluoromethane	1	0	Qua	0.2810	0.1573	0.1641	0.3217	0.3558	0.3785	0.3462	0.1648	-----	0.271	1.67	0.998	0.999	35	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Dichlorodifluorometha	1	0	Avg	0.1653	0.1418	0.1579	0.1758	0.1922	0.2000	0.1854	0.1500	-----	0.171	1.66	0.999	1.00	12	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Chloromethane	1	0	Avg	0.2150	0.2001	0.2228	0.2269	0.2404	0.2519	0.2309	0.2239	-----	0.227	1.84	0.998	1.00	6.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromomethane	1	0	Avg	0.1510	0.1440	0.1520	0.1707	0.1946	0.2189	0.1887	0.1615	-----	0.173	2.20	0.994	0.998	15	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Vinyl Chloride	1	0	Avg	0.2292	0.2152	0.2296	0.2488	0.2695	0.2825	0.2628	0.2253	-----	0.245	1.91	0.999	1.00	9.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Chloroethane	1	0	Avg	0.1523	0.1606	0.1589	0.1677	0.1757	0.1839	0.1655	0.1661	-----	0.166	2.28	0.997	0.999	5.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Trichlorofluoromethan	1	0	Avg	0.3369	0.3251	0.3467	0.3601	0.3925	0.4178	0.3810	0.3390	-----	0.362	2.49	0.998	0.999	8.8	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethyl ether	1	0	Avg	0.1767	0.1725	0.1833	0.1896	0.2038	0.2133	0.1921	0.1759	-----	0.188	2.71	0.997	0.999	7.6	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Furan	1	0	Avg	0.3167	0.3087	0.3303	0.3375	0.3536	0.3624	0.3204	0.3375	-----	0.333	2.75	0.996	1.00	5.5	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,2-Trichloro-1,2,2-tr	1	0	Avg	0.1834	0.1836	0.1904	0.1957	0.2123	0.2230	0.2060	0.1934	-----	0.198	2.91	0.998	1.00	7.1	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Methylene Chloride	1	0	Avg	0.2383	0.2426	0.2481	0.2581	0.2765	0.2920	0.2688	0.2471	-----	0.259	3.30	0.998	1.00	7.2	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Acrolein	1	0	Qua	0.0389	0.0353	0.0416	0.0456	0.0494	0.0521	0.0480	0.0236	-----	0.0418	2.82	0.998	1.00	22		100.0	25.00	50.00	250.0	500.0	1250.	2500.	5.00	
Acrylonitrile	1	0	Avg	0.0852	0.0740	0.0907	0.0911	0.0994	0.1029	0.0936	0.0797	-----	0.0896	3.49	0.998	1.00	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Iodomethane	1	0	Avg	0.3158	0.2828	0.3240	0.3500	0.3606	0.3641	0.3336	0.2610	-----	0.324	3.05	0.998	1.00	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Acetone	1	0	Avg	0.0594	0.0629	0.0642	0.0640	0.0670	0.0692	0.0604	0.0705	-----	0.0647	2.93	0.995	0.999	6.1	0.10 a	100.0	25.00	50.00	250.0	500.0	1250.	2500.	5.00	
Carbon Disulfide	1	0	Avg	0.5196	0.5141	0.5404	0.5862	0.6283	0.6580	0.6098	0.5479	-----	0.576	3.12	0.998	1.00	9.2	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
t-Butyl Alcohol	1	0	Avg	0.0355	0.0345	0.0367	0.0379	0.0407	0.0426	0.0384	0.0351	-----	0.0377	2.71	0.997	0.999	7.6		100.0	25.00	50.00	250.0	500.0	1250.	2500.	5.00	
n-Hexane	1	0	Avg	0.2130	0.1972	0.2206	0.2331	0.2541	0.2594	0.2420	0.2251	-----	0.231	3.77	0.999	1.00	9.1		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Di-isopropyl-ether	1	0	Avg	0.6691	0.6481	0.6876	0.7085	0.7611	0.7746	0.6902	0.6604	-----	0.700	3.92	0.997	1.00	6.6		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1-Dichloroethene	1	0	Avg	0.3277	0.3147	0.3368	0.3526	0.3789	0.3926	0.3555	0.3355	-----	0.349	2.91	0.998	1.00	7.5	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Methyl Acetate	1	0	Avg	0.1629	0.1909	0.1897	0.1765	0.1838	0.1920	0.1724	0.2085	-----	0.185	3.20	0.997	0.999	7.6	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Methyl-t-butyl ether	1	0	Avg	0.6308	0.6058	0.6649	0.6870	0.7196	0.7617	0.6913	0.6253	0.6330	0.669	3.52	0.998	0.999	7.6	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	0.50
1,1-Dichloroethane	1	0	Avg	0.4016	0.3962	0.4182	0.4261	0.4611	0.4740	0.4360	0.4098	-----	0.428	3.89	0.998	1.00	6.5	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
trans-1,2-Dichloroethe	1	0	Avg	0.2367	0.2320	0.2451	0.2583	0.2812	0.2925	0.2715	0.2472	-----	0.258	3.54	0.999	1.00	8.4	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethyl-t-butyl ether	1	0	Avg	0.6721	0.6576	0.7032	0.7279	0.7737	0.8070	0.7319	0.6983	-----	0.722	4.22	0.998	1.00	6.9	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
cis-1,2-Dichloroethene	1	0	Avg	0.3889	0.3857	0.4044	0.4220	0.4462	0.4634	0.4206	0.3900	-----	0.415	4.35	0.998	1.00	6.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromochloromethane	1	0	Avg	0.1954	0.1907	0.2041	0.2073	0.2125	0.2067	0.1824	0.1970	-----	0.200	4.52	0.996	1.00	5.0		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
2,2-Dichloropropane	1	0	Avg	0.3307	0.3157	0.3352	0.3456	0.3712	0.3844	0.3511	0.3245	-----	0.345	4.35	0.998	1.00	6.8		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethyl acetate	1	0	Avg	0.2002	0.1994	0.2117	0.2176	0.2335	0.2377	0.2206	0.2363	-----	0.220	4.38	0.999	1.00	7.0		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,4-Dioxane	1	0	Avg	0.0028	0.0027	0.0031	0.0031	0.0033	0.0035	0.0031	0.0028	-----	0.00309	5.49	0.997	0.999	9.0		1000.	250.0	500.0	2500.	5000.	12500	25000	50.00	
1,1-Dichloropropene	1	0	Avg	0.3179	0.3114	0.3344	0.3412	0.3631	0.3794	0.3480	0.3189	-----	0.339	4.80	0.998	1.00	7.0		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Chloroform	1	0	Avg	0.4212	0.4231	0.4477	0.4511	0.4775	0.4987	0.4604	0.4123	-----	0.449	4.55	0.998	1.00	6.6	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Dibromofluoromethan	1	0	Avg	0.2746	0.2701	0.2712	0.2801	0.2781	0.2789	0.2808	0.2722	0.2757	0.276	4.66	-1	-1	1.4		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Cyclohexane	1	0	Avg	0.2979	0.2902	0.3188	0.3228	0.3539	0.3692	0.3410	0.3131	-----	0.326	4.75	0.998	1.00	8.3	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dichloroethane-d4	1	0	Avg	0.1470	0.1465	0.1485	0.1474	0.1459	0.1451	0.1454	0.1463	0.1481	0.147	4.88	-1	-1	0.80		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
1,2-Dichloroethane	1	0	Avg	0.3428	0.3349	0.3574	0.3585	0.3744	0.3812	0.3329	0.3637	0.3917	0.360	4.93	0.996	1.00	5.7	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	0.50
2-Butanone	1	0	Avg	0.0873	0.0868	0.0937	0.1000	0.1035	0.1095	0.0931	0.0985	-----	0.0966	4.34	0.993	0.999	8.2	0.10 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,1-Trichloroethane	1	0	Avg	0.3836	0.3749	0.4018	0.4093	0.4314	0.4577	0.4264	0.3785	-----	0.408	4.70	0.999	1.00	7.1	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Carbon Tetrachloride	1	0	Avg	0.3416	0.3257	0.3547	0.3645	0.3903	0.4113	0.3825	0.3595	-----	0.366	4.81	0.999	1.00	7.5	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Vinyl Acetate	1	0	Avg	0.7130	0.6208	0.7138	0.7807	0.8402	0.8578	0.7691	0.5843	-----	0.735	3.92	0.997	1.00	13		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromodichloromethan	1	0	Avg	0.3366	0.3355	0.3552	0.3639	0.3868	0.4107	0.3835	0.3418	-----	0.364	5.56	0.999	1.00	7.5	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	

Flags

a - failed the min rf criteria

c - failed the minimum correlation coeff criteria(if applicable)

Note: Avg Rsd: 8.169

Corr 1 = Correlation Coefficient for linear Eq.
Corr 2 = Correlation Coefficient for quad Eq.
Fit = Indicates whether Avg RF, Linear, or Quadratic Curve was used for compound.

2041509 0080

Method: EPA 8260D

Form 6
Initial Calibration

Instrument: GCMS_8

Level #	Data File	Cal Identifier	Analysis Date/Time	Level #	Data File	Cal Identifier	Analysis Date/Time
1	8M557502.D	CAL @ 20 PPB	04/15/22 10:15	2	8M557500.D	CAL @ 5 PPB	04/15/22 09:38
3	8M557501.D	CAL @ 10 PPB	04/15/22 09:57	4	8M557503.D	CAL @ 50 PPB	04/15/22 10:33
5	8M557504.D	CAL @ 100 PPB	04/15/22 10:51	6	8M557505.D	CAL @ 250 PPB	04/15/22 11:10
7	8M557506.D	CAL @ 500 PPB	04/15/22 11:28	8	8M557499.D	CAL @ 1 PPB	04/15/22 09:20
9	8M557498.D	CAL @ 0.5 PPB	04/15/22 09:02				

Compound	Col	Mr	Fit:	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8	RF9	AvgRf	RT	Corr1	Corr2	%Rsd		Calibration Level Concentrations Lvl1	Lvl2	Lvl3	Lvl4	Lvl5	Lvl6	Lvl7	Lvl8	Lvl9
Methylcyclohexane	1	0	Avg	0.3035	0.2797	0.3120	0.3254	0.3584	0.3787	0.3581	0.3154	-----	0.329	5.41	0.999	1.00	10	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Dibromomethane	1	0	Avg	0.1919	0.1909	0.2061	0.2098	0.2242	0.2398	0.2274	0.1733	-----	0.208	5.49	0.999	1.00	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dichloropropane	1	0	Avg	0.2340	0.2368	0.2482	0.2536	0.2699	0.2889	0.2649	0.2316	-----	0.254	5.42	0.998	0.999	7.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Trichloroethene	1	0	Avg	0.2750	0.2691	0.2807	0.2943	0.3169	0.3385	0.3235	0.2662	-----	0.296	5.29	0.999	1.00	9.3	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Benzene	1	0	Avg	0.9258	0.9138	0.9693	0.9820	1.0468	1.0878	0.9708	0.9609	0.9158	0.975	4.93	0.997	0.999	6.1	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	0.50
tert-Amyl methyl ether	1	0	Avg	0.6511	0.6179	0.6767	0.6936	0.7376	0.7702	0.6956	0.6268	-----	0.684	4.98	0.997	1.00	7.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Iso-propylacetate	1	0	Avg	0.5037	0.4820	0.4768	0.4664	0.4888	0.4819	0.4026	0.6842	-----	0.498	4.93	0.992	1.00	16	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Methyl methacrylate	1	0	Avg	0.2113	0.2119	0.2315	0.2252	0.2326	0.2366	0.2043	0.2696	-----	0.228	5.46	0.995	0.999	9.0	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Dibromochloromethan	1	0	Avg	0.3206	0.2880	0.3266	0.3384	0.3647	0.3864	0.3575	0.2915	-----	0.334	6.44	0.998	1.00	10	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
2-Chloroethylvinylethe	1	0	Avg	0.0240	0.0210	0.0259	0.0280	0.0311	0.0342	0.0315	0.0234	-----	0.0274	5.72	0.998	0.999	17		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
cis-1,3-Dichloropropen	1	0	Avg	0.4323	0.4046	0.4526	0.4581	0.4868	0.5128	0.4636	0.4194	-----	0.454	5.81	0.997	0.999	7.8	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
trans-1,3-Dichloroprop	1	0	Avg	0.4067	0.3935	0.4122	0.4304	0.4646	0.4882	0.4338	0.3854	-----	0.427	6.10	0.997	0.999	8.3	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethyl methacrylate	1	0	Avg	0.2182	0.1949	0.2233	0.2328	0.2457	0.2531	0.2204	0.2047	-----	0.224	6.13	0.995	0.999	8.7	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,2-Trichloroethane	1	0	Avg	0.2545	0.2571	0.2631	0.2642	0.2782	0.2930	0.2661	0.2601	-----	0.267	6.21	0.998	0.999	4.8	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dibromoethane	1	0	Avg	0.2779	0.2634	0.2893	0.2887	0.3085	0.3275	0.2982	0.2773	-----	0.291	6.51	0.998	0.999	6.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,3-Dichloropropane	1	0	Avg	0.4308	0.4254	0.4541	0.4546	0.4744	0.4924	0.4347	0.4185	-----	0.448	6.30	0.996	0.999	5.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
4-Methyl-2-Pentanone	1	0	Avg	0.2151	0.2144	0.2289	0.2327	0.2449	0.2542	0.2263	0.2328	-----	0.231	5.88	0.997	0.999	5.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
2-Hexanone	1	0	Avg	0.1511	0.1395	0.1584	0.1603	0.1688	0.1755	0.1517	0.1384	-----	0.156	6.32	0.995	0.999	8.4	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Tetrachloroethene	1	0	Avg	0.2470	0.2344	0.2545	0.2549	0.2747	0.2912	0.2675	0.2484	-----	0.259	6.31	0.998	0.999	6.9	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Toluene-d8	1	0	Avg	1.1404	1.1237	1.1438	1.1208	1.1224	1.1035	1.0935	1.1324	1.1388	1.12	5.97	-1	-1	1.5		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Toluene	1	0	Avg	0.6878	0.6838	0.7038	0.7082	0.7561	0.7854	0.7074	0.7077	-----	0.718	6.00	0.997	1.00	4.9	0.40	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,1,2-Tetrachloroeth	1	0	Avg	0.2767	0.2634	0.2930	0.2905	0.3116	0.3331	0.3016	0.2607	-----	0.291	6.81	0.998	0.999	8.4		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Chlorobenzene	1	0	Avg	0.7787	0.7588	0.8084	0.8091	0.8610	0.9053	0.8077	0.8023	0.7627	0.811	6.77	0.997	0.999	5.8	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	0.50
n-Butyl acrylate	1	0	Avg	0.7905	0.6847	0.7586	0.8523	0.9171	0.9743	0.8823	0.6373	-----	0.812	7.02	0.998	0.999	14	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
n-Amyl acetate	1	0	Avg	0.6495	0.5726	0.6530	0.6921	0.7379	0.7580	0.6717	0.5588	-----	0.662	7.14	0.996	1.00	11	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromoform	1	0	Avg	0.4000	0.3735	0.4069	0.4261	0.4632	0.5096	0.4774	0.3436	-----	0.425	7.22	0.999	0.999	13	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethylbenzene	1	0	Avg	0.6351	0.5869	0.6741	0.6832	0.7297	0.7785	0.6894	0.6277	-----	0.676	6.82	0.996	0.999	8.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,2,2-Tetrachloroeth	1	0	Avg	0.5739	0.5354	0.5861	0.5855	0.6181	0.6578	0.6006	0.5640	-----	0.590	7.43	0.998	0.999	6.2	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromofluorobenzene	1	0	Avg	0.8069	0.8084	0.7927	0.7944	0.8004	0.8068	0.8100	0.8089	0.7996	0.803	7.38	-1	-1	0.81		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Styrene	1	0	Avg	1.5225	1.4035	1.5342	1.5741	1.6958	1.7651	1.5280	1.3815	-----	1.55	7.10	0.995	0.999	8.4	0.30	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
m&p-Xylenes	1	0	Avg	0.8938	0.8553	0.9178	0.9205	0.9852	1.0303	0.8841	0.8584	0.8552	0.911	6.87	0.994	0.999	6.7	0.10	40.00	10.00	20.00	100.0	200.0	500.0	1000.	2.00	1.00
o-Xylene	1	0	Avg	0.8783	0.8688	0.9104	0.9157	0.9756	1.0257	0.9069	0.8585	-----	0.918	7.09	0.996	0.999	6.2	0.30	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
trans-1,4-Dichloro-2-b	1	0	Avg	0.2230	0.2078	0.2276	0.2278	0.2460	0.2516	0.2127	0.2272	-----	0.228	7.46	0.993	0.999	6.5		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,3-Dichlorobenzene	1	0	Avg	1.0710	1.0277	1.1048	1.1051	1.1825	1.2491	1.1232	1.0657	-----	1.12	7.99	0.997	0.999	6.3	0.60	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,4-Dichlorobenzene	1	0	Avg	1.0904	1.0791	1.1406	1.1258	1.2073	1.2735	1.1512	1.1050	-----	1.15	8.03	0.997	0.999	5.7	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dichlorobenzene	1	0	Avg	1.0223	0.9824	1.0320	1.0408	1.1180	1.1866	1.0724	0.9546	-----	1.05	8.25	0.997	0.999	7.1	0.40	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Isopropylbenzene	1	0	Avg	2.1700	2.0726	2.1995	2.2280	2.3826	2.4558	1.9549	2.0278	-----	2.19	7.29	0.986	0.999	7.8	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Cyclohexanone	1	0	Avg	0.0155	0.0182	0.0170	0.0158	0.0161	0.0178	0.0151	0.0164	-----	0.0166	7.36	0.993	0.998	6.6		100.0	25.00	50.00	250.0	500.0	1250.	2500.	5.00	
Camphene	1	0	Avg	0.5302	0.5007	0.5332	0.5418	0.5883	0.6184	0.5628	0.5359	-----	0.551	7.45	0.998	0.999	6.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,3-Trichloropropane	1	0	Avg	0.7305	0.6712	0.7567	0.7539	0.7970	0.8333	0.7393	0.7590	-----	0.755	7.47	0.996	0.999	6.3		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
2-Chlorotoluene	1	0	Avg	1.3730	1.3613	1.3998	1.4086	1.4813	1.5190	1.2856	1.3984	-----	1.40	7.57	0.993	0.999	5.1		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	

Flags
a - failed the min rf criteria
c - failed the minimum correlation coeff criteria(if applicable)

Note: Avg Rsd: 8.169
Corr 1 = Correlation Coefficient for linear Eq.
Corr 2 = Correlation Coefficient for quad Eq.
Fit = Indicates whether Avg RF, Linear, or Quadratic Curve was used for compound.

2041509 0081

Method: EPA 8260D

Form 6
Initial Calibration

Instrument: GCMS_8

Level #	Data File	Cal Identifier	Analysis Date/Time	Level #	Data File	Cal Identifier	Analysis Date/Time
1	8M557502.D	CAL @ 20 PPB	04/15/22 10:15	2	8M557500.D	CAL @ 5 PPB	04/15/22 09:38
3	8M557501.D	CAL @ 10 PPB	04/15/22 09:57	4	8M557503.D	CAL @ 50 PPB	04/15/22 10:33
5	8M557504.D	CAL @ 100 PPB	04/15/22 10:51	6	8M557505.D	CAL @ 250 PPB	04/15/22 11:10
7	8M557506.D	CAL @ 500 PPB	04/15/22 11:28	8	8M557499.D	CAL @ 1 PPB	04/15/22 09:20
9	8M557498.D	CAL @ 0.5 PPB	04/15/22 09:02				

Compound	Col	Mr	Fit:	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8	RF9	AvgRf	RT	Corr1	Corr2	%Rsd		Calibration Level Concentrations Lvl1	Lvl2	Lvl3	Lvl4	Lvl5	Lvl6	Lvl7	Lvl8	Lvl9
p-Ethyltoluene	1	0	Avg	2.1016	1.9744	2.1154	2.1200	2.2539	2.3381	1.9299	1.8926	-----	2.09	7.57	0.991	0.999	7.4		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
4-Chlorotoluene	1	0	Avg	1.3588	1.3430	1.3880	1.3894	1.4893	1.5355	1.2878	1.2969	-----	1.39	7.63	0.992	0.999	6.3		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
n-Propylbenzene	1	0	Avg	2.4070	2.3357	2.4760	2.4659	2.6263	2.6760	1.9993	2.3302	-----	2.41	7.51	0.977	0.998	8.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromobenzene	1	0	Avg	1.1848	1.1351	1.2958	1.2278	1.3085	1.3557	1.1973	1.2721	-----	1.25	7.48	0.996	0.999	5.9		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,3,5-Trimethylbenzen	1	0	Avg	1.6674	1.6543	1.7340	1.7526	1.8715	1.9125	1.5697	1.6408	-----	1.73	7.59	0.990	0.999	6.8		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Butyl methacrylate	1	0	Avg	0.5523	0.4875	0.5476	0.5739	0.6083	0.6038	0.4907	0.4618	-----	0.541	7.60	0.988	0.999	10	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
t-Butylbenzene	1	0	Avg	1.6754	1.5873	1.7125	1.7360	1.8681	1.9673	1.7618	1.5968	-----	1.74	7.79	0.997	0.999	7.4		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,4-Trimethylbenzen	1	0	Avg	1.7801	1.6939	1.8022	1.8392	1.9608	2.0377	1.7355	1.7086	-----	1.82	7.81	0.993	0.999	6.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
sec-Butylbenzene	1	0	Avg	1.9666	1.8959	2.0123	2.0446	2.1953	2.2755	1.8690	1.9244	-----	2.02	7.91	0.990	0.999	7.2		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
4-Isopropyltoluene	1	0	Avg	1.7179	1.6012	1.7047	1.7735	1.9102	1.9993	1.6943	1.6130	-----	1.75	7.97	0.993	0.999	7.9		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
n-Butylbenzene	1	0	Avg	1.7241	1.6280	1.7545	1.7884	1.9102	1.9712	1.7339	1.6328	-----	1.77	8.20	0.996	0.999	6.9		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
p-Diethylbenzene	1	0	Avg	0.9729	0.8922	0.9769	1.0304	1.1077	1.1808	1.0714	0.9300	-----	1.02	8.18	0.998	0.999	9.4		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,4,5-Tetramethylbe	1	0	Avg	1.3150	1.1895	1.3233	1.4036	1.5212	1.6273	1.4607	1.1468	-----	1.37	8.63	0.997	0.999	12		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dibromo-3-Chloro	1	0	Avg	0.1284	0.1130	0.1318	0.1369	0.1532	0.1677	0.1565	0.1202	-----	0.139	8.68	0.999	0.999	14	0.05	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Camphor	1	0	Avg	0.0395	0.0359	0.0428	0.0436	0.0478	0.0517	0.0493	0.0353	0.0373	0.0426	9.11	0.999	0.999	14		200.0	50.00	100.0	500.0	1000.	2500.	5000.	10.00	5.00
Hexachlorobutadiene	1	0	Avg	0.2433	0.2152	0.2396	0.2517	0.2747	0.2924	0.2712	0.2168	-----	0.251	9.25	0.998	0.999	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,4-Trichlorobenzen	1	0	Avg	0.5466	0.5198	0.5562	0.5760	0.6226	0.6748	0.6185	0.5389	-----	0.582	9.16	0.998	0.999	9.0	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,3-Trichlorobenzen	1	0	Avg	0.4344	0.4070	0.4498	0.4643	0.5023	0.5394	0.5069	0.4293	-----	0.467	9.45	0.999	0.999	9.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Naphthalene	1	0	Avg	1.3119	1.1650	1.3315	1.4054	1.5057	1.6165	1.4643	1.1831	-----	1.37	9.32	0.998	0.999	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	

Flags	*Note:* Avg Rsd: 8.169
a - failed the min rf criteria	*Corr 1 = Correlation Coefficient for linear Eq.*
c - failed the minimum correlation coeff criteria(if applicable)	*Corr 2 = Correlation Coefficient for quad Eq.*
	Fit = Indicates whether Avg RF, Linear, or Quadratic Curve was used for compound.

Form7

Continuing Calibration

Calibration Name: CAL @ 20 PPB **Data File:** 8M557657.D **Instrument:** GCMS 8

Cont Calibration Date/Time 4/19/2022 9:02:00 A Method: EPA 8260D

TxtCompd:	Col#	Multi Num	Type	RT	Conc	Conc Exp	Lo Lim	MIN RF	Initial RF	RF	%Diff	Flag
Fluorobenzene	1	0	I	5.08	30.00	30	**			0.000	0.00	
Chlorodifluoromethane	1	0		1.68	16.82	20	20	0.1	0.271	0.323	15.89	
Dichlorodifluoromethane	1	0		1.66	15.35	20	20	0.1	0.171	0.131	23.23	C1
Chloromethane	1	0		1.84	19.73	20	20	0.1	0.227	0.223	1.34	
Bromomethane	1	0		2.19	16.72	20	20	0.1	0.173	0.144	16.40	
Vinyl Chloride	1	0		1.91	20.43	20	20	0.1	0.245	0.251	2.13	
Chloroethane	1	0		2.28	21.01	20	20	0.1	0.166	0.175	5.03	
Trichlorofluoromethane	1	0		2.49	19.91	20	20	0.1	0.362	0.361	0.45	
Ethyl ether	1	0		2.71	22.62	20	20	0.5	0.188	0.213	13.10	
Furan	1	0		2.75	22.32	20	20	0.5	0.333	0.372	11.61	
1,1,2-Trichloro-1,2,2-trifluoroetha	1	0		2.91	21.06	20	20	0.1	0.198	0.209	5.30	
Methylene Chloride	1	0		3.30	22.04	20	20	0.1	0.259	0.285	10.20	
Acrolein	1	0		2.82	95.83	100	20		0.042	0.051	4.17	
Acrylonitrile	1	0		3.49	23.53	20	20		0.090	0.105	17.67	
Iodomethane	1	0		3.05	12.82	20	20		0.324	0.208	35.92	C1
Acetone	1	0		2.93	115.24	100	20	0.1	0.065	0.075	15.24	
Carbon Disulfide	1	0		3.12	21.33	20	20	0.1	0.576	0.614	6.67	
t-Butyl Alcohol	1	0		2.71	113.06	100	20		0.038	0.043	13.06	
n-Hexane	1	0		3.76	24.68	20	20		0.231	0.285	23.40	C1
Di-isopropyl-ether	1	0		3.92	23.73	20	20		0.700	0.831	18.66	
1,1-Dichloroethene	1	0		2.92	21.45	20	20	0.1	0.349	0.375	7.24	
Methyl Acetate	1	0		3.20	21.48	20	20	0.1	0.185	0.198	7.41	
Methyl-t-butyl ether	1	0		3.52	21.97	20	20	0.1	0.669	0.735	9.86	
1,1-Dichloroethane	1	0		3.89	22.14	20	20	0.2	0.428	0.474	10.70	
trans-1,2-Dichloroethene	1	0		3.54	21.47	20	20	0.1	0.258	0.277	7.36	
Ethyl-t-butyl ether	1	0		4.21	22.35	20	20	0.5	0.722	0.806	11.75	
cis-1,2-Dichloroethene	1	0		4.34	22.75	20	20	0.1	0.415	0.472	13.77	
Bromochloromethane	1	0		4.51	24.10	20	20		0.200	0.240	20.51	C1
2,2-Dichloropropane	1	0		4.35	24.33	20	20		0.345	0.420	21.65	C1
Ethyl acetate	1	0		4.37	23.57	20	20		0.220	0.259	17.86	
1,4-Dioxane	1	0		5.48	1104.31	1000	20		0.003	0.003	10.43	
1,1-Dichloropropene	1	0		4.80	21.83	20	20		0.339	0.370	9.16	
Chloroform	1	0		4.55	21.22	20	20	0.2	0.449	0.477	6.12	
Dibromofluoromethane	1	0	S	4.66	29.40	30	**		0.276	0.270	2.02	
Cyclohexane	1	0		4.74	22.84	20	20	0.1	0.326	0.372	14.18	
1,2-Dichloroethane-d4	1	0	S	4.88	29.30	30	**		0.147	0.143	2.32	
1,2-Dichloroethane	1	0		4.92	21.72	20	20	0.1	0.360	0.391	8.62	
2-Butanone	1	0		4.34	21.57	20	20	0.1	0.097	0.104	7.83	
1,1,1-Trichloroethane	1	0		4.70	20.76	20	20	0.1	0.408	0.423	3.78	
Carbon Tetrachloride	1	0		4.81	20.41	20	20	0.1	0.366	0.374	2.06	
Vinyl Acetate	1	0		3.91	24.70	20	20		0.735	0.908	23.49	C1
Bromodichloromethane	1	0		5.56	20.98	20	20	0.2	0.364	0.382	4.92	
Methylcyclohexane	1	0		5.41	21.96	20	20	0.1	0.329	0.361	9.78	
Dibromomethane	1	0		5.48	20.05	20	20		0.208	0.209	0.26	
1,2-Dichloropropane	1	0		5.42	22.84	20	20	0.1	0.254	0.289	14.18	
Trichloroethene	1	0		5.29	20.42	20	20	0.2	0.296	0.302	2.10	
Benzene	1	0		4.93	22.07	20	20	0.5	0.975	1.076	10.35	
tert-Amyl methyl ether	1	0		4.97	21.69	20	20		0.684	0.741	8.43	
Chlorobenzene-d5	1	0	I	6.75	30.00	30	**			0.000	0.00	
Iso-propylacetate	1	0		4.93	22.29	20	20	0.5	0.498	0.555	11.46	
Methyl methacrylate	1	0		5.41	28.46	20	20	0.5	0.228	0.324	42.31	C1
Dibromochloromethane	1	0		6.43	20.85	20	20	0.1	0.334	0.348	4.24	

S-Surrogate Compound I-Internal Standard Compound

N/O or N/Q - Not applicable for this run C1-Compound %Diff exceeds limits ** - No limit specified in method

Note: 8260/8270 limits are compared against the %DIFF/R.F. 625 limits are compared against the %DIFF.

624 limits are compared against the concentration found. 524.2 limits are compared against the %DIFF

Form7

Continuing Calibration

Calibration Name: CAL @ 20 PPB **Data File:** 8M557657.D **Instrument:** GCMS 8

Cont Calibration Date/Time 4/19/2022 9:02:00 A **Method:** EPA 8260D

TxtCompd:	Col#	Multi Num	Type	RT	Conc	Conc Exp	Lo Lim	MIN RF	Initial RF	RF	%Diff	Flag
2-Chloroethylvinylether	1	0		5.71	20.97	20	20		0.027	0.029	4.87	
cis-1,3-Dichloropropene	1	0		5.81	22.86	20	20	0.2	0.454	0.519	14.29	
trans-1,3-Dichloropropene	1	0		6.10	22.62	20	20	0.1	0.427	0.483	13.09	
Ethyl methacrylate	1	0		6.12	24.63	20	20	0.5	0.224	0.276	23.17	C1
1,1,2-Trichloroethane	1	0		6.20	22.01	20	20	0.1	0.267	0.294	10.05	
1,2-Dibromoethane	1	0		6.51	21.73	20	20	0.1	0.291	0.317	8.66	
1,3-Dichloropropane	1	0		6.30	22.56	20	20		0.448	0.505	12.78	
4-Methyl-2-Pentanone	1	0		5.87	23.78	20	20	0.1	0.231	0.275	18.92	
2-Hexanone	1	0		6.32	24.35	20	20	0.1	0.156	0.189	21.74	C1
Tetrachloroethene	1	0		6.30	20.73	20	20	0.2	0.259	0.269	3.65	
Toluene-d8	1	0	S	5.96	31.07	30	**		1.124	1.165	3.57	
Toluene	1	0		6.00	21.82	20	20	0.4	0.718	0.783	9.09	
1,1,1,2-Tetrachloroethane	1	0		6.80	20.59	20	20		0.291	0.300	2.97	
Chlorobenzene	1	0		6.77	21.55	20	20	0.5	0.811	0.873	7.74	
1,4-Dichlorobenzene-d4	1	0	I	8.01	30.00	30	**			0.000	0.00	
n-Butyl acrylate	1	0		7.02	25.11	20	20	0.5	0.812	1.020	25.53	C1
n-Amyl acetate	1	0		7.14	26.06	20	20	0.5	0.662	0.862	30.29	C1
Bromoform	1	0		7.21	20.94	20	20	0.1	0.425	0.445	4.71	
Ethylbenzene	1	0		6.81	22.90	20	20	0.1	0.676	0.774	14.50	
1,1,2,2-Tetrachloroethane	1	0		7.43	23.38	20	20	0.1	0.590	0.690	16.89	
Bromofluorobenzene	1	0	S	7.38	30.57	30	**		0.803	0.818	1.91	
Styrene	1	0		7.09	23.48	20	20	0.3	1.551	1.820	17.38	
m&p-Xylenes	1	0		6.87	47.59	40	20	0.1	0.911	1.084	18.98	
o-Xylene	1	0		7.09	22.91	20	20	0.3	0.918	1.051	14.57	
trans-1,4-Dichloro-2-butene	1	0		7.46	25.34	20	20		0.228	0.289	26.72	C1
1,3-Dichlorobenzene	1	0		7.99	21.75	20	20	0.6	1.116	1.214	8.76	
1,4-Dichlorobenzene	1	0		8.03	21.97	20	20	0.5	1.147	1.260	9.85	
1,2-Dichlorobenzene	1	0		8.25	21.78	20	20	0.4	1.051	1.145	8.90	
Isopropylbenzene	1	0		7.28	23.53	20	20	0.1	2.186	2.572	17.64	
Cyclohexanone	1	0		7.35	184.07	100	20		0.017	0.030	84.07	C1
Camphene	1	0		7.45	23.60	20	20		0.551	0.651	17.98	
1,2,3-Trichloropropane	1	0		7.46	23.09	20	20		0.755	0.872	15.47	
2-Chlorotoluene	1	0		7.57	23.65	20	20		1.403	1.660	18.26	
p-Ethyltoluene	1	0		7.56	22.81	20	20		2.091	2.384	14.04	
4-Chlorotoluene	1	0		7.63	23.78	20	20		1.386	1.648	18.89	
n-Propylbenzene	1	0		7.50	24.32	20	20		2.415	2.937	21.62	C1
Bromobenzene	1	0		7.47	24.86	20	20		1.247	1.550	24.32	C1
1,3,5-Trimethylbenzene	1	0		7.59	24.11	20	20		1.725	2.080	20.55	C1
Butyl methacrylate	1	0		7.60	26.00	20	20	0.5	0.541	0.703	30.02	C1
t-Butylbenzene	1	0		7.78	22.55	20	20		1.738	1.960	12.74	
1,2,4-Trimethylbenzene	1	0		7.80	23.17	20	20		1.820	2.108	15.84	
sec-Butylbenzene	1	0		7.90	23.46	20	20		2.023	2.373	17.28	
4-Isopropyltoluene	1	0		7.97	23.08	20	20		1.752	2.022	15.42	
n-Butylbenzene	1	0		8.20	23.70	20	20		1.768	2.095	18.48	
p-Diethylbenzene	1	0		8.18	22.66	20	20		1.020	1.156	13.31	
1,2,4,5-Tetramethylbenzene	1	0		8.63	22.49	20	20		1.373	1.545	12.47	
1,2-Dibromo-3-Chloropropane	1	0		8.68	20.88	20	20	0.05	0.139	0.145	4.38	
Camphor	1	0		9.10	206.55	200	20		0.043	0.044	3.28	
Hexachlorobutadiene	1	0		9.24	22.28	20	20		0.251	0.279	11.38	
1,2,4-Trichlorobenzene	1	0		9.16	20.76	20	20	0.2	0.582	0.604	3.79	
1,2,3-Trichlorobenzene	1	0		9.45	20.98	20	20		0.467	0.490	4.92	
Naphthalene	1	0		9.31	22.03	20	20		1.373	1.512	10.13	

S-Surrogate Compound I-Internal Standard Compound

N/O or N/Q - Not applicable for this run C1-Compound %Diff exceeds limits ** - No limit specified in method

Note: 8260/8270 limits are compared against the %DIFF/R.F. 625 limits are compared against the %DIFF.

624 limits are compared against the concentration found. 524.2 limits are compared against the %DIFF

Form7

Continuing Calibration

Calibration Name: CAL @ 20PPB **Data File:** 8M557697.D **Instrument:** GCMS 8

Cont Calibration Date/Time 4/19/2022 8:59:00 P Method: EPA 8260D

TxtCompd:	Col#	Multi Num	Type	RT	Conc	Conc Exp	Lo Lim	MIN RF	Initial RF	RF	%Diff	Flag
Fluorobenzene	1	0	I	5.08	30.00	30	**			0.000	0.00	
Chlorodifluoromethane	1	0		1.68	16.90	20	20	0.1	0.271	0.325	15.52	
Dichlorodifluoromethane	1	0		1.66	14.29	20	20	0.1	0.171	0.122	28.54	C1
Chloromethane	1	0		1.83	18.85	20	20	0.1	0.227	0.213	5.77	
Bromomethane	1	0		2.19	12.37	20	20	0.1	0.173	0.107	38.16	C1
Vinyl Chloride	1	0		1.91	19.58	20	20	0.1	0.245	0.240	2.12	
Chloroethane	1	0		2.28	20.50	20	20	0.1	0.166	0.171	2.51	
Trichlorofluoromethane	1	0		2.49	19.51	20	20	0.1	0.362	0.354	2.47	
Ethyl ether	1	0		2.71	21.58	20	20	0.5	0.188	0.203	7.91	
Furan	1	0		2.75	21.61	20	20	0.5	0.333	0.360	8.07	
1,1,2-Trichloro-1,2,2-trifluoroetha	1	0		2.91	20.28	20	20	0.1	0.198	0.201	1.41	
Methylene Chloride	1	0		3.30	21.57	20	20	0.1	0.259	0.279	7.84	
Acrolein	1	0		2.82	85.60	100	20		0.042	0.045	14.40	
Acrylonitrile	1	0		3.49	22.45	20	20		0.090	0.101	12.24	
Iodomethane	1	0		3.05	13.73	20	20		0.324	0.222	31.35	C1
Acetone	1	0		2.93	111.49	100	20	0.1	0.065	0.072	11.49	
Carbon Disulfide	1	0		3.12	20.84	20	20	0.1	0.576	0.600	4.20	
t-Butyl Alcohol	1	0		2.71	107.83	100	20		0.038	0.041	7.83	
n-Hexane	1	0		3.76	22.39	20	20		0.231	0.258	11.97	
Di-isopropyl-ether	1	0		3.92	23.17	20	20		0.700	0.811	15.84	
1,1-Dichloroethene	1	0		2.92	21.36	20	20	0.1	0.349	0.373	6.82	
Methyl Acetate	1	0		3.20	21.11	20	20	0.1	0.185	0.195	5.55	
Methyl-t-butyl ether	1	0		3.53	21.35	20	20	0.1	0.669	0.714	6.75	
1,1-Dichloroethane	1	0		3.89	22.01	20	20	0.2	0.428	0.471	10.06	
trans-1,2-Dichloroethene	1	0		3.54	20.95	20	20	0.1	0.258	0.270	4.76	
Ethyl-t-butyl ether	1	0		4.22	21.89	20	20	0.5	0.722	0.790	9.46	
cis-1,2-Dichloroethene	1	0		4.34	21.75	20	20	0.1	0.415	0.451	8.73	
Bromochloromethane	1	0		4.51	24.02	20	20		0.200	0.240	20.08	
2,2-Dichloropropane	1	0		4.35	19.87	20	20		0.345	0.343	0.66	
Ethyl acetate	1	0		4.37	22.46	20	20		0.220	0.247	12.28	
1,4-Dioxane	1	0		5.48	1040.05	1000	20		0.003	0.003	4.00	
1,1-Dichloropropene	1	0		4.80	21.67	20	20		0.339	0.368	8.35	
Chloroform	1	0		4.55	21.49	20	20	0.2	0.449	0.482	7.43	
Dibromofluoromethane	1	0	S	4.66	29.66	30	**		0.276	0.273	1.12	
Cyclohexane	1	0		4.74	22.19	20	20	0.1	0.326	0.362	10.96	
1,2-Dichloroethane-d4	1	0	S	4.88	30.05	30	**		0.147	0.147	0.17	
1,2-Dichloroethane	1	0		4.92	21.32	20	20	0.1	0.360	0.384	6.60	
2-Butanone	1	0		4.34	19.86	20	20	0.1	0.097	0.096	0.71	
1,1,1-Trichloroethane	1	0		4.70	20.66	20	20	0.1	0.408	0.422	3.32	
Carbon Tetrachloride	1	0		4.81	20.03	20	20	0.1	0.366	0.367	0.15	
Vinyl Acetate	1	0		3.91	23.10	20	20		0.735	0.849	15.49	
Bromodichloromethane	1	0		5.56	20.60	20	20	0.2	0.364	0.375	2.99	
Methylcyclohexane	1	0		5.41	21.33	20	20	0.1	0.329	0.351	6.67	
Dibromomethane	1	0		5.48	19.97	20	20		0.208	0.208	0.17	
1,2-Dichloropropane	1	0		5.42	22.19	20	20	0.1	0.254	0.281	10.93	
Trichloroethene	1	0		5.29	20.24	20	20	0.2	0.296	0.299	1.20	
Benzene	1	0		4.93	21.91	20	20	0.5	0.975	1.068	9.54	
tert-Amyl methyl ether	1	0		4.97	21.23	20	20		0.684	0.726	6.17	
Chlorobenzene-d5	1	0	I	6.75	30.00	30	**			0.000	0.00	
Iso-propylacetate	1	0		4.93	20.86	20	20	0.5	0.498	0.520	4.28	
Methyl methacrylate	1	0		5.45	22.54	20	20	0.5	0.228	0.257	12.72	
Dibromochloromethane	1	0		6.43	20.40	20	20	0.1	0.334	0.341	1.98	

S-Surrogate Compound I-Internal Standard Compound

N/O or N/Q - Not applicable for this run C1-Compound %Diff exceeds limits ** - No limit specified in method

Note: 8260/8270 limits are compared against the %DIFF/R.F. 625 limits are compared against the %DIFF.

624 limits are compared against the concentration found. 524.2 limits are compared against the %DIFF

Form7

Continuing Calibration

Calibration Name: CAL @ 20PPB **Data File:** 8M557697.D **Instrument:** GCMS 8

Cont Calibration Date/Time 4/19/2022 8:59:00 P Method: EPA 8260D

TxtCompd:	Col#	Multi Num	Type	RT	Conc	Conc Exp	Lo Lim	MIN RF	Initial RF	RF	%Diff	Flag
2-Chloroethylvinylether	1	0		5.71	19.48	20	20		0.027	0.027	2.61	
cis-1,3-Dichloropropene	1	0		5.81	21.72	20	20	0.2	0.454	0.493	8.60	
trans-1,3-Dichloropropene	1	0		6.10	21.78	20	20	0.1	0.427	0.465	8.92	
Ethyl methacrylate	1	0		6.13	23.00	20	20	0.5	0.224	0.258	14.98	
1,1,2-Trichloroethane	1	0		6.21	21.52	20	20	0.1	0.267	0.287	7.61	
1,2-Dibromoethane	1	0		6.51	21.06	20	20	0.1	0.291	0.307	5.32	
1,3-Dichloropropane	1	0		6.30	22.38	20	20		0.448	0.502	11.92	
4-Methyl-2-Pentanone	1	0		5.87	22.87	20	20	0.1	0.231	0.264	14.33	
2-Hexanone	1	0		6.32	23.03	20	20	0.1	0.156	0.179	15.16	
Tetrachloroethene	1	0		6.30	20.46	20	20	0.2	0.259	0.265	2.31	
Toluene-d8	1	0	S	5.96	30.87	30	**		1.124	1.157	2.92	
Toluene	1	0		6.00	21.61	20	20	0.4	0.718	0.775	8.06	
1,1,1,2-Tetrachloroethane	1	0		6.80	20.67	20	20		0.291	0.301	3.37	
Chlorobenzene	1	0		6.77	21.35	20	20	0.5	0.811	0.865	6.74	
1,4-Dichlorobenzene-d4	1	0	I	8.02	30.00	30	**			0.000	0.00	
n-Butyl acrylate	1	0		7.02	23.19	20	20	0.5	0.812	0.942	15.96	
n-Amyl acetate	1	0		7.14	24.15	20	20	0.5	0.662	0.799	20.74	C1
Bromoform	1	0		7.21	19.70	20	20	0.1	0.425	0.419	1.48	
Ethylbenzene	1	0		6.81	22.29	20	20	0.1	0.676	0.753	11.46	
1,1,2,2-Tetrachloroethane	1	0		7.43	22.07	20	20	0.1	0.590	0.651	10.35	
Bromofluorobenzene	1	0	S	7.38	29.79	30	**		0.803	0.797	0.71	
Styrene	1	0		7.10	22.33	20	20	0.3	1.551	1.731	11.65	
m&p-Xylenes	1	0		6.87	45.32	40	20	0.1	0.911	1.032	13.31	
o-Xylene	1	0		7.09	22.09	20	20	0.3	0.918	1.013	10.44	
trans-1,4-Dichloro-2-butene	1	0		7.46	22.36	20	20		0.228	0.255	11.82	
1,3-Dichlorobenzene	1	0		7.99	20.93	20	20	0.6	1.116	1.168	4.66	
1,4-Dichlorobenzene	1	0		8.03	21.03	20	20	0.5	1.147	1.206	5.14	
1,2-Dichlorobenzene	1	0		8.25	20.91	20	20	0.4	1.051	1.099	4.57	
Isopropylbenzene	1	0		7.28	22.61	20	20	0.1	2.186	2.471	13.03	
Cyclohexanone	1	0		7.35	122.06	100	20		0.017	0.020	22.06	C1
Camphene	1	0		7.45	22.61	20	20		0.551	0.624	13.07	
1,2,3-Trichloropropane	1	0		7.46	21.50	20	20		0.755	0.812	7.51	
2-Chlorotoluene	1	0		7.57	22.70	20	20		1.403	1.593	13.49	
p-Ethyltoluene	1	0		7.56	22.78	20	20		2.091	2.382	13.91	
4-Chlorotoluene	1	0		7.63	22.52	20	20		1.386	1.561	12.59	
n-Propylbenzene	1	0		7.51	23.13	20	20		2.415	2.793	15.67	
Bromobenzene	1	0		7.47	22.40	20	20		1.247	1.397	11.98	
1,3,5-Trimethylbenzene	1	0		7.59	22.30	20	20		1.725	1.924	11.51	
Butyl methacrylate	1	0		7.60	24.50	20	20	0.5	0.541	0.662	22.50	C1
t-Butylbenzene	1	0		7.78	21.63	20	20		1.738	1.880	8.15	
1,2,4-Trimethylbenzene	1	0		7.80	22.22	20	20		1.820	2.022	11.10	
sec-Butylbenzene	1	0		7.90	22.29	20	20		2.023	2.254	11.43	
4-Isopropyltoluene	1	0		7.97	22.08	20	20		1.752	1.934	10.42	
n-Butylbenzene	1	0		8.20	22.30	20	20		1.768	1.971	11.49	
p-Diethylbenzene	1	0		8.18	21.51	20	20		1.020	1.097	7.55	
1,2,4,5-Tetramethylbenzene	1	0		8.63	21.38	20	20		1.373	1.468	6.88	
1,2-Dibromo-3-Chloropropane	1	0		8.68	19.74	20	20	0.05	0.139	0.137	1.31	
Camphor	1	0		9.10	180.96	200	20		0.043	0.039	9.52	
Hexachlorobutadiene	1	0		9.24	20.50	20	20		0.251	0.257	2.50	
1,2,4-Trichlorobenzene	1	0		9.16	19.86	20	20	0.2	0.582	0.578	0.68	
1,2,3-Trichlorobenzene	1	0		9.45	20.11	20	20		0.467	0.469	0.57	
Naphthalene	1	0		9.31	20.69	20	20		1.373	1.420	3.45	

S-Surrogate Compound I-Internal Standard Compound

N/O or N/Q - Not applicable for this run C1-Compound %Diff exceeds limits ** - No limit specified in method

Note: 8260/8270 limits are compared against the %DIFF/R.F. 625 limits are compared against the %DIFF.

624 limits are compared against the concentration found. 524.2 limits are compared against the %DIFF

FORM8

Internal Standard Areas

Evaluation Std Data File: 8M557502.D Method: EPA 8260D

Analysis Date/Time: 04/15/22 10:15

Lab File ID: CAL @ 20 PPB

	I1		I2		I3		I4		I5		I6		I7	
	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT
Eval File Area/RT:	708804	5.08	631558	6.75	351886	8.02								
Eval File Area Limit:	354402-1417608		315779-1263116		175943-703772									
Eval File Rt Limit:	4.58-5.58		6.25-7.25		7.52-8.52									

Data File	Sample#						
8M557498.D	CAL @ 0.5 PPB	673269	5.08	602815	6.75	336532	8.02
8M557499.D	CAL @ 1 PPB	677571	5.08	598717	6.75	337938	8.02
8M557500.D	CAL @ 5 PPB	690154	5.08	618822	6.75	346663	8.02
8M557501.D	CAL @ 10 PPB	669250	5.08	599966	6.75	340178	8.02
8M557502.D	CAL @ 20 PPB	708804	5.08	631558	6.75	351886	8.02
8M557503.D	CAL @ 50 PPB	676310	5.08	625719	6.75	354229	8.02
8M557504.D	CAL @ 100 PPB	638187	5.08	594836	6.75	336099	8.02
8M557505.D	CAL @ 250 PPB	610490	5.08	580750	6.75	327122	8.02
8M557506.D	CAL @ 500 PPB	662473	5.08	647988	6.75	359332	8.02
8M557512.D	ICV	736505	5.08	670801	6.75	378050	8.02

I1 = Fluorobenzene
I2 = Chlorobenzene-d5
I3 = 1,4-Dichlorobenzene-d4
I4 =
I5 =
I6 =
I7 =

625/8270 Internal Standard concentration = 40 mg/L (in final extract)
624/8260 Internal Standard concentration = 30ug/L
524 Internal Standard concentration =5ug/L

Internal Standard Areas

Upper Limit = + 100% of internal standard area from daily cal or mid pt.

Lower Limit = - 50% of internal standard area from daily cal or mid pt.

Flags:

A - Indicates the compound failed the internal standard area criteria

R - Indicates the compound failed the internal standard retention time criteria.

Retention Times: Limit = within +/- 0.5 min of internal standard retention time from the daily cal or mid pt.

FORM8

Internal Standard Areas

Evaluation Std Data File: 8M557657.D Method: EPA 8260D

Analysis Date/Time: 04/19/22 09:02

Lab File ID: CAL @ 20 PPB

	I1		I2		I3		I4		I5		I6		I7	
	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT
Eval File Area/RT:	703113	5.08	625948	6.75	331223	8.01								
Eval File Area Limit:	351556-1406226		312974-1251896		165612-662446									
Eval File Rt Limit:	4.58-5.58		6.25-7.25		7.51-8.51									

Data File	Sample#													
8M557660.D	DI	776988	5.08	690887	6.75	364579	8.01							
8M557661.D	DAILY BLANK	739136	5.08	658881	6.75	356697	8.02							
8M557662.D	DAILY BLANK	716658	5.08	650033	6.75	352657	8.02							
8M557663.D	AD30072-002	707276	5.08	635464	6.75	344203	8.01							
8M557664.D	AD30072-005	713513	5.08	643223	6.75	343672	8.02							
8M557665.D	MBS101376	730806	5.08	647660	6.75	351130	8.01							
8M557666.D	MBS101377	697457	5.08	617255	6.75	337269	8.01							
8M557670.D	AD30117-007(5X)	753008	5.08	666826	6.75	355278	8.02							
8M557671.D	AD30117-005(5X)	738047	5.08	668500	6.75	357718	8.01							
8M557672.D	AD29993-007(50X)(T:	662871	5.08	601893	6.75	326092	8.01							
8M557673.D	AD29993-007(50X)(T:	766502	5.08	680686	6.75	369325	8.02							
8M557674.D	AD29993-007(50X)(T)	732654	5.08	658865	6.75	351568	8.02							
8M557675.D	AD30154-001(50X)(T)	730828	5.08	656716	6.75	354091	8.02							
8M557676.D	AD30154-002(50X)(T)	770673	5.08	681089	6.75	372464	8.02							
8M557677.D	EF-1-V-370496(04192	742206	5.08	663173	6.75	356625	8.02							
8M557678.D	AD30079-011	725490	5.08	648494	6.75	347669	8.02							
8M557679.D	AD30147-015	730606	5.08	652270	6.75	346182	8.02							
8M557680.D	AD30164-006	719708	5.08	649500	6.75	349163	8.02							
8M557681.D	AD30164-007	725018	5.08	652132	6.75	344635	8.02							
8M557682.D	AD30107-009	708428	5.08	638075	6.75	337523	8.02							
8M557683.D	AD30107-012	732589	5.08	652918	6.75	348725	8.02							
8M557684.D	AD30118-001	714774	5.08	648484	6.75	343622	8.01							
8M557685.D	AD30118-004	734813	5.08	664889	6.75	354467	8.02							
8M557686.D	AD30118-005	689275	5.08	610858	6.75	331729	8.01							
8M557687.D	AD30138-008	687678	5.08	628628	6.75	339900	8.02							
8M557688.D	AD30138-009	686670	5.08	621471	6.75	339696	8.02							
8M557689.D	AD30138-010	708994	5.08	643140	6.75	347500	8.02							
8M557690.D	AD30138-014	723784	5.08	645378	6.75	346035	8.02							
8M557691.D	AD30138-015	740056	5.08	661893	6.75	357636	8.01							
8M557692.D	AD30138-016	687826	5.08	625511	6.75	330355	8.02							
8M557693.D	AD30138-017	749044	5.08	671929	6.75	361438	8.01							

I1 = Fluorobenzene
I2 = Chlorobenzene-d5
I3 = 1,4-Dichlorobenzene-d4
I4 =
I5 =
I6 =
I7 =

625/8270 Internal Standard concentration = 40 mg/L (in final extract)
624/8260 Internal Standard concentration = 30ug/L
524 Internal Standard concentration =5ug/L

Internal Standard Areas

Upper Limit = + 100% of internal standard area from daily cal or mid pt.

Lower Limit = - 50% of internal standard area from daily cal or mid pt.

Flags:

A - Indicates the compound failed the internal standard area criteria

R - Indicates the compound failed the internal standard retention time criteria.

Retention Times: Limit = within +/- 0.5 min of internal standard retention time from the daily cal or mid pt.

FORM8

Internal Standard Areas

Evaluation Std Data File: 8M557697.D Method: EPA 8260D

Analysis Date/Time: 04/19/22 20:59

Lab File ID: CAL @ 20PPB

	I1		I2		I3		I4		I5		I6		I7	
	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT
Eval File Area/RT:	668370	5.08	596978	6.75	323922	8.02								
Eval File Area Limit:	334185-1336740		298489-1193956		161961-647844									
Eval File Rt Limit:	4.58-5.58		6.25-7.25		7.52-8.52									

Data File	Sample#						
8M557700.D	BLK	725190	5.08	649408	6.75	348348	8.02
8M557701.D	BLK	740623	5.08	654632	6.75	347476	8.02
8M557702.D	DAILY BLANK	733251	5.08	662118	6.75	355710	8.01
8M557703.D	MBS101380	680899	5.08	617422	6.75	336153	8.02
8M557704.D	STD	733228	5.08	654931	6.75	360590	8.02
8M557705.D	AD30072-005(MS)	661390	5.08	594346	6.75	324527	8.02
8M557706.D	AD30072-005(MSD)	720802	5.08	645571	6.75	353078	8.02
8M557707.D	BLK	696954	5.08	628091	6.75	336279	8.02
8M557708.D	BLK	694416	5.08	616156	6.75	334174	8.02
8M557709.D	AD30199-008	733373	5.08	658727	6.75	353678	8.02
8M557710.D	AD30199-009	742014	5.08	669082	6.75	356328	8.02
8M557711.D	AD30156-007	725073	5.08	646522	6.75	345165	8.02
8M557712.D	AD30166-001	704836	5.08	636047	6.75	343126	8.02
8M557713.D	AD30166-002	741143	5.08	663991	6.75	360825	8.02
8M557714.D	AD30170-001	732269	5.08	655571	6.75	348060	8.02
8M557715.D	AD30170-002	726021	5.08	657339	6.75	353340	8.02
8M557716.D	AD30164-001	712290	5.08	635842	6.75	342110	8.02
8M557717.D	AD30164-002	719018	5.08	653058	6.75	352787	8.02
8M557718.D	AD30164-003	746636	5.08	665463	6.75	364846	8.01
8M557719.D	AD30164-004	707527	5.08	638073	6.75	341219	8.02
8M557720.D	AD30164-005	738522	5.08	666851	6.75	359104	8.02
8M557721.D	AD30138-003	720407	5.08	647981	6.75	347403	8.02
8M557722.D	AD30138-004	693904	5.08	623798	6.75	343987	8.02
8M557723.D	AD30138-005	729284	5.08	647064	6.75	347041	8.02
8M557724.D	AD30138-006	743595	5.08	660613	6.75	354159	8.02
8M557725.D	AD30138-007	699364	5.08	635982	6.75	339452	8.02
8M557726.D	AD30138-011(10X)	713228	5.08	632657	6.75	339144	8.02
8M557727.D	AD30138-012(20X)	723556	5.08	635368	6.75	339376	8.02
8M557728.D	AD30138-013(50X)	734154	5.08	654743	6.75	347429	8.01
8M557729.D	BLK	696822	5.08	622856	6.75	329679	8.02

I1 = Fluorobenzene
I2 = Chlorobenzene-d5
I3 = 1,4-Dichlorobenzene-d4
I4 =
I5 =
I6 =
I7 =

625/8270 Internal Standard concentration = 40 mg/L (in final extract)
624/8260 Internal Standard concentration = 30ug/L
524 Internal Standard concentration =5ug/L

Internal Standard Areas

Upper Limit = + 100% of internal standard area from daily cal or mid pt.

Lower Limit = - 50% of internal standard area from daily cal or mid pt.

Flags:

A - Indicates the compound failed the internal standard area criteria

R - Indicates the compound failed the internal standard retention time criteria.

Retention Times: Limit = within +/- 0.5 min of internal standard retention time from the daily cal or mid pt.

Hampton-Clarke
Analytical & Field Services

Last Page of Report

Hampton-Clarke Report Of Analysis

Client: Dewberry
Project: NJT Allied Bldg Supply

HC Project #: 2042834

Sample ID: MW-1R
Lab#: AD30446-001
Matrix: Aqueous

Collection Date: 4/28/2022
Receipt Date: 4/28/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	10	ug/l	5.0	ND
Ethylbenzene	**10**	**ug/l**	**10**	**440**
m&p-Xylenes	**10**	**ug/l**	**10**	**940**
o-Xylene	10	ug/l	10	ND
Toluene	10	ug/l	10	ND
Xylenes (Total)	**10**	**ug/l**	**10**	**940**

Sample ID: DUP_4-28-22 **Collection Date: 4/28/2022**
Lab#: AD30446-002 **Receipt Date: 4/28/2022**
Matrix: Aqueous

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	10	ug/l	5.0	ND
Ethylbenzene	**10**	**ug/l**	**10**	**390**
m&p-Xylenes	**10**	**ug/l**	**10**	**880**
o-Xylene	10	ug/l	10	ND
Toluene	10	ug/l	10	ND
Xylenes (Total)	**10**	**ug/l**	**10**	**880**

Sample ID: FB 4-28-22 **Collection Date: 4/28/2022**
Lab#: AD30446-003 **Receipt Date: 4/28/2022**
Matrix: Aqueous

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

Sample ID: TRIP BLANK
Lab#: AD30446-004
Matrix: Aqueous

Collection Date: 4/27/2022
Receipt Date: 4/28/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

Hampton-Clarke, Inc. (WBE/DBE/SBE)

175 Route 46 West and 2 Madison Road, Fairfield, New Jersey 07004
Ph: 800-426-9992 | 973-244-9770 Fax: 973-244-9787 | 973-439-1458

Service Center: 137-D Gaither Drive, Mount Laurel, New Jersey 08054
Ph (Service Center): 856-780-6057 Fax: 856-780-6056

Hampton-Clarke
WBE/DBE/SBE 800-426-9992
A Women-Owned, Disadvantaged, Small Business Enterprise

NELAC/NJ #07071 | PA #68-00463 | NY #11408 | CT #PH-0671 | KY #90124 | DE HSCA Approved

CHAIN OF CUSTODY RECORD

Project# (Lab Use Only): 2042834

Page 1 of 1

3) Reporting Requirements (Please Circle)

Turnaround	Report Type	Electronic Data Deliv.
When Available:	Summary	NJ Hazsite
1 Business Day (100%) *	Results + QC (Waste)	Excel Reg NJ / NY / PA
2 Business Days (75%) *	Reduced:	EnviroData
3 Business Days (50%) *	[ ] NJ [ ] NY	EQuIS:
4 Business Days (35%) *	[ ] PA [ ] Other___	[ ] 4-File [ ] EZ
5 Business Days (25%)	NJ Full NY ASP CatB	[ ] NYDEC
6 Business Days (Stand.)	NY ASP CatA	[ ] Region 2 or 5
Other:		Other: DKQP

* Expedited TAT Not Always Available. Please Check with Lab.

Customer Information

1a) Customer: Dewberry Engineers Inc.
Address: 600 Parsippany Rd #301
Parsippany NJ 07054
1b) Email/Cell/Fax/Ph: jrobinson@dewberry.com
1c) Send Invoice to: John Robinson
1d) Send Report to: John Robinson

Project Information

2a) Project: Allied Building Supply
NJ Transit Cindy Street
2b) Project Mgr: John Robinson
2c) Project Location (City/State): Linden, NJ
2d) Quote/PO # (If Applicable): 50102686

FOR LAB USE ONLY

Batch # A30446

===> Check If Contingent ===>

Matrix Codes

DW - Drinking Water S - Soil A - Air
GW - Ground Water SL - Sludge
WW - Waste Water OL - Oil
OT - Other (please specify under item 9, Comments)

7) Analysis (specify methods & parameter lists)

<=== Check If Contingent <===

Lab Sample #	4) Customer Sample ID	5) Matrix	6) Sample Date	6) Sample Time	Sample Type: Composite (C)	Sample Type: Grab (G)	BTEX	8) # of Bottles: None	MeOH	En Core	NaOH	HCl	H2SO4	HNO3	Other:	9) Comments
001	MW-1R	GW	4/28/22	15:00		X	X					3				
002	Dup 4-28-22	GW	4/28/22	—		X	X					3				
003	FD 4-29-22	OT	4/28/22	14:40		X	X					3				Field Blank
004	Trip Blank	OT	4/27/22	—		X	X					3				Trip Blank

10) Relinquished by:	Accepted by:	Date	Time
[signature]	Shantel R	4/28/22	17:12

11) Sampler (print name): Date:

Additional Notes DKQP LSRP

Comments, Notes, Special Requirements, HAZARDS

Indicate if low-level methods required to meet current groundwater standards (SPLP for soil):

- [ ] BN or BNA (8270E SIM)
- [ ] VOC (8260D SIM or 8011)
- [ ] SPLP (BN, BNA, Metals)
- [ ] 1,4 Dioxane

Check if applicable:

- [ ] Project-Specific Reporting Limits
- [ ] High Contaminant Concentrations
- [X] NJ LSRP Project (also check boxes above/right)

For NJ LSRP projects, indicate which standards need to be met:

- [X] NJDEP GWQS
- [ ] NJDEP SRS
- [ ] ~~NJDEP SPLP~~
- [ ] Other (specify):

Cooler Temperature: 2.7

Please note NUMBERED items. If not completed your analytical work may be delayed.
A fee of $5/sample will be assessed for storage should sample not be activated for any analysis.

Internal use: sampling plan (check box) HC [ ] or client [ ] FSP#

Hampton-Clarke
Analytical & Field Services

175 US Highway 46, STE D · Fairfield, NJ 07004-2327
2 Madison Road, Fairfield, NJ 07004-2327
800-426-9992 · 973-244-9770
FAX: 973-244-9787
WWW.HCVLAB.COM

Project: NJT Allied Bldg Materials

Client PO: 50102686

Report To: Dewberry
600 Parsippany Road
Parsippany, NJ 07054
Attn: John Robinson

Received Date: 7/6/2022

Report Date: 8/3/2022

Deliverables: NJDEP-R

Lab ID: AD31818

Lab Project No: 2070616

This report is a true report of results obtained from our tests of this material. The report relates only to those samples received and analyzed by the laboratory. All results meet the requirements of the NELAC Institute standards. Laboratory reports may not be reproduced, except in full, without the written approval of the laboratory.

In lieu of a formal contract document, the total aggregate liability of Hampton-Clarke to all parties shall not exceed Hampton-Clarke's total fee for analytical services rendered.

Sean Berls - Quality Assurance Officer OR **Jean Revolus - Laboratory Director**

NJ (07071) NY (ELAP11408) CT (PH-0671)
PA (68-00463) KY (90124)

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Sample Summary

Client: Dewberry

HC Project #: 2070616

Project: NJT Allied Bldg Materials

Lab#	SampleID	Matrix	Collection Date	Receipt Date
AD31818-001	MW-1R	Aqueous	7/6/2022	7/6/2022
AD31818-002	DUP-7-6-22	Aqueous	7/6/2022	7/6/2022
AD31818-003	FB-7-6-22	Aqueous	7/6/2022	7/6/2022
AD31818-004	Trip Blank	Aqueous	7/5/2022	7/6/2022

Data of Known Quality Conformance/Non-Conformance Summary Questionnaire

Laboratory Name: Hampton-Clarke

Client: Dewberry

Project Location: Linden, NJ

Project Number: 2070616

Laboratory Sample ID(s): AD31818

Sampling Date(s): 7/5/2022, 7/6/2022

List DKQP Methods Used: 8260D, 524.2, 8270E, 8081B, 8082A, NJEPH, 6010D, 6020B, 9012B, 7196A

1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	Yes No
1A	Were the method specified handling, preservation, and holding time requirements met?	Yes No
1B	*EPH Method:* Was the EPH method conducted without significant modifications?	Yes No
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes No
3	Were samples received at an appropriate temperature (4±2°C)?	Yes No N/A
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	Yes No
5	a) Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt? b) Were these reporting limits met?	Yes No Yes No N/A
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	Yes No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	Yes No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality".

QC Review

HC Case Narrative

Client: Dewberry **HC Project:** 2070616
Project: NJT Allied Bldg Materials

This case narrative is in the form of an exception report. Method specific and/or QA/QC anomalies related to this report only are detailed below.

Volatile Organic Analysis:

The Method Blank Spike for batch 102306 had recoveries outside QC limits (Laboratory & DKQP limits). Please refer to the applicable Form 3 for the recoveries. Please refer to Form 4 to see which samples are associated with the Method Blank Spike.

The MSD RPD, Matrix Spike and/or Matrix Spike Duplicate for batch 102306 had recoveries outside QC limits (Laboratory & DKQP Limits). Please refer to the applicable Form 3 for the recoveries.

2-Chloroethylvinylether did not recover in the Matrix Spike and/or Matrix Spike Duplicate in batch 102306 due to acid preservation of sample. 2-Chloroethylvinylether readily decomposes under acidic conditions. The recovery of 2-Chloroethylvinylether is within QC limits in the Laboratory Control Sample. Please refer to the applicable Form 3 for the recoveries.

Sean Berls Quality Assurance Officer	Or	Jean Revolus Laboratory Director	8/3/22 Date

Hampton-Clarke
Analytical & Field Services

175 US Highway 46, STE D · FAIRFIELD, NJ 07004
2 MADISON ROAD · FAIRFIELD, NJ 07004
800-426-9992 · 973-244-9770 · FAX: 973-244-9787
WWW. HAMPTON-CLARKE.COM

August 8, 2022

John Robinson, PG, CPG, GISP, LSRP
Senior Hydrogeologist
Environmental Services
600 Parsippany Road, Suite 301
Parsippany, NJ 07054-3715

Re: NJT Allied Bldg Materials (H-C proj 2070616)

Dear Mr. Robinson:

When Hampton-Clarke analyzed the NJT Allied Bldg Materials samples for volatile organic compounds in batch 102306, the associated Method Blank Spike, Matrix Spike, Matrix Spike Duplicate, and MS/MSD RPD failed to meet DKQP criteria for some compounds. Those compounds were Acrolein, n-Amyl acetate, Bromobenzene, n-Butyl acrylate, Butyl methacrylate, Camphene, 2-Chloroethylvilyl ether, Cyclohexanone, trans-1,4-Dichloro-2-butene, p-Diethylbenzene, Ethyl methacrylate, and Furan.

As the compounds which failed were not compounds of interest for your project, it is my opinion that these failures should not affect the usability of your results.

Sincerely,



Sean Berls
QA Manager
Hampton-Clarke
973-598-3888
sberls@hcvlab.com

HC Executive Summary

Client: Dewberry

HC Project #: 2070616

Project: NJT Allied Bldg Materials

Lab#: AD31818-001 **Sample ID: MW-1R**

Analyte	Units	RL	Result	Analytical Method
Ethylbenzene	ug/l	1.0	140	EPA 8260D
m&p-Xylenes	ug/l	1.0	230	EPA 8260D
o-Xylene	ug/l	1.0	1.2	EPA 8260D
Xylenes (Total)	ug/l	1.0	230	EPA 8260D

Lab#: AD31818-002 **Sample ID: DUP-7-6-22**

Analyte	Units	RL	Result	Analytical Method
Ethylbenzene	ug/l	1.0	160	EPA 8260D
m&p-Xylenes	ug/l	1.0	280	EPA 8260D
o-Xylene	ug/l	1.0	1.5	EPA 8260D
Xylenes (Total)	ug/l	1.0	280	EPA 8260D

HC Report of Analysis

Client: Dewberry
HC Project #: 2070616
Project: NJT Allied Bldg Materials

Sample ID: MW-1R
Lab#: AD31818-001
Matrix: Aqueous
Collection Date: 7/6/2022
Receipt Date: 7/6/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	**1**	**ug/l**	**1.0**	**140**
m&p-Xylenes	**1**	**ug/l**	**1.0**	**230**
o-Xylene	**1**	**ug/l**	**1.0**	**1.2**
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	**1**	**ug/l**	**1.0**	**230**

Sample ID: DUP-7-6-22
Lab#: AD31818-002
Matrix: Aqueous

Collection Date: 7/6/2022
Receipt Date: 7/6/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	**1**	**ug/l**	**1.0**	**160**
m&p-Xylenes	**1**	**ug/l**	**1.0**	**280**
o-Xylene	**1**	**ug/l**	**1.0**	**1.5**
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	**1**	**ug/l**	**1.0**	**280**

Sample ID: FB-7-6-22 **Collection Date:** 7/6/2022
Lab#: AD31818-003 **Receipt Date:** 7/6/2022
Matrix: Aqueous

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

Sample ID: Trip Blank
Lab#: AD31818-004
Matrix: Aqueous

Collection Date: 7/5/2022
Receipt Date: 7/6/2022

BTEX (8260)

Analyte	DF	Units	RL	Result
Benzene	1	ug/l	0.50	ND
Ethylbenzene	1	ug/l	1.0	ND
m&p-Xylenes	1	ug/l	1.0	ND
o-Xylene	1	ug/l	1.0	ND
Toluene	1	ug/l	1.0	ND
Xylenes (Total)	1	ug/l	1.0	ND

HC Reporting Limit Definitions/Data Qualifiers

REPORTING DEFINITIONS

DF = Dilution Factor

DUP = Duplicate

LCS = Laboratory Control Spike

MBS = Method Blank Spike

MDL = Method Detection Limit

MR = Matrix Replicate

MS = Matrix Spike

MSD = Matrix Spike Duplicate

NA = Not Applicable

ND = Not Detected

PS = Post Digestion Spike

RL* = Reporting Limit

RT = Retention Time

SD = Serial Dilution

**Samples with elevated Reporting Limits (RLs) as a result of a dilution may not achieve client reporting limits in some cases. The elevated RLs are unavoidable consequences of sample dilution required to quantitate target analytes that exceed the calibration range of the instrument.*

DATA QUALIFIERS

A- Indicates that the Tentatively Identified Compound (TIC) is suspected to be an aldol-condensation product. These compounds are by-products of acetone and methylene chloride used in the extraction process.

B- Indicates analyte was present in the Method Blank and sample.

d- For Pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentration is generally reported.

E- Indicates the concentration exceeded the upper calibration range of the instrument.

J- Indicates the value is estimated because it is either a Tentatively Identified Compound (TIC) or the reported concentration is greater than the MDL but less than the RL. For samples results between the MDL and RL there is a possibility of false positives or misidentification at the quantitation levels. Additionally, the acceptance criteria for QC samples may not be met.

R- Retention Time is out.

Y- Indicates a contaminant found in the blank at less than 10% of the concentration of a contaminant found in the sample.

Laboratory Chronicle

Client: Dewberry

HC Project #: 2070616

Project: NJT Allied Bldg Materials

Lab#: AD31818-001 **Sample ID: MW-1R**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	7/7/22 15:04	SG

Lab#: AD31818-002 **Sample ID: DUP-7-6-22**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	7/7/22 15:23	SG

Lab#: AD31818-003 **Sample ID: FB-7-6-22**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	7/7/22 16:36	SG

Lab#: AD31818-004 **Sample ID: Trip Blank**

Test Code	Prep Method	Prep Date	By	Analytical Method	Analysis Date	By
BTEX (8260)	EPA5030/5035			EPA 8260D	7/7/22 16:54	SG

Chain of Custody

2070616 0012

Hampton-Clarke, Inc. (WBE/DBE/SBE)

175 US Highway 46 and 2 Madison Road, Fairfield, New Jersey 07004
Ph: 800-426-9992 | 973-244-9770 Fax: 973-244-9787 | 973-439-1458
Service Center: 137-D Gaither Drive, Mount Laurel, New Jersey 08054
Ph (Service Center): 856-780-6057 Fax: 856-780-6056
NELAC/NJ #07071 | PA #68-00463 | NY #11408 | CT #PH-0671 | KY #90124 | DE HSCA Approved

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A Women-Owned, Disadvantaged, Small Business Enterprise

CHAIN OF CUSTODY RECORD

Project# (Lab Use Only): 20706116

Page 1 of 1

3) Reporting Requirements (Please Circle)

Turnaround	Report Type	Electronic Data Deliv.
When Available:	Summary	~~NJ Hazsite~~
1 Business Day (100%) *	Results + QC (Waste)	Excel Reg. NJ / NY / PA
2 Business Days (75%) *	Reduced:	EnviroData
3 Business Days (50%) *	[X] NJ [ ] NY	EQuIS: ✓
4 Business Days (35%) *	[ ] PA [ ] Other___	[ ] 4-File [ ] EZ
5 Business Days (25%)	NJ Full / NY ASP CatB	[ ] NYDEC
~~8 Business Days (Stand.)~~	NY ASP CatA	[ ] Region 2 or 5
Other:		Other: LSRP

* Expedited TAT Not Always Available. Please Check with Lab.

Customer Information

1a) Customer: 600 Parsippany Rd suite 301
Address: Parsippany, NJ 07054
1b) Email/Cell/Fax/Ph: 201-602-2407
1c) Send Invoice to: John Robinson
1d) Send Report to: John Robinson

Project Information

2a) Project: NJ Transit station lot 2 Allied Building Materials
2b) Project Mgr: John Robinson
2c) Project Location (City/State): Linden, NJ
2d) Quote/PO # (If Applicable): SO102686

FOR LAB USE ONLY ↓

Batch # AD31818

===> Check If Contingent ===>

Matrix Codes
DW - Drinking Water S - Soil A - Air
GW - Ground Water SL - Sludge
WW - Waste Water OL - Oil
OT - Other (please specify under item 9, Comments)

7) Analysis *(specify methods & parameter lists)*

<=== Check If Contingent <===

Lab Sample #	4) Customer Sample ID	5) Matrix	6) Sample Date	6) Sample Time	Sample Type: Composite (C)	Sample Type: Grab (G)	BTEX	8) # of Bottles: None	MeOH	En Core	NaOH	HCl	H2SO4	HNO3	Other:	9) Comments
001	MW-1R	GW	7/6/22	1115		X	X					3				
002	DUP-7-6-22	GW	7/6/22	—		X	X					3				
003	FB-7-6-22	GW	7/6/22	1110		X	X					3				
004	Trip Blank					X	X					3				

10) Relinquished by:	Accepted by:	Date	Time
[signature]	[signature]	7/6/22	13:50

11) Sampler (print name): John Robinson Date: 7/6/22

Additional Notes DKQP Watch for xylene interference
Benzene RL - 1 ug/L

Comments, Notes, Special Requirements, HAZARDS

Indicate if low-level methods required to meet current groundwater standards (SPLP for soil):
- [ ] BN or BNA (8270E SIM)
- [ ] VOC (8260D SIM or 8011)
- [ ] SPLP (BN, BNA, Metals)
- [ ] 1,4 Dioxane

For NJ LSRP projects, indicate which standards need to be met:
- [X] NJDEP GWQS
- [ ] NJDEP SRS
- [ ] NJDEP SPLP
- [ ] Other (specify):

Check if applicable:
- [ ] Project-Specific Reporting Limits
- [ ] High Contaminant Concentrations
- [X] NJ LSRP Project (also check boxes above/right)

Cooler Temperature: 2°

Please note NUMBERED items. If not completed your analytical work may be delayed.
A fee of $5/sample will be assessed for storage should sample not be activated for any analysis.

Internal use: sampling plan (check box) HC [ ] or client [ ] FSP#

CONDITION UPON RECEIPT

Batch Number AD31818 Entered By: maxwell

Date Entered 7/6/2022 1:58:00 PM

1	Yes	Is there a corresponding COC included with the samples?
2	Yes	Are the samples in a container such as a cooler or Ice chest?
3	No	Are the COC seals intact?
4	T0054	<--- Thermometer ID. Please specify the Temperature inside the container (in degC). 2.8
5	Yes	Are the samples refrigerated (where required)/have they arrived on ice?
6	Yes	Are the samples within the holding times for the parameters listed on the COC? IF no, list parameters and samples:
7	Yes	Are all of the sample bottles intact? If no, specify sample numbers broken/leaking
8	Yes	Are all of the sample labels or numbers legible? If no specify:
9	Yes	Do the contents match the COC? If no, specify
10	Yes	Is there enough sample sent for the analyses listed on the COC? If no, specify:
11	Yes	Are samples preserved correctly?
12	Yes	Was temperature blank present (Place comment below if not)? If not was temperature of samples verified?
13	Yes	Other comments ...Specify (TB date, sample matrix, any missing info, etc.) TRIP BLANK DATE 7/5/22
14	NA	Corrective actions (Specify item number and corrective action taken).
15	NA	Were any samples for ortho-phosphate or dissolved ferrous iron field filtered?

PRESERVATION DOCUMENT

Batch Number AD31818

Entered By: maxwell

Date Entered 7/6/2022 2:03:00 PM

Lab#:	Container Size	Container/Vial Check	Parameter	Preservative	Preservative Lot#	PH	pH Lot#
AD31818-001	40ML	G	VO	HCL	253057	1	HC281827
AD31818-002	40ML	G	VO	HCL	253057	1	HC281827
AD31818-003	40ML	G	VO	HCL	253057	1	HC281827
AD31818-004	40ML	G	VO	HCL	253057	1	HC281827

Internal Chain of Custody

Lab#:	DateTime:	Loc or User	Bot Nu	A/M	Analysis
AD31818-001	07/06/22 13:50	MAXW	0	M	Received
AD31818-001	07/06/22 13:58	MAXW	0	M	Login
AD31818-001	07/07/22 09:48	R31	3	M	NONE
AD31818-001	07/07/22 09:48	R31	4	M	NONE
AD31818-001	07/07/22 09:48	R31	5	M	NONE
AD31818-002	07/06/22 13:50	MAXW	0	M	Received
AD31818-002	07/06/22 13:58	MAXW	0	M	Login
AD31818-002	07/07/22 09:48	R31	1	M	NONE
AD31818-002	07/07/22 09:48	R31	2	M	NONE
AD31818-002	07/07/22 09:48	R31	3	M	NONE
AD31818-003	07/06/22 13:50	MAXW	0	M	Received
AD31818-003	07/06/22 13:58	MAXW	0	M	Login
AD31818-003	07/07/22 09:48	R31	1	M	NONE
AD31818-003	07/07/22 09:48	R31	2	M	NONE
AD31818-003	07/07/22 09:48	R31	3	M	NONE
AD31818-004	07/06/22 13:50	MAXW	0	M	Received
AD31818-004	07/06/22 13:58	MAXW	0	M	Login
AD31818-004	07/07/22 09:48	R31	1	M	NONE
AD31818-004	07/07/22 09:48	R31	2	M	NONE
AD31818-004	07/07/22 09:48	R31	3	M	NONE

Lab#:	DateTime:	Loc or User	Bot Nu	A/M	Analysis

Samples marked as received are stored in coolers or refrigerator R12, or R24 at 4 deg C until Login

Volatile Data

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD31818-001
Client Id: MW-1R
Data File: 8M561203.D
Analysis Date: 07/07/22 15:04
Date Rec/Extracted: 07/06/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	**95-47-6**	**o-Xylene**	**1.0**	**1.2**
100-41-4	**Ethylbenzene**	**1.0**	**140**	108-88-3	Toluene	1.0	U
79601-23-1	**m&p-Xylenes**	**1.0**	**230**	**1330-20-7**	**Xylenes (Total)**	**1.0**	**230**

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used
Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

Quantitation Report (QT Reviewed)

SampleID : AD31818-001 Operator : SG Qt Meth : 8M_A0415.M
Data File: 8M561203.D Sam Mult : 1 Vial# : 28 Qt On : 07/08/22 07:36
Acq On : 07/07/22 15:04 Misc : A,5ML!4 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\07-07-22\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	546388	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.748	117	483603	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.014	152	256613	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.658	111	151274	30.12	ug/l	0.00
Spiked Amount 30.000			Recovery = 100.40%			
39) 1,2-Dichloroethane-d4	4.876	67	90841	33.99	ug/l	0.00
Spiked Amount 30.000			Recovery = 113.30%			
66) Toluene-d8	5.960	98	583044	32.17	ug/l	0.00
Spiked Amount 30.000			Recovery = 107.23%			
76) Bromofluorobenzene	7.375	174	205147	29.86	ug/l	0.00
Spiked Amount 30.000			Recovery = 99.53%			
Target Compounds						Qvalue
74) Ethylbenzene	6.809	106	783104	135.5071	ug/l	99
78) m&p-Xylenes	6.867	106	1817306	233.1527	ug/l	98
79) o-Xylene	7.088	106	9789m	1.2473	ug/l	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

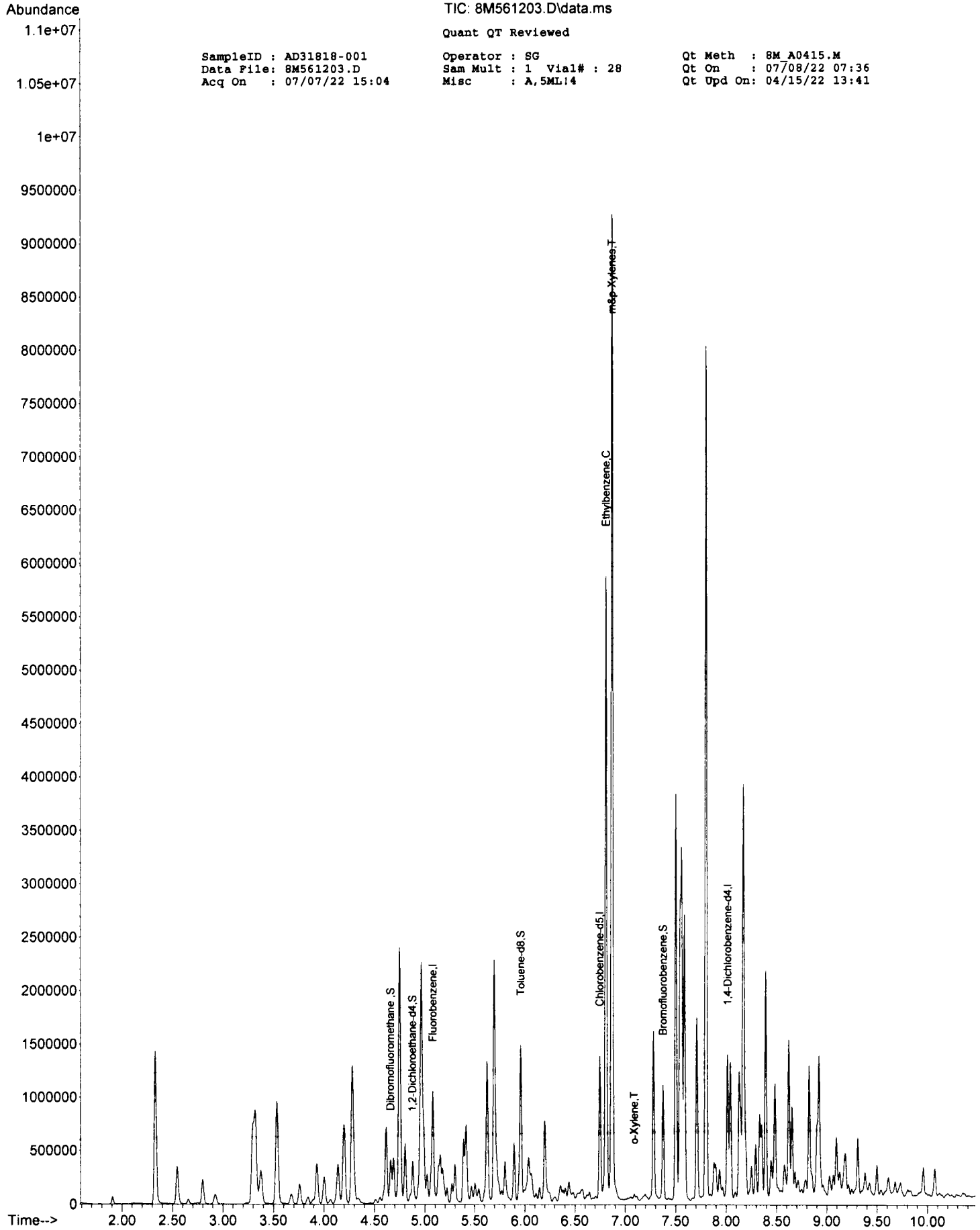
TIC: 8M561203.D\data.ms

Quant QT Reviewed

SampleID : AD31818-001
Data File: 8M561203.D
Acq On : 07/07/22 15:04

Operator : SG
Sam Mult : 1 Vial# : 28
Misc : A,5ML!4

Qt Meth : 8M_A0415.M
Qt On : 07/08/22 07:36
Qt Upd On: 04/15/22 13:41



Form1

ORGANICS VOLATILE REPORT

Sample Number: AD31818-002
Client Id: DUP-7-6-22
Data File: 8M561204.D
Analysis Date: 07/07/22 15:23
Date Rec/Extracted: 07/06/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	**95-47-6**	**o-Xylene**	**1.0**	**1.5**
100-41-4	**Ethylbenzene**	**1.0**	**160**	108-88-3	Toluene	1.0	U
79601-23-1	**m&p-Xylenes**	**1.0**	**280**	**1330-20-7**	**Xylenes (Total)**	**1.0**	**280**

Worksheet #: 648123

Total Target Concentration 440

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used

Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

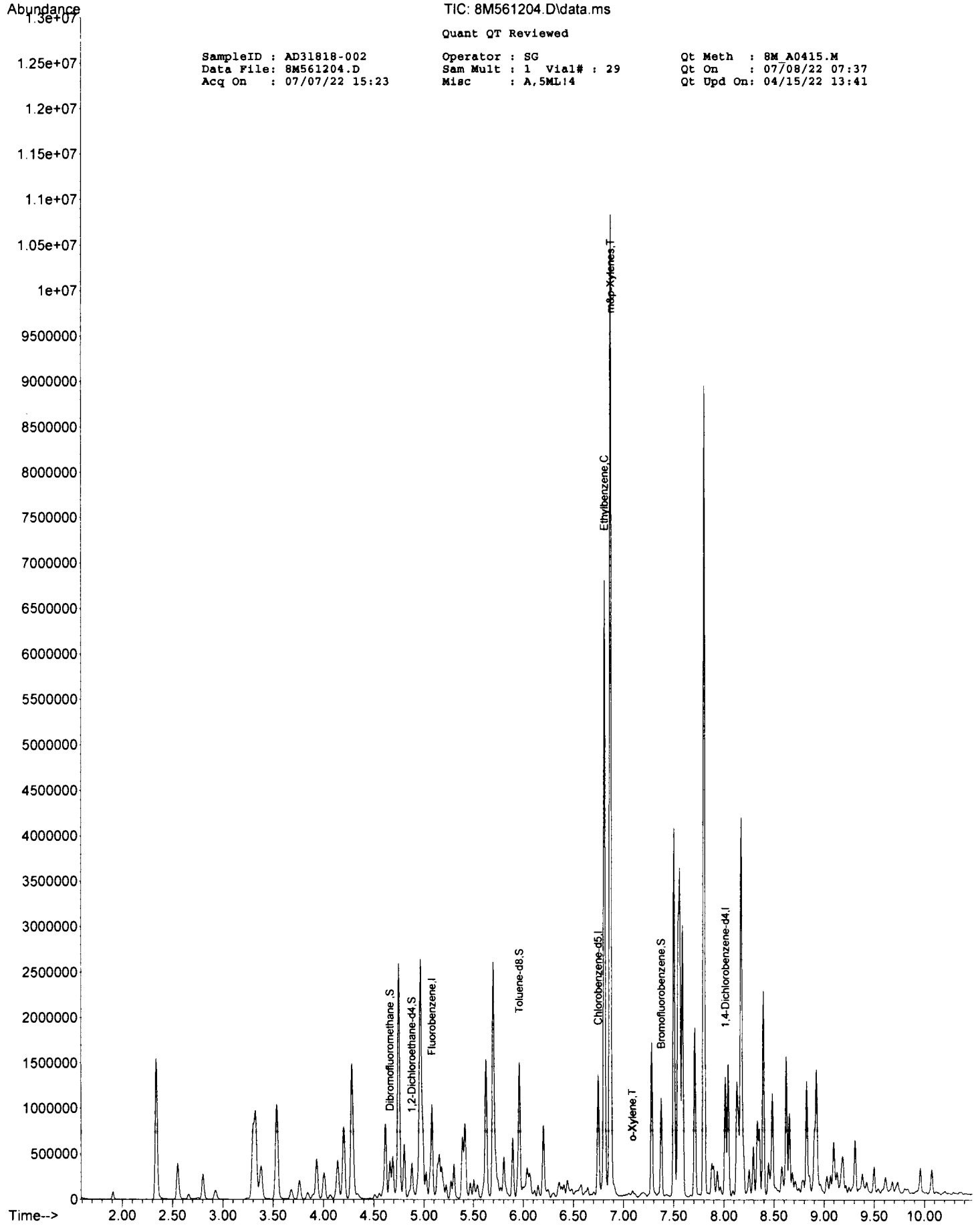
Quantitation Report (QT Reviewed)

SampleID : AD31818-002 Operator : SG Qt Meth : 8M_A0415.M
Data File: 8M561204.D Sam Mult : 1 Vial# : 29 Qt On : 07/08/22 07:37
Acq On : 07/07/22 15:23 Misc : A,5ML!4 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\07-07-22\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	548545	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.748	117	485497	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.015	152	251698	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	154235	30.58	ug/l	0.00
Spiked Amount 30.000			Recovery =	101.93%		
39) 1,2-Dichloroethane-d4	4.880	67	88835	33.11	ug/l	0.00
Spiked Amount 30.000			Recovery =	110.37%		
66) Toluene-d8	5.960	98	581669	31.97	ug/l	0.00
Spiked Amount 30.000			Recovery =	106.57%		
76) Bromofluorobenzene	7.375	174	203103	30.14	ug/l	0.00
Spiked Amount 30.000			Recovery =	100.47%		
Target Compounds						Qvalue
74) Ethylbenzene	6.809	106	909888	160.5201	ug/l	100
78) m&p-Xylenes	6.870	106	2165044m	283.1900	ug/l	
79) o-Xylene	7.088	106	11848m	1.5391	ug/l	

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M561204.D\data.ms
Quant QT Reviewed
SampleID : AD31818-002
Data File: 8M561204.D
Acq On : 07/07/22 15:23
Operator : SG
Sam Mult : 1 Vial# : 29
Misc : A,5ML;14
Qt Meth : 8M_A0415.M
Qt On : 07/08/22 07:37
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Ethylbenzene,C
m&p-Xylenes,T
o-Xylene,T
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD31818-003
Client Id: FB-7-6-22
Data File: 8M561208.D
Analysis Date: 07/07/22 16:36
Date Rec/Extracted: 07/06/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U	1330-20-7	Xylenes (Total)	1.0	U

Worksheet #: 648123

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used

Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

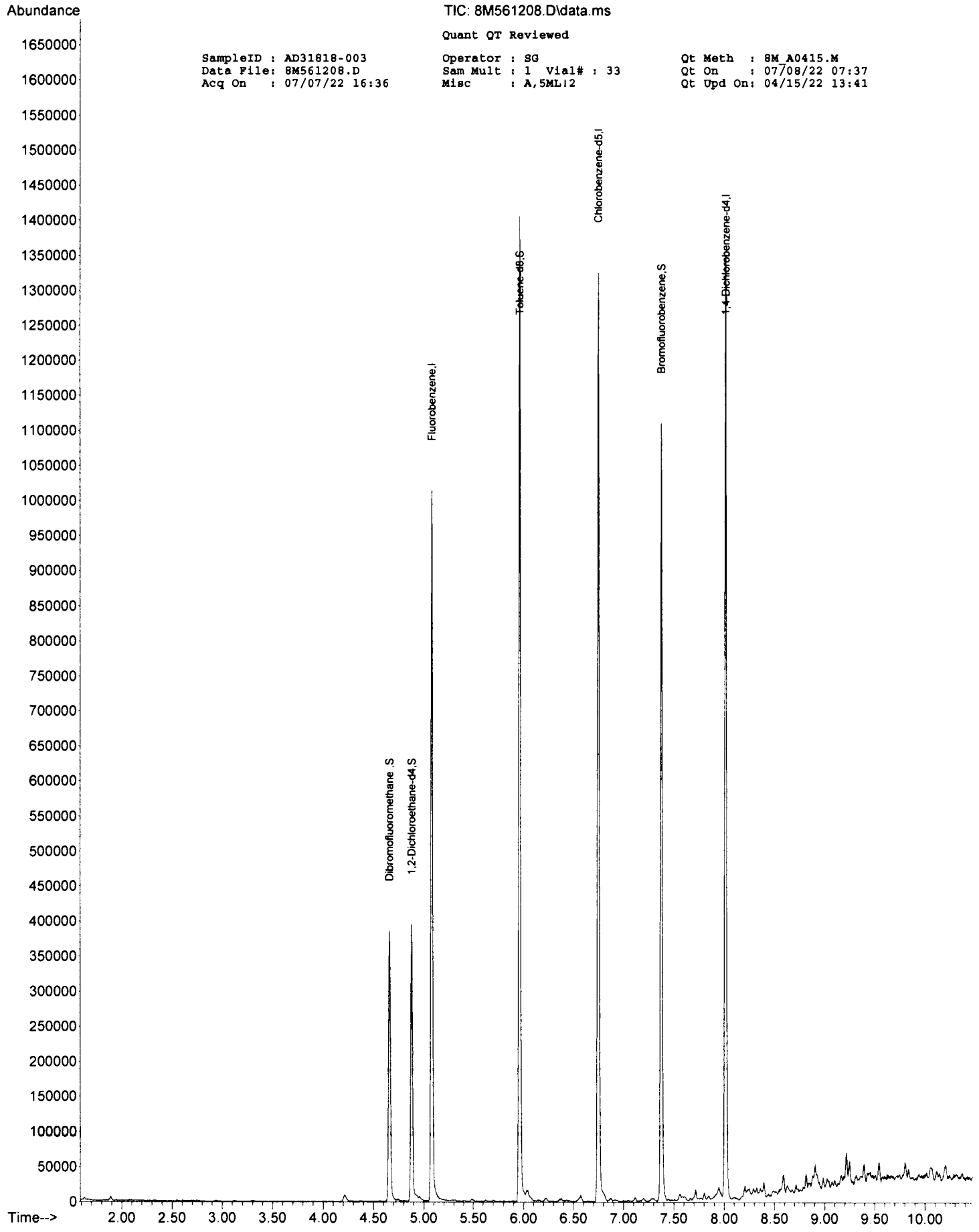
Quantitation Report (QT Reviewed)

SampleID : AD31818-003 Operator : SG Qt Meth : 8M_A0415.M
Data File: 8M561208.D Sam Mult : 1 Vial# : 33 Qt On : 07/08/22 07:37
Acq On : 07/07/22 16:36 Misc : A,5ML!2 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\07-07-22\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	570676	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.748	117	494585	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.014	152	252014	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	158608	30.23	ug/l	0.00
Spiked Amount 30.000			Recovery = 100.77%			
39) 1,2-Dichloroethane-d4	4.879	67	92319	33.08	ug/l	0.00
Spiked Amount 30.000			Recovery = 110.27%			
66) Toluene-d8	5.960	98	595372	32.12	ug/l	0.00
Spiked Amount 30.000			Recovery = 107.07%			
76) Bromofluorobenzene	7.375	174	209637	31.07	ug/l	0.00
Spiked Amount 30.000			Recovery = 103.57%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M561208.D\data.ms
Quant QT Reviewed
SampleID : AD31818-003
Data File: 8M561208.D
Acq On : 07/07/22 16:36
Operator : SG
Sam Mult : 1 Vial# : 33
Misc : A,5ML!2
Qt Meth : 8M_A0415.M
Qt On : 07/08/22 07:37
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: AD31818-004
Client Id: Trip Blank
Data File: 8M561209.D
Analysis Date: 07/07/22 16:54
Date Rec/Extracted: 07/06/22-NA
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U	1330-20-7	Xylenes (Total)	1.0	U

Worksheet #: 648123

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used

Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

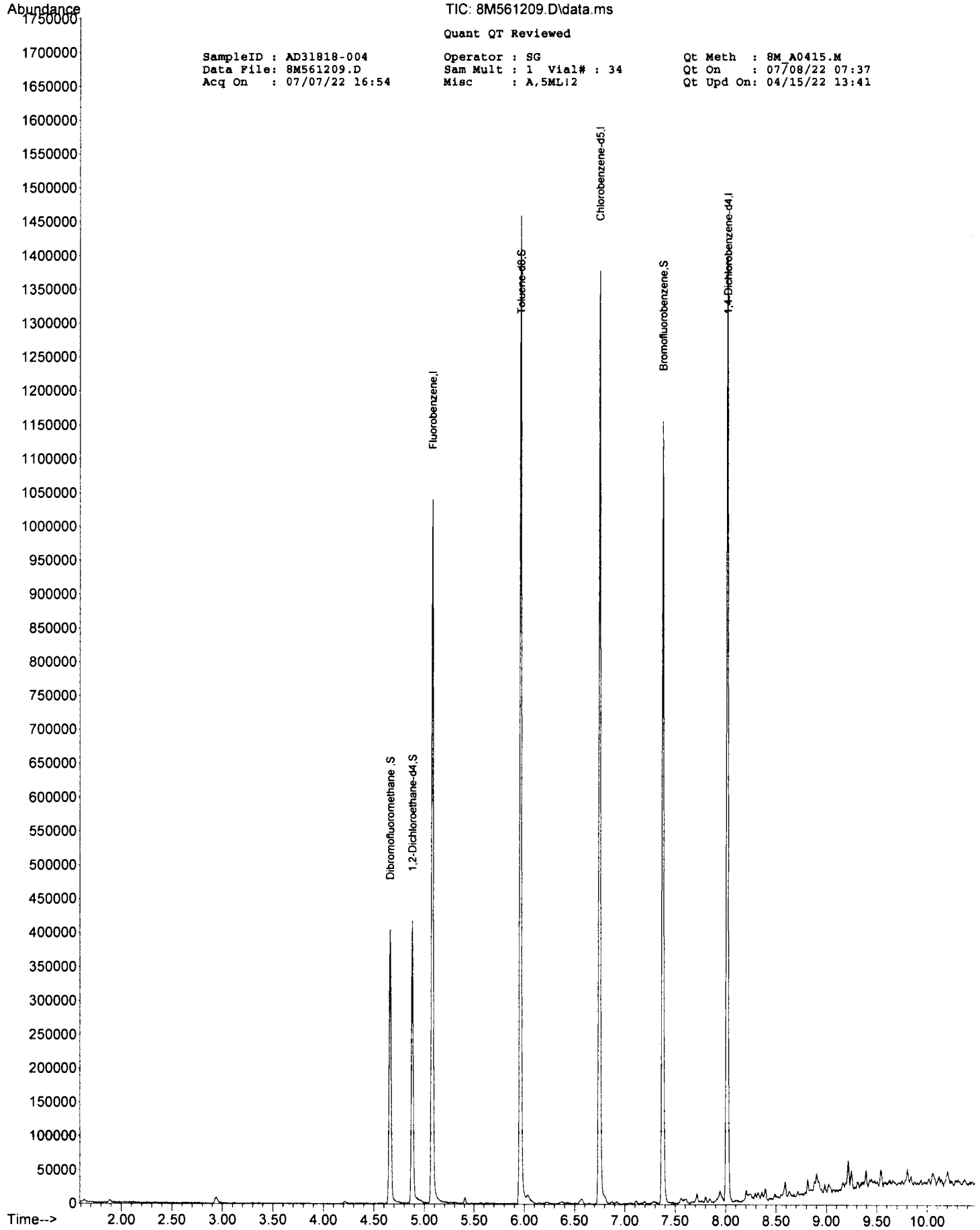
Quantitation Report (QT Reviewed)

SampleID : AD31818-004 Operator : SG Qt Meth : 8M_A0415.M
Data File: 8M561209.D Sam Mult : 1 Vial# : 34 Qt On : 07/08/22 07:37
Acq On : 07/07/22 16:54 Misc : A,5ML!2 Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\07-07-22\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	589274	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.748	117	517719	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.015	152	264738	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	167071	30.84	ug/l	0.00
Spiked Amount 30.000			Recovery = 102.80%			
39) 1,2-Dichloroethane-d4	4.880	67	96678	33.54	ug/l	0.00
Spiked Amount 30.000			Recovery = 111.80%			
66) Toluene-d8	5.960	98	619646	31.93	ug/l	0.00
Spiked Amount 30.000			Recovery = 106.43%			
76) Bromofluorobenzene	7.375	174	219320	30.94	ug/l	0.00
Spiked Amount 30.000			Recovery = 103.13%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M561209.D\data.ms
Quant QT Reviewed
SampleID : AD31818-004
Data File: 8M561209.D
Acq On : 07/07/22 16:54
Operator : SG
Sam Mult : 1 Vial# : 34
Misc : A,5ML;2
Qt Meth : 8M_A0415.M
Qt On : 07/08/22 07:37
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

Form1

ORGANICS VOLATILE REPORT

Sample Number: DAILY BLANK
Client Id:
Data File: 8M561184.D
Analysis Date: 07/07/22 08:59
Date Rec/Extracted:
Column: DB-624 25M 0.200mm ID 1.12um film

Method: EPA 8260D
Matrix: Aqueous
Initial Vol: 5ml
Final Vol: NA
Dilution: 1.00
Solids: 0

Units: ug/L

Cas #	Compound	RL	Conc	Cas #	Compound	RL	Conc
71-43-2	Benzene	0.50	U	95-47-6	o-Xylene	1.0	U
100-41-4	Ethylbenzene	1.0	U	108-88-3	Toluene	1.0	U
79601-23-1	m&p-Xylenes	1.0	U				

Worksheet #: 648123

Total Target Concentration 0

ColumnID: (^) Indicates results from 2nd column

U - Indicates the compound was analyzed but not detected.
B - Indicates the analyte was found in the blank as well as in the sample.
E - Indicates the analyte concentration exceeds the calibration range of the instrument.
R - Retention Time Out
J - Indicates an estimated value when a compound is detected at less than the specified detection limit.
d - Pesticide %Diff>40% between columns due to coelution. Lower concentration used
Chlordane (Total) is sum of a-Chlordane and y-Chlordane.

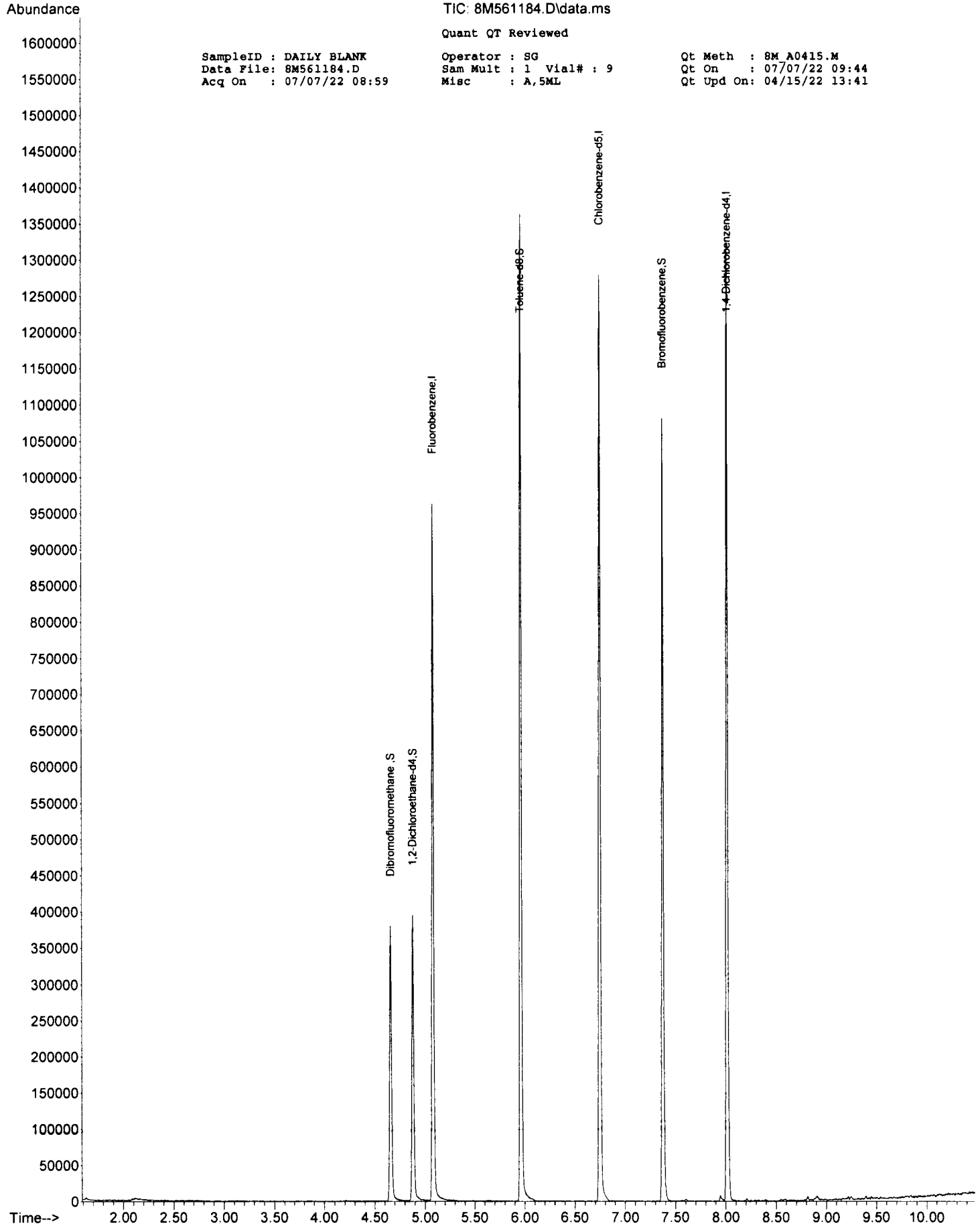
Quantitation Report (QT Reviewed)

SampleID : DAILY BLANK Operator : SG Qt Meth : 8M_A0415.M
Data File: 8M561184.D Sam Mult : 1 Vial# : 9 Qt On : 07/07/22 09:44
Acq On : 07/07/22 08:59 Misc : A,5ML Qt Upd On: 04/15/22 13:41

Data Path : G:\GcMsData\2022\GCMS_8\Data\07-07-22\
Qt Path : G:\GcMsData\2022\GCMS_8\MethodQt\
Qt Resp Via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
4) Fluorobenzene	5.079	96	538835	30.00	ug/l	0.00
52) Chlorobenzene-d5	6.748	117	471296	30.00	ug/l	0.00
70) 1,4-Dichlorobenzene-d4	8.014	152	246399	30.00	ug/l	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	4.661	111	154128	31.11	ug/l	0.00
Spiked Amount 30.000			Recovery = 103.70%			
39) 1,2-Dichloroethane-d4	4.880	67	89468	33.95	ug/l	0.00
Spiked Amount 30.000			Recovery = 113.17%			
66) Toluene-d8	5.960	98	564333	31.95	ug/l	0.00
Spiked Amount 30.000			Recovery = 106.50%			
76) Bromofluorobenzene	7.375	174	197326	29.91	ug/l	0.00
Spiked Amount 30.000			Recovery = 99.70%			
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration (+) = signals summed


Abundance
TIC: 8M561184.D\data.ms
Quant QT Reviewed
SampleID : DAILY BLANK
Data File: 8M561184.D
Acq On : 07/07/22 08:59
Operator : SG
Sam Mult : 1 Vial# : 9
Misc : A,5ML
Qt Meth : 8M_A0415.M
Qt On : 07/07/22 09:44
Qt Upd On: 04/15/22 13:41
Dibromofluoromethane,S
1,2-Dichloroethane-d4,S
Fluorobenzene,I
Toluene-d8,S
Chlorobenzene-d5,I
Bromofluorobenzene,S
1,4-Dichlorobenzene-d4,I
Time-->

FORM2

Surrogate Recovery

Method: EPA 8260D

Dfile	Sample#	Matrix	Date/Time	Surr Dil	Dilute Out Flag	Column1 S1 Recov	Column1 S2 Recov	Column1 S3 Recov	Column1 S4 Recov	Column0 S5 Recov	Column0 S6 Recov
8M561184.D	DAILY BLANK	A	07/07/22 08:59	1		104	113	106	100		
8M561203.D	AD31818-001	A	07/07/22 15:04	1		100	113	107	100		
8M561204.D	AD31818-002	A	07/07/22 15:23	1		102	110	107	100		
8M561208.D	AD31818-003	A	07/07/22 16:36	1		101	110	107	104		
8M561209.D	AD31818-004	A	07/07/22 16:54	1		103	112	106	103		
8M561187.D	AD31826-001	A	07/07/22 09:54	1		102	114	108	101		
8M561190.D	MBS102306	A	07/07/22 10:49	1		101	112	109	101		
8M561205.D	AD31826-001(MS)	A	07/07/22 15:41	1		102	112	107	103		
8M561206.D	AD31826-001(MSD)	A	07/07/22 15:59	1		104	113	108	103		

Flags: SD=Surrogate diluted out

*=Surrogate out

Method: EPA 8260D

Aqueous Laboratory Limits

Compound	Spike Amt	Limits
S1=Dibromofluoromethane	30	73-131
S2=1,2-Dichloroethane-d4	30	78-128
S3=Toluene-d8	30	79-111
S4=Bromofluorobenzene	30	82-112

FORM2

Surrogate Recovery

Method: EPA 8260D

Dfile	Sample#	Matrix	Date/Time	Surr Dil	Dilute Out Flag	Column1 S1 Recov	Column1 S2 Recov	Column1 S3 Recov	Column1 S4 Recov	Column0 S5 Recov	Column0 S6 Recov
8M561184.D	DAILY BLANK	A	07/07/22 08:59	1		104	113	106	100		
8M561203.D	AD31818-001	A	07/07/22 15:04	1		100	113	107	100		
8M561204.D	AD31818-002	A	07/07/22 15:23	1		102	110	107	100		
8M561208.D	AD31818-003	A	07/07/22 16:36	1		101	110	107	104		
8M561209.D	AD31818-004	A	07/07/22 16:54	1		103	112	106	103		
8M561187.D	AD31826-001	A	07/07/22 09:54	1		102	114	108	101		
8M561190.D	MBS102306	A	07/07/22 10:49	1		101	112	109	101		
8M561205.D	AD31826-001(MS)	A	07/07/22 15:41	1		102	112	107	103		
8M561206.D	AD31826-001(MSD)	A	07/07/22 15:59	1		104	113	108	103		

Flags: SD=Surrogate diluted out
*=Surrogate out

Method: EPA 8260D

Aqueous DKQP Limits

Compound	Spike Amt	Limits
S1=Dibromofluoromethane	30	70-130
S2=1,2-Dichloroethane-d4	30	70-130
S3=Toluene-d8	30	70-130
S4=Bromofluorobenzene	30	70-130

Form3
Recovery Data Laboratory Limits
QC Batch: MBS102306

Data File | Sample ID: | Analysis Date
Spike or Dup: 8M561190.D | MBS102306 | 7/7/2022 10:49:00 AM
Non Spike(If applicable):
Inst Blank(If applicable):

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	18.1224	0	20	91	50	150
Dichlorodifluoromethane	1	31.7429	0	20	159*	50	150
Chloromethane	1	24.3617	0	20	122	50	150
Bromomethane	1	16.3375	0	20	82	50	150
Vinyl Chloride	1	24.9702	0	20	125	50	150
Chloroethane	1	24.6061	0	20	123	50	150
Trichlorofluoromethane	1	26.261	0	20	131	50	150
Ethyl ether	1	24.3664	0	20	122	50	150
Furan	1	28.0838	0	20	140	50	150
1,1,2-Trichloro-1,2,2-trifluoroethane	1	23.8551	0	20	119	50	150
Methylene Chloride	1	20.6224	0	20	103	70	130
Acrolein	1	64.6122	0	100	65	50	150
Acrylonitrile	1	20.3919	0	20	102	50	150
Iodomethane	1	15.6429	0	20	78	50	150
Acetone	1	89.2509	0	100	89	50	150
Carbon Disulfide	1	24.8054	0	20	124	50	150
t-Butyl Alcohol	1	121.7323	0	100	122	50	150
n-Hexane	1	25.9534	0	20	130	70	130
Di-isopropyl-ether	1	24.4211	0	20	122	70	130
1,1-Dichloroethene	1	24.4065	0	20	122	70	130
Methyl Acetate	1	23.3025	0	20	117	50	150
Methyl-t-butyl ether	1	22.4179	0	20	112	70	130
1,1-Dichloroethane	1	23.5342	0	20	118	70	130
trans-1,2-Dichloroethene	1	21.1251	0	20	106	70	130
Ethyl-t-butyl ether	1	22.4543	0	20	112	70	130
cis-1,2-Dichloroethene	1	24.1463	0	20	121	70	130
Bromochloromethane	1	24.3732	0	20	122	70	130
2,2-Dichloropropane	1	25.9525	0	20	130	70	130
Ethyl acetate	1	21.7508	0	20	109	50	150
1,4-Dioxane	1	748.3369	0	1000	75	50	150
1,1-Dichloropropene	1	21.929	0	20	110	70	130
Chloroform	1	22.828	0	20	114	70	130
Cyclohexane	1	24.8645	0	20	124	70	130
1,2-Dichloroethane	1	24.4351	0	20	122	70	130
2-Butanone	1	19.0279	0	20	95	50	150
1,1,1-Trichloroethane	1	23.4842	0	20	117	70	130
Carbon Tetrachloride	1	22.8624	0	20	114	50	150
Vinyl Acetate	1	21.4618	0	20	107	50	150
Bromodichloromethane	1	21.0696	0	20	105	70	130
Methylcyclohexane	1	21.8937	0	20	109	70	130
Dibromomethane	1	18.4138	0	20	92	70	130
1,2-Dichloropropane	1	22.0139	0	20	110	70	130
Trichloroethene	1	19.506	0	20	98	70	130
Benzene	**1**	**21.5353**	**0**	**20**	**108**	**70**	**130**
tert-Amyl methyl ether	1	21.7414	0	20	109	70	130
Iso-propylacetate	1	25.0932	0	20	125	70	130
Methyl methacrylate	1	25.9334	0	20	130	70	130
Dibromochloromethane	1	20.3448	0	20	102	70	130
2-Chloroethylvinylether	1	43.6566	0	20	218*	70	130
cis-1,3-Dichloropropene	1	23.3635	0	20	117	70	130
trans-1,3-Dichloropropene	1	23.544	0	20	118	70	130
Ethyl methacrylate	1	28.2686	0	20	141*	70	130
1,1,2-Trichloroethane	1	21.0598	0	20	105	70	130
1,2-Dibromoethane	1	21.1397	0	20	106	70	130
1,3-Dichloropropane	1	22.5754	0	20	113	70	130
4-Methyl-2-Pentanone	1	24.4702	0	20	122	50	150
2-Hexanone	1	23.632	0	20	118	50	150
Tetrachloroethene	1	20.9526	0	20	105	50	150
Toluene	**1**	**21.7862**	**0**	**20**	**109**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	21.3369	0	20	107	70	130
Chlorobenzene	1	21.737	0	20	109	70	130

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS102306

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	29.3872	0	20	147*	70	130
n-Amyl acetate	1	29.5757	0	20	148*	70	130
Bromoform	1	19.7077	0	20	99	70	130
Ethylbenzene	**1**	**22.6631**	**0**	**20**	**113**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	23.0586	0	20	115	70	130
Styrene	1	23.5522	0	20	118	70	130
m&p-Xylenes	**1**	**47.8972**	**0**	**40**	**120**	**70**	**130**
o-Xylene	**1**	**23.7094**	**0**	**20**	**119**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	27.5757	0	20	138	50	150
1,3-Dichlorobenzene	1	21.5359	0	20	108	70	130
1,4-Dichlorobenzene	1	20.8538	0	20	104	70	130
1,2-Dichlorobenzene	1	21.3058	0	20	107	70	130
Isopropylbenzene	1	23.924	0	20	120	70	130
Cyclohexanone	1	132.3305	0	100	132	50	150
Camphene	1	26.8393	0	20	134*	70	130
1,2,3-Trichloropropane	1	22.1534	0	20	111	70	130
2-Chlorotoluene	1	24.5047	0	20	123	70	130
p-Ethyltoluene	1	25.6122	0	20	128	70	130
4-Chlorotoluene	1	24.6539	0	20	123	70	130
n-Propylbenzene	1	24.7131	0	20	124	70	130
Bromobenzene	1	26.1163	0	20	131*	70	130
1,3,5-Trimethylbenzene	1	23.2475	0	20	116	70	130
Butyl methacrylate	1	32.4996	0	20	162*	70	130
t-Butylbenzene	1	22.5538	0	20	113	70	130
1,2,4-Trimethylbenzene	1	23.82	0	20	119	70	130
sec-Butylbenzene	1	23.7703	0	20	119	70	130
4-Isopropyltoluene	1	23.1827	0	20	116	70	130
n-Butylbenzene	1	24.7359	0	20	124	70	130
p-Diethylbenzene	1	23.6604	0	20	118	70	130
1,2,4,5-Tetramethylbenzene	1	25.0501	0	20	125	70	130
1,2-Dibromo-3-Chloropropane	1	19.8537	0	20	99	50	150
Camphor	1	195.7821	0	200	98	20	150
Hexachlorobutadiene	1	23.6871	0	20	118	50	150
1,2,4-Trichlorobenzene	1	20.2716	0	20	101	70	130
1,2,3-Trichlorobenzene	1	22.2729	0	20	111	70	130
Naphthalene	1	23.713	0	20	119	50	150

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Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS102306

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M561205.D	AD31826-001(MS)	7/7/2022 3:41:00 PM
Non Spike(If applicable):	8M561187.D	AD31826-001	7/7/2022 9:54:00 AM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	16.8442	0	20	84	50	150
Dichlorodifluoromethane	1	32.5777	0	20	163*	50	150
Chloromethane	1	24.9782	0	20	125	50	150
Bromomethane	1	16.8184	0	20	84	50	150
Vinyl Chloride	1	25.8999	0	20	129	50	150
Chloroethane	1	24.1383	0	20	121	50	150
Trichlorofluoromethane	1	26.2711	0	20	131	50	150
Ethyl ether	1	24.2753	0	20	121	50	150
Furan	1	27.9864	0	20	140	50	150
1,1,2-Trichloro-1,2,2-trifluoroethane	1	24.3258	0	20	122	50	150
Methylene Chloride	1	21.0104	0	20	105	70	130
Acrolein	1	63.2547	0	100	63	50	150
Acrylonitrile	1	17.1934	0	20	86	50	150
Iodomethane	1	16.4531	0	20	82	50	150
Acetone	1	94.0842	0	100	94	50	150
Carbon Disulfide	1	26.1466	0	20	131	50	150
t-Butyl Alcohol	1	121.2774	0	100	121	50	150
n-Hexane	1	26.2949	0	20	131*	70	130
Di-isopropyl-ether	1	24.5173	0	20	123	70	130
1,1-Dichloroethene	1	25.0515	0	20	125	70	130
Methyl Acetate	1	23.279	0	20	116	50	150
Methyl-t-butyl ether	1	23.0068	0	20	115	70	130
1,1-Dichloroethane	1	23.6237	0	20	118	70	130
trans-1,2-Dichloroethene	1	21.5566	0	20	108	70	130
Ethyl-t-butyl ether	1	22.7066	0	20	114	70	130
cis-1,2-Dichloroethene	1	24.2111	0	20	121	70	130
Bromochloromethane	1	24.5455	0	20	123	70	130
2,2-Dichloropropane	1	25.6124	0	20	128	70	130
Ethyl acetate	1	24.0095	0	20	120	50	150
1,4-Dioxane	1	338.561	0	1000	34*	50	150
1,1-Dichloropropene	1	22.6185	0	20	113	70	130
Chloroform	1	22.5326	0	20	113	70	130
Cyclohexane	1	25.8723	0	20	129	70	130
1,2-Dichloroethane	1	24.0784	0	20	120	70	130
2-Butanone	1	17.5271	0	20	88	50	150
1,1,1-Trichloroethane	1	23.5625	0	20	118	70	130
Carbon Tetrachloride	1	23.4446	0	20	117	50	150
Vinyl Acetate	1	21.7528	0	20	109	50	150
Bromodichloromethane	1	20.6854	0	20	103	70	130
Methylcyclohexane	1	22.1677	0	20	111	70	130
Dibromomethane	1	18.9456	0	20	95	70	130
1,2-Dichloropropane	1	22.2026	0	20	111	70	130
Trichloroethene	1	19.9662	0	20	100	70	130
Benzene	1	21.9426	0	20	110	70	130
tert-Amyl methyl ether	1	21.7827	0	20	109	70	130
Iso-propylacetate	1	24.7306	0	20	124	70	130
Methyl methacrylate	1	33.8066	0	20	169*	70	130
Dibromochloromethane	1	20.032	0	20	100	70	130
2-Chloroethylvinylether	1	0	0	20	0*	70	130
cis-1,3-Dichloropropene	1	22.8286	0	20	114	70	130
trans-1,3-Dichloropropene	1	22.6707	0	20	113	70	130
Ethyl methacrylate	1	28.0655	0	20	140*	70	130
1,1,2-Trichloroethane	1	21.2193	0	20	106	70	130
1,2-Dibromoethane	1	20.6755	0	20	103	70	130
1,3-Dichloropropane	1	21.8796	0	20	109	70	130
4-Methyl-2-Pentanone	1	24.4	0	20	122	50	150
2-Hexanone	1	23.9198	0	20	120	50	150
Tetrachloroethene	1	21.2479	0	20	106	50	150
Toluene	1	22.0532	0	20	110	70	130
1,1,1,2-Tetrachloroethane	1	20.5432	0	20	103	70	130
Chlorobenzene	1	21.3729	0	20	107	70	130

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS102306

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	30.2162	0	20	151*	70	130
n-Amyl acetate	1	31.5944	0	20	158*	70	130
Bromoform	1	20.0657	0	20	100	70	130
Ethylbenzene	**1**	**23.4631**	**0**	**20**	**117**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	23.1505	0	20	116	70	130
Styrene	1	23.2703	0	20	116	70	130
m&p-Xylenes	**1**	**47.0069**	**0**	**40**	**118**	**70**	**130**
o-Xylene	**1**	**23.2917**	**0**	**20**	**116**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	24.5745	0	20	123	50	150
1,3-Dichlorobenzene	1	21.1153	0	20	106	70	130
1,4-Dichlorobenzene	1	20.9417	0	20	105	70	130
1,2-Dichlorobenzene	1	20.6095	0	20	103	70	130
Isopropylbenzene	1	23.9793	0	20	120	70	130
Cyclohexanone	1	72.6006	0	100	73	50	150
Camphene	1	20.1883	0	20	101	70	130
1,2,3-Trichloropropane	1	22.0239	0	20	110	70	130
2-Chlorotoluene	1	24.7146	0	20	124	70	130
p-Ethyltoluene	1	25.4467	0	20	127	70	130
4-Chlorotoluene	1	24.5095	0	20	123	70	130
n-Propylbenzene	1	25.044	0	20	125	70	130
Bromobenzene	1	23.2313	0	20	116	70	130
1,3,5-Trimethylbenzene	1	23.5766	0	20	118	70	130
Butyl methacrylate	1	29.8884	0	20	149*	70	130
t-Butylbenzene	1	22.1814	0	20	111	70	130
1,2,4-Trimethylbenzene	1	23.7661	0	20	119	70	130
sec-Butylbenzene	1	23.0592	0	20	115	70	130
4-Isopropyltoluene	1	22.9018	0	20	115	70	130
n-Butylbenzene	1	24.2302	0	20	121	70	130
p-Diethylbenzene	1	0	0	20	0*	70	130
1,2,4,5-Tetramethylbenzene	1	25.4894	0	20	127	70	130
1,2-Dibromo-3-Chloropropane	1	19.8939	0	20	99	50	150
Camphor	1	176.5112	0	200	88	20	150
Hexachlorobutadiene	1	22.7231	0	20	114	50	150
1,2,4-Trichlorobenzene	1	20.0695	0	20	100	70	130
1,2,3-Trichlorobenzene	1	21.712	0	20	109	70	130
Naphthalene	1	23.4939	0	20	117	50	150

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS102306

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M561206.D	AD31826-001(MSD)	7/7/2022 3:59:00 PM
Non Spike(If applicable):	8M561187.D	AD31826-001	7/7/2022 9:54:00 AM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MSD

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	15.089	0	20	75	50	150
Dichlorodifluoromethane	1	30.266	0	20	151*	50	150
Chloromethane	1	23.1559	0	20	116	50	150
Bromomethane	1	16.3875	0	20	82	50	150
Vinyl Chloride	1	23.123	0	20	116	50	150
Chloroethane	1	22.0033	0	20	110	50	150
Trichlorofluoromethane	1	23.8739	0	20	119	50	150
Ethyl ether	1	22.6211	0	20	113	50	150
Furan	1	25.2657	0	20	126	50	150
1,1,2-Trichloro-1,2,2-trifluoroethane	1	22.1715	0	20	111	50	150
Methylene Chloride	1	19.5336	0	20	98	70	130
Acrolein	1	61.6008	0	100	62	50	150
Acrylonitrile	1	19.1508	0	20	96	50	150
Iodomethane	1	16.4738	0	20	82	50	150
Acetone	1	86.7478	0	100	87	50	150
Carbon Disulfide	1	23.2874	0	20	116	50	150
t-Butyl Alcohol	1	113.0131	0	100	113	50	150
n-Hexane	1	25.1706	0	20	126	70	130
Di-isopropyl-ether	1	22.5407	0	20	113	70	130
1,1-Dichloroethene	1	22.5778	0	20	113	70	130
Methyl Acetate	1	21.5425	0	20	108	50	150
Methyl-t-butyl ether	1	21.2647	0	20	106	70	130
1,1-Dichloroethane	1	21.4328	0	20	107	70	130
trans-1,2-Dichloroethene	1	19.4549	0	20	97	70	130
Ethyl-t-butyl ether	1	21.1038	0	20	106	70	130
cis-1,2-Dichloroethene	1	22.4463	0	20	112	70	130
Bromochloromethane	1	22.2714	0	20	111	70	130
2,2-Dichloropropane	1	23.0396	0	20	115	70	130
Ethyl acetate	1	21.7012	0	20	109	50	150
1,4-Dioxane	1	740.1694	0	1000	74	50	150
1,1-Dichloropropene	1	20.4409	0	20	102	70	130
Chloroform	1	20.4279	0	20	102	70	130
Cyclohexane	1	23.6985	0	20	118	70	130
1,2-Dichloroethane	1	22.591	0	20	113	70	130
2-Butanone	1	18.1783	0	20	91	50	150
1,1,1-Trichloroethane	1	21.8027	0	20	109	70	130
Carbon Tetrachloride	1	21.7304	0	20	109	50	150
Vinyl Acetate	1	20.2385	0	20	101	50	150
Bromodichloromethane	1	19.2114	0	20	96	70	130
Methylcyclohexane	1	21.1095	0	20	106	70	130
Dibromomethane	1	17.4603	0	20	87	70	130
1,2-Dichloropropane	1	20.2318	0	20	101	70	130
Trichloroethene	1	18.5592	0	20	93	70	130
Benzene	**1**	**19.5796**	**0**	**20**	**98**	**70**	**130**
tert-Amyl methyl ether	1	20.2947	0	20	101	70	130
Iso-propylacetate	1	22.8853	0	20	114	70	130
Methyl methacrylate	1	31.2459	0	20	156*	70	130
Dibromochloromethane	1	18.2225	0	20	91	70	130
2-Chloroethylvinylether	1	2.5518	0	20	13*	70	130
cis-1,3-Dichloropropene	1	20.4597	0	20	102	70	130
trans-1,3-Dichloropropene	1	20.9044	0	20	105	70	130
Ethyl methacrylate	1	25.5747	0	20	128	70	130
1,1,2-Trichloroethane	1	19.1306	0	20	96	70	130
1,2-Dibromoethane	1	18.7274	0	20	94	70	130
1,3-Dichloropropane	1	20.1338	0	20	101	70	130
4-Methyl-2-Pentanone	1	22.3131	0	20	112	50	150
2-Hexanone	1	22.4616	0	20	112	50	150
Tetrachloroethene	1	18.8472	0	20	94	50	150
Toluene	**1**	**19.7439**	**0**	**20**	**99**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	19.1635	0	20	96	70	130
Chlorobenzene	1	19.5186	0	20	98	70	130

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Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data Laboratory Limits
QC Batch: MBS102306

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MSD

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	27.9455	0	20	140*	70	130
n-Amyl acetate	1	29.6895	0	20	148*	70	130
Bromoform	1	17.9991	0	20	90	70	130
Ethylbenzene	**1**	**22.3384**	**0**	**20**	**112**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	21.7761	0	20	109	70	130
Styrene	1	21.637	0	20	108	70	130
m&p-Xylenes	**1**	**43.0856**	**0**	**40**	**108**	**70**	**130**
o-Xylene	**1**	**21.5417**	**0**	**20**	**108**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	23.2408	0	20	116	50	150
1,3-Dichlorobenzene	1	19.7934	0	20	99	70	130
1,4-Dichlorobenzene	1	19.8193	0	20	99	70	130
1,2-Dichlorobenzene	1	19.8325	0	20	99	70	130
Isopropylbenzene	1	22.4169	0	20	112	70	130
Cyclohexanone	1	91.6073	0	100	92	50	150
Camphene	1	18.347	0	20	92	70	130
1,2,3-Trichloropropane	1	20.7148	0	20	104	70	130
2-Chlorotoluene	1	22.514	0	20	113	70	130
p-Ethyltoluene	1	23.9322	0	20	120	70	130
4-Chlorotoluene	1	22.352	0	20	112	70	130
n-Propylbenzene	1	23.5712	0	20	118	70	130
Bromobenzene	1	21.7475	0	20	109	70	130
1,3,5-Trimethylbenzene	1	21.9116	0	20	110	70	130
Butyl methacrylate	1	27.7779	0	20	139*	70	130
t-Butylbenzene	1	21.1402	0	20	106	70	130
1,2,4-Trimethylbenzene	1	21.9983	0	20	110	70	130
sec-Butylbenzene	1	22.4441	0	20	112	70	130
4-Isopropyltoluene	1	21.9569	0	20	110	70	130
n-Butylbenzene	1	23.3286	0	20	117	70	130
p-Diethylbenzene	1	22.2809	0	20	111	70	130
1,2,4,5-Tetramethylbenzene	1	23.4885	0	20	117	70	130
1,2-Dibromo-3-Chloropropane	1	19.1564	0	20	96	50	150
Camphor	1	181.1747	0	200	91	20	150
Hexachlorobutadiene	1	20.8968	0	20	104	50	150
1,2,4-Trichlorobenzene	1	19.2373	0	20	96	70	130
1,2,3-Trichlorobenzene	1	20.8747	0	20	104	70	130
Naphthalene	1	22.2456	0	20	111	50	150

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
RPD Data Laboratory Limits
QC Batch: MBS102306

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M561206.D	AD31826-001(MSD)	7/7/2022 3:59:00 PM
Duplicate(If applicable):	8M561205.D	AD31826-001(MS)	7/7/2022 3:41:00 PM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MSD

Analyte:	Column	Dup/MSD/MBSD Conc	Sample/MS/MBS Conc	RPD	Limit
Chlorodifluoromethane	1	15.089	16.8442	11	30
Dichlorodifluoromethane	1	30.266	32.5777	7.4	30
Chloromethane	1	23.1559	24.9782	7.6	30
Bromomethane	1	16.3875	16.8184	2.6	30
Vinyl Chloride	1	23.123	25.8999	11	40
Chloroethane	1	22.0033	24.1383	9.3	30
Trichlorofluoromethane	1	23.8739	26.2711	9.6	30
Ethyl ether	1	22.6211	24.2753	7.1	30
Furan	1	25.2657	27.9864	10	30
1,1,2-Trichloro-1,2,2-trifluoroethane	1	22.1715	24.3258	9.3	30
Methylene Chloride	1	19.5336	21.0104	7.3	30
Acrolein	1	61.6008	63.2547	2.6	30
Acrylonitrile	1	19.1508	17.1934	11	30
Iodomethane	1	16.4738	16.4531	0.13	30
Acetone	1	86.7478	94.0842	8.1	30
Carbon Disulfide	1	23.2874	26.1466	12	30
t-Butyl Alcohol	1	113.0131	121.2774	7.1	30
n-Hexane	1	25.1706	26.2949	4.4	30
Di-isopropyl-ether	1	22.5407	24.5173	8.4	30
1,1-Dichloroethene	1	22.5778	25.0515	10	40
Methyl Acetate	1	21.5425	23.279	7.7	30
Methyl-t-butyl ether	1	21.2647	23.0068	7.9	30
1,1-Dichloroethane	1	21.4328	23.6237	9.7	40
trans-1,2-Dichloroethene	1	19.4549	21.5566	10	30
Ethyl-t-butyl ether	1	21.1038	22.7066	7.3	30
cis-1,2-Dichloroethene	1	22.4463	24.2111	7.6	30
Bromochloromethane	1	22.2714	24.5455	9.7	30
2,2-Dichloropropane	1	23.0396	25.6124	11	30
Ethyl acetate	1	21.7012	24.0095	10	30
1,4-Dioxane	1	740.1694	338.561	74*	30
1,1-Dichloropropene	1	20.4409	22.6185	10	30
Chloroform	1	20.4279	22.5326	9.8	40
Cyclohexane	1	23.6985	25.8723	8.8	30
1,2-Dichloroethane	1	22.591	24.0784	6.4	40
2-Butanone	1	18.1783	17.5271	3.6	40
1,1,1-Trichloroethane	1	21.8027	23.5625	7.8	30
Carbon Tetrachloride	1	21.7304	23.4446	7.6	40
Vinyl Acetate	1	20.2385	21.7528	7.2	30
Bromodichloromethane	1	19.2114	20.6854	7.4	30
Methylcyclohexane	1	21.1095	22.1677	4.9	30
Dibromomethane	1	17.4603	18.9456	8.2	30
1,2-Dichloropropane	1	20.2318	22.2026	9.3	30
Trichloroethene	1	18.5592	19.9662	7.3	40
Benzene	**1**	**19.5796**	**21.9426**	**11**	**40**
tert-Amyl methyl ether	1	20.2947	21.7827	7.1	30
Iso-propylacetate	1	22.8853	24.7306	7.8	30
Methyl methacrylate	1	31.2459	33.8066	7.9	30
Dibromochloromethane	1	18.2225	20.032	9.5	30
2-Chloroethylvinylether	1	2.5518	0	200*	30
cis-1,3-Dichloropropene	1	20.4597	22.8286	11	30
trans-1,3-Dichloropropene	1	20.9044	22.6707	8.1	30
Ethyl methacrylate	1	25.5747	28.0655	9.3	30
1,1,2-Trichloroethane	1	19.1306	21.2193	10	30
1,2-Dibromoethane	1	18.7274	20.6755	9.9	30
1,3-Dichloropropane	1	20.1338	21.8796	8.3	30
4-Methyl-2-Pentanone	1	22.3131	24.4	8.9	30
2-Hexanone	1	22.4616	23.9198	6.3	30
Tetrachloroethene	1	18.8472	21.2479	12	40
Toluene	**1**	**19.7439**	**22.0532**	**11**	**40**
1,1,1,2-Tetrachloroethane	1	19.1635	20.5432	6.9	30
Chlorobenzene	1	19.5186	21.3729	9.1	40

* - Indicates outside of limits NA - Both concentrations=0... no result can be calculated

Bold and underline - Indicates the compounds reported on form1

Form3
RPD Data Laboratory Limits

QC Batch: MBS102306

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MSD

Analyte:	Column	Dup/MSD/MBSD Conc	Sample/MS/MBS Conc	RPD	Limit
n-Butyl acrylate	1	27.9455	30.2162	7.8	30
n-Amyl acetate	1	29.6895	31.5944	6.2	30
Bromoform	1	17.9991	20.0657	11	30
Ethylbenzene	**1**	**22.3384**	**23.4631**	**4.9**	**30**
1,1,2,2-Tetrachloroethane	1	21.7761	23.1505	6.1	30
Styrene	1	21.637	23.2703	7.3	30
m&p-Xylenes	**1**	**43.0856**	**47.0069**	**8.7**	**30**
o-Xylene	**1**	**21.5417**	**23.2917**	**7.8**	**30**
trans-1,4-Dichloro-2-butene	1	23.2408	24.5745	5.6	30
1,3-Dichlorobenzene	1	19.7934	21.1153	6.5	30
1,4-Dichlorobenzene	1	19.8193	20.9417	5.5	40
1,2-Dichlorobenzene	1	19.8325	20.6095	3.8	40
Isopropylbenzene	1	22.4169	23.9793	6.7	30
Cyclohexanone	1	91.6073	72.6006	23	30
Camphene	1	18.347	20.1883	9.6	30
1,2,3-Trichloropropane	1	20.7148	22.0239	6.1	30
2-Chlorotoluene	1	22.514	24.7146	9.3	30
p-Ethyltoluene	1	23.9322	25.4467	6.1	30
4-Chlorotoluene	1	22.352	24.5095	9.2	30
n-Propylbenzene	1	23.5712	25.044	6.1	40
Bromobenzene	1	21.7475	23.2313	6.6	30
1,3,5-Trimethylbenzene	1	21.9116	23.5766	7.3	30
Butyl methacrylate	1	27.7779	29.8884	7.3	30
t-Butylbenzene	1	21.1402	22.1814	4.8	30
1,2,4-Trimethylbenzene	1	21.9983	23.7661	7.7	30
sec-Butylbenzene	1	22.4441	23.0592	2.7	40
4-Isopropyltoluene	1	21.9569	22.9018	4.2	30
n-Butylbenzene	1	23.3286	24.2302	3.8	30
p-Diethylbenzene	1	22.2809	0	200*	30
1,2,4,5-Tetramethylbenzene	1	23.4885	25.4894	8.2	30
1,2-Dibromo-3-Chloropropane	1	19.1564	19.8939	3.8	30
Camphor	1	181.1747	176.5112	2.6	30
Hexachlorobutadiene	1	20.8968	22.7231	8.4	30
1,2,4-Trichlorobenzene	1	19.2373	20.0695	4.2	30
1,2,3-Trichlorobenzene	1	20.8747	21.712	3.9	30
Naphthalene	1	22.2456	23.4939	5.5	30

* - Indicates outside of limits NA - Both concentrations=0... no result can be calculated

Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS102306

Data File | Sample ID: | Analysis Date

Spike or Dup: 8M561190.D | MBS102306 | 7/7/2022 10:49:00 AM

Non Spike(If applicable):

Inst Blank(If applicable):

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	18.1224	0	20	91	70	130
Dichlorodifluoromethane	1	31.7429	0	20	159	40	160
Chloromethane	1	24.3617	0	20	122	40	160
Bromomethane	1	16.3375	0	20	82	40	160
Vinyl Chloride	1	24.9702	0	20	125	70	130
Chloroethane	1	24.6061	0	20	123	40	160
Trichlorofluoromethane	1	26.261	0	20	131	40	160
Ethyl ether	1	24.3664	0	20	122	70	130
Furan	1	28.0838	0	20	140*	70	130
1,1,2-Trichloro-1,2,2-trifluoroethane	1	23.8551	0	20	119	70	130
Methylene Chloride	1	20.6224	0	20	103	70	130
Acrolein	1	64.6122	0	100	65*	70	130
Acrylonitrile	1	20.3919	0	20	102	70	130
Iodomethane	1	15.6429	0	20	78	70	130
Acetone	1	89.2509	0	100	89	40	160
Carbon Disulfide	1	24.8054	0	20	124	40	160
t-Butyl Alcohol	1	121.7323	0	100	122	70	130
n-Hexane	1	25.9534	0	20	130	70	130
Di-isopropyl-ether	1	24.4211	0	20	122	70	130
1,1-Dichloroethene	1	24.4065	0	20	122	70	130
Methyl Acetate	1	23.3025	0	20	117	70	130
Methyl-t-butyl ether	1	22.4179	0	20	112	70	130
1,1-Dichloroethane	1	23.5342	0	20	118	70	130
trans-1,2-Dichloroethene	1	21.1251	0	20	106	70	130
Ethyl-t-butyl ether	1	22.4543	0	20	112	70	130
cis-1,2-Dichloroethene	1	24.1463	0	20	121	70	130
Bromochloromethane	1	24.3732	0	20	122	70	130
2,2-Dichloropropane	1	25.9525	0	20	130	70	130
Ethyl acetate	1	21.7508	0	20	109	70	130
1,4-Dioxane	1	748.3369	0	1000	75	40	160
1,1-Dichloropropene	1	21.929	0	20	110	70	130
Chloroform	1	22.828	0	20	114	70	130
Cyclohexane	1	24.8645	0	20	124	70	130
1,2-Dichloroethane	1	24.4351	0	20	122	70	130
2-Butanone	1	19.0279	0	20	95	70	130
1,1,1-Trichloroethane	1	23.4842	0	20	117	70	130
Carbon Tetrachloride	1	22.8624	0	20	114	70	130
Vinyl Acetate	1	21.4618	0	20	107	70	130
Bromodichloromethane	1	21.0696	0	20	105	70	130
Methylcyclohexane	1	21.8937	0	20	109	70	130
Dibromomethane	1	18.4138	0	20	92	70	130
1,2-Dichloropropane	1	22.0139	0	20	110	70	130
Trichloroethene	1	19.506	0	20	98	70	130
Benzene	**1**	**21.5353**	**0**	**20**	**108**	**70**	**130**
tert-Amyl methyl ether	1	21.7414	0	20	109	70	130
Iso-propylacetate	1	25.0932	0	20	125	70	130
Methyl methacrylate	1	25.9334	0	20	130	70	130
Dibromochloromethane	1	20.3448	0	20	102	70	130
2-Chloroethylvinylether	1	43.6566	0	20	218*	70	130
cis-1,3-Dichloropropene	1	23.3635	0	20	117	70	130
trans-1,3-Dichloropropene	1	23.544	0	20	118	70	130
Ethyl methacrylate	1	28.2686	0	20	141*	70	130
1,1,2-Trichloroethane	1	21.0598	0	20	105	70	130
1,2-Dibromoethane	1	21.1397	0	20	106	70	130
1,3-Dichloropropane	1	22.5754	0	20	113	70	130
4-Methyl-2-Pentanone	1	24.4702	0	20	122	40	160
2-Hexanone	1	23.632	0	20	118	40	160
Tetrachloroethene	1	20.9526	0	20	105	70	130
Toluene	**1**	**21.7862**	**0**	**20**	**109**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	21.3369	0	20	107	70	130
Chlorobenzene	1	21.737	0	20	109	70	130

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits

Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS102306

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MBS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	29.3872	0	20	147*	70	130
n-Amyl acetate	1	29.5757	0	20	148*	70	130
Bromoform	1	19.7077	0	20	99	70	130
Ethylbenzene	**1**	**22.6631**	**0**	**20**	**113**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	23.0586	0	20	115	70	130
Styrene	1	23.5522	0	20	118	70	130
m&p-Xylenes	**1**	**47.8972**	**0**	**40**	**120**	**70**	**130**
o-Xylene	**1**	**23.7094**	**0**	**20**	**119**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	27.5757	0	20	138*	70	130
1,3-Dichlorobenzene	1	21.5359	0	20	108	70	130
1,4-Dichlorobenzene	1	20.8538	0	20	104	70	130
1,2-Dichlorobenzene	1	21.3058	0	20	107	70	130
Isopropylbenzene	1	23.924	0	20	120	70	130
Cyclohexanone	1	132.3305	0	100	132*	70	130
Camphene	1	26.8393	0	20	134*	70	130
1,2,3-Trichloropropane	1	22.1534	0	20	111	70	130
2-Chlorotoluene	1	24.5047	0	20	123	70	130
p-Ethyltoluene	1	25.6122	0	20	128	70	130
4-Chlorotoluene	1	24.6539	0	20	123	70	130
n-Propylbenzene	1	24.7131	0	20	124	70	130
Bromobenzene	1	26.1163	0	20	131*	70	130
1,3,5-Trimethylbenzene	1	23.2475	0	20	116	70	130
Butyl methacrylate	1	32.4996	0	20	162*	70	130
t-Butylbenzene	1	22.5538	0	20	113	70	130
1,2,4-Trimethylbenzene	1	23.82	0	20	119	70	130
sec-Butylbenzene	1	23.7703	0	20	119	70	130
4-Isopropyltoluene	1	23.1827	0	20	116	70	130
n-Butylbenzene	1	24.7359	0	20	124	70	130
p-Diethylbenzene	1	23.6604	0	20	118	70	130
1,2,4,5-Tetramethylbenzene	1	25.0501	0	20	125	70	130
1,2-Dibromo-3-Chloropropane	1	19.8537	0	20	99	40	160
Camphor	1	195.7821	0	200	98	70	130
Hexachlorobutadiene	1	23.6871	0	20	118	70	130
1,2,4-Trichlorobenzene	1	20.2716	0	20	101	70	130
1,2,3-Trichlorobenzene	1	22.2729	0	20	111	70	130
Naphthalene	1	23.713	0	20	119	40	160

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS102306

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M561205.D	AD31826-001(MS)	7/7/2022 3:41:00 PM
Non Spike(If applicable):	8M561187.D	AD31826-001	7/7/2022 9:54:00 AM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	16.8442	0	20	84	70	130
Dichlorodifluoromethane	1	32.5777	0	20	163*	40	160
Chloromethane	1	24.9782	0	20	125	40	160
Bromomethane	1	16.8184	0	20	84	40	160
Vinyl Chloride	1	25.8999	0	20	129	70	130
Chloroethane	1	24.1383	0	20	121	40	160
Trichlorofluoromethane	1	26.2711	0	20	131	40	160
Ethyl ether	1	24.2753	0	20	121	70	130
Furan	1	27.9864	0	20	140*	70	130
1,1,2-Trichloro-1,2,2-trifluoroethane	1	24.3258	0	20	122	70	130
Methylene Chloride	1	21.0104	0	20	105	70	130
Acrolein	1	63.2547	0	100	63*	70	130
Acrylonitrile	1	17.1934	0	20	86	70	130
Iodomethane	1	16.4531	0	20	82	70	130
Acetone	1	94.0842	0	100	94	40	160
Carbon Disulfide	1	26.1466	0	20	131	40	160
t-Butyl Alcohol	1	121.2774	0	100	121	70	130
n-Hexane	1	26.2949	0	20	131*	70	130
Di-isopropyl-ether	1	24.5173	0	20	123	70	130
1,1-Dichloroethene	1	25.0515	0	20	125	70	130
Methyl Acetate	1	23.279	0	20	116	70	130
Methyl-t-butyl ether	1	23.0068	0	20	115	70	130
1,1-Dichloroethane	1	23.6237	0	20	118	70	130
trans-1,2-Dichloroethene	1	21.5566	0	20	108	70	130
Ethyl-t-butyl ether	1	22.7066	0	20	114	70	130
cis-1,2-Dichloroethene	1	24.2111	0	20	121	70	130
Bromochloromethane	1	24.5455	0	20	123	70	130
2,2-Dichloropropane	1	25.6124	0	20	128	70	130
Ethyl acetate	1	24.0095	0	20	120	70	130
1,4-Dioxane	1	338.561	0	1000	34*	40	160
1,1-Dichloropropene	1	22.6185	0	20	113	70	130
Chloroform	1	22.5326	0	20	113	70	130
Cyclohexane	1	25.8723	0	20	129	70	130
1,2-Dichloroethane	1	24.0784	0	20	120	70	130
2-Butanone	1	17.5271	0	20	88	70	130
1,1,1-Trichloroethane	1	23.5625	0	20	118	70	130
Carbon Tetrachloride	1	23.4446	0	20	117	70	130
Vinyl Acetate	1	21.7528	0	20	109	70	130
Bromodichloromethane	1	20.6854	0	20	103	70	130
Methylcyclohexane	1	22.1677	0	20	111	70	130
Dibromomethane	1	18.9456	0	20	95	70	130
1,2-Dichloropropane	1	22.2026	0	20	111	70	130
Trichloroethene	1	19.9662	0	20	100	70	130
Benzene	**1**	**21.9426**	**0**	**20**	**110**	**70**	**130**
tert-Amyl methyl ether	1	21.7827	0	20	109	70	130
Iso-propylacetate	1	24.7306	0	20	124	70	130
Methyl methacrylate	1	33.8066	0	20	169*	70	130
Dibromochloromethane	1	20.032	0	20	100	70	130
2-Chloroethylvinylether	1	0	0	20	0*	70	130
cis-1,3-Dichloropropene	1	22.8286	0	20	114	70	130
trans-1,3-Dichloropropene	1	22.6707	0	20	113	70	130
Ethyl methacrylate	1	28.0655	0	20	140*	70	130
1,1,2-Trichloroethane	1	21.2193	0	20	106	70	130
1,2-Dibromoethane	1	20.6755	0	20	103	70	130
1,3-Dichloropropane	1	21.8796	0	20	109	70	130
4-Methyl-2-Pentanone	1	24.4	0	20	122	40	160
2-Hexanone	1	23.9198	0	20	120	40	160
Tetrachloroethene	1	21.2479	0	20	106	70	130
Toluene	**1**	**22.0532**	**0**	**20**	**110**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	20.5432	0	20	103	70	130
Chlorobenzene	1	21.3729	0	20	107	70	130

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS102306

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MS

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	30.2162	0	20	151*	70	130
n-Amyl acetate	1	31.5944	0	20	158*	70	130
Bromoform	1	20.0657	0	20	100	70	130
Ethylbenzene	**1**	**23.4631**	**0**	**20**	**117**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	23.1505	0	20	116	70	130
Styrene	1	23.2703	0	20	116	70	130
m&p-Xylenes	**1**	**47.0069**	**0**	**40**	**118**	**70**	**130**
o-Xylene	**1**	**23.2917**	**0**	**20**	**116**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	24.5745	0	20	123	70	130
1,3-Dichlorobenzene	1	21.1153	0	20	106	70	130
1,4-Dichlorobenzene	1	20.9417	0	20	105	70	130
1,2-Dichlorobenzene	1	20.6095	0	20	103	70	130
Isopropylbenzene	1	23.9793	0	20	120	70	130
Cyclohexanone	1	72.6006	0	100	73	70	130
Camphene	1	20.1883	0	20	101	70	130
1,2,3-Trichloropropane	1	22.0239	0	20	110	70	130
2-Chlorotoluene	1	24.7146	0	20	124	70	130
p-Ethyltoluene	1	25.4467	0	20	127	70	130
4-Chlorotoluene	1	24.5095	0	20	123	70	130
n-Propylbenzene	1	25.044	0	20	125	70	130
Bromobenzene	1	23.2313	0	20	116	70	130
1,3,5-Trimethylbenzene	1	23.5766	0	20	118	70	130
Butyl methacrylate	1	29.8884	0	20	149*	70	130
t-Butylbenzene	1	22.1814	0	20	111	70	130
1,2,4-Trimethylbenzene	1	23.7661	0	20	119	70	130
sec-Butylbenzene	1	23.0592	0	20	115	70	130
4-Isopropyltoluene	1	22.9018	0	20	115	70	130
n-Butylbenzene	1	24.2302	0	20	121	70	130
p-Diethylbenzene	1	0	0	20	0*	70	130
1,2,4,5-Tetramethylbenzene	1	25.4894	0	20	127	70	130
1,2-Dibromo-3-Chloropropane	1	19.8939	0	20	99	40	160
Camphor	1	176.5112	0	200	88	70	130
Hexachlorobutadiene	1	22.7231	0	20	114	70	130
1,2,4-Trichlorobenzene	1	20.0695	0	20	100	70	130
1,2,3-Trichlorobenzene	1	21.712	0	20	109	70	130
Naphthalene	1	23.4939	0	20	117	40	160

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS102306

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M561206.D	AD31826-001(MSD)	7/7/2022 3:59:00 PM
Non Spike(If applicable):	8M561187.D	AD31826-001	7/7/2022 9:54:00 AM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MSD

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
Chlorodifluoromethane	1	15.089	0	20	75	70	130
Dichlorodifluoromethane	1	30.266	0	20	151	40	160
Chloromethane	1	23.1559	0	20	116	40	160
Bromomethane	1	16.3875	0	20	82	40	160
Vinyl Chloride	1	23.123	0	20	116	70	130
Chloroethane	1	22.0033	0	20	110	40	160
Trichlorofluoromethane	1	23.8739	0	20	119	40	160
Ethyl ether	1	22.6211	0	20	113	70	130
Furan	1	25.2657	0	20	126	70	130
1,1,2-Trichloro-1,2,2-trifluoroethane	1	22.1715	0	20	111	70	130
Methylene Chloride	1	19.5336	0	20	98	70	130
Acrolein	1	61.6008	0	100	62*	70	130
Acrylonitrile	1	19.1508	0	20	96	70	130
Iodomethane	1	16.4738	0	20	82	70	130
Acetone	1	86.7478	0	100	87	40	160
Carbon Disulfide	1	23.2874	0	20	116	40	160
t-Butyl Alcohol	1	113.0131	0	100	113	70	130
n-Hexane	1	25.1706	0	20	126	70	130
Di-isopropyl-ether	1	22.5407	0	20	113	70	130
1,1-Dichloroethene	1	22.5778	0	20	113	70	130
Methyl Acetate	1	21.5425	0	20	108	70	130
Methyl-t-butyl ether	1	21.2647	0	20	106	70	130
1,1-Dichloroethane	1	21.4328	0	20	107	70	130
trans-1,2-Dichloroethene	1	19.4549	0	20	97	70	130
Ethyl-t-butyl ether	1	21.1038	0	20	106	70	130
cis-1,2-Dichloroethene	1	22.4463	0	20	112	70	130
Bromochloromethane	1	22.2714	0	20	111	70	130
2,2-Dichloropropane	1	23.0396	0	20	115	70	130
Ethyl acetate	1	21.7012	0	20	109	70	130
1,4-Dioxane	1	740.1694	0	1000	74	40	160
1,1-Dichloropropene	1	20.4409	0	20	102	70	130
Chloroform	1	20.4279	0	20	102	70	130
Cyclohexane	1	23.6985	0	20	118	70	130
1,2-Dichloroethane	1	22.591	0	20	113	70	130
2-Butanone	1	18.1783	0	20	91	70	130
1,1,1-Trichloroethane	1	21.8027	0	20	109	70	130
Carbon Tetrachloride	1	21.7304	0	20	109	70	130
Vinyl Acetate	1	20.2385	0	20	101	70	130
Bromodichloromethane	1	19.2114	0	20	96	70	130
Methylcyclohexane	1	21.1095	0	20	106	70	130
Dibromomethane	1	17.4603	0	20	87	70	130
1,2-Dichloropropane	1	20.2318	0	20	101	70	130
Trichloroethene	1	18.5592	0	20	93	70	130
Benzene	**1**	**19.5796**	**0**	**20**	**98**	**70**	**130**
tert-Amyl methyl ether	1	20.2947	0	20	101	70	130
Iso-propylacetate	1	22.8853	0	20	114	70	130
Methyl methacrylate	1	31.2459	0	20	156*	70	130
Dibromochloromethane	1	18.2225	0	20	91	70	130
2-Chloroethylvinylether	1	2.5518	0	20	13*	70	130
cis-1,3-Dichloropropene	1	20.4597	0	20	102	70	130
trans-1,3-Dichloropropene	1	20.9044	0	20	105	70	130
Ethyl methacrylate	1	25.5747	0	20	128	70	130
1,1,2-Trichloroethane	1	19.1306	0	20	96	70	130
1,2-Dibromoethane	1	18.7274	0	20	94	70	130
1,3-Dichloropropane	1	20.1338	0	20	101	70	130
4-Methyl-2-Pentanone	1	22.3131	0	20	112	40	160
2-Hexanone	1	22.4616	0	20	112	40	160
Tetrachloroethene	1	18.8472	0	20	94	70	130
Toluene	**1**	**19.7439**	**0**	**20**	**99**	**70**	**130**
1,1,1,2-Tetrachloroethane	1	19.1635	0	20	96	70	130
Chlorobenzene	1	19.5186	0	20	98	70	130

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
Recovery Data DKQP Limits
QC Batch: MBS102306

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MSD

Analyte:	Col	Spike Conc	Sample Conc	Expected Conc	Recovery	Lower Limit	Upper Limit
n-Butyl acrylate	1	27.9455	0	20	140*	70	130
n-Amyl acetate	1	29.6895	0	20	148*	70	130
Bromoform	1	17.9991	0	20	90	70	130
Ethylbenzene	**1**	**22.3384**	**0**	**20**	**112**	**70**	**130**
1,1,2,2-Tetrachloroethane	1	21.7761	0	20	109	70	130
Styrene	1	21.637	0	20	108	70	130
m&p-Xylenes	**1**	**43.0856**	**0**	**40**	**108**	**70**	**130**
o-Xylene	**1**	**21.5417**	**0**	**20**	**108**	**70**	**130**
trans-1,4-Dichloro-2-butene	1	23.2408	0	20	116	70	130
1,3-Dichlorobenzene	1	19.7934	0	20	99	70	130
1,4-Dichlorobenzene	1	19.8193	0	20	99	70	130
1,2-Dichlorobenzene	1	19.8325	0	20	99	70	130
Isopropylbenzene	1	22.4169	0	20	112	70	130
Cyclohexanone	1	91.6073	0	100	92	70	130
Camphene	1	18.347	0	20	92	70	130
1,2,3-Trichloropropane	1	20.7148	0	20	104	70	130
2-Chlorotoluene	1	22.514	0	20	113	70	130
p-Ethyltoluene	1	23.9322	0	20	120	70	130
4-Chlorotoluene	1	22.352	0	20	112	70	130
n-Propylbenzene	1	23.5712	0	20	118	70	130
Bromobenzene	1	21.7475	0	20	109	70	130
1,3,5-Trimethylbenzene	1	21.9116	0	20	110	70	130
Butyl methacrylate	1	27.7779	0	20	139*	70	130
t-Butylbenzene	1	21.1402	0	20	106	70	130
1,2,4-Trimethylbenzene	1	21.9983	0	20	110	70	130
sec-Butylbenzene	1	22.4441	0	20	112	70	130
4-Isopropyltoluene	1	21.9569	0	20	110	70	130
n-Butylbenzene	1	23.3286	0	20	117	70	130
p-Diethylbenzene	1	22.2809	0	20	111	70	130
1,2,4,5-Tetramethylbenzene	1	23.4885	0	20	117	70	130
1,2-Dibromo-3-Chloropropane	1	19.1564	0	20	96	40	160
Camphor	1	181.1747	0	200	91	70	130
Hexachlorobutadiene	1	20.8968	0	20	104	70	130
1,2,4-Trichlorobenzene	1	19.2373	0	20	96	70	130
1,2,3-Trichlorobenzene	1	20.8747	0	20	104	70	130
Naphthalene	1	22.2456	0	20	111	40	160

* - Indicates outside of limits # - Indicates outside of standard limits but within method exceedance limits
Bold and underline - Indicates the compounds reported on form1

Form3
RPD DATA DKQP Limits
QC Batch: MBS102306

	Data File	Sample ID:	Analysis Date
Spike or Dup:	8M561206.D	AD31826-001(MSD)	7/7/2022 3:59:00 PM
Duplicate(If applicable):	8M561205.D	AD31826-001(MS)	7/7/2022 3:41:00 PM
Inst Blank(If applicable):			

Method: 8260D Matrix: Aqueous Units: ug/L QC Type: MSD

Analyte:	Column	Dup/MSD/MBSD Conc	Sample/MS/MBS Conc	RPD	Limit
Chlorodifluoromethane	1	15.089	16.8442	11	20
Dichlorodifluoromethane	1	30.266	32.5777	7.4	20
Chloromethane	1	23.1559	24.9782	7.6	20
Bromomethane	1	16.3875	16.8184	2.6	20
Vinyl Chloride	1	23.123	25.8999	11	20
Chloroethane	1	22.0033	24.1383	9.3	20
Trichlorofluoromethane	1	23.8739	26.2711	9.6	20
Ethyl ether	1	22.6211	24.2753	7.1	20
Furan	1	25.2657	27.9864	10	20
1,1,2-Trichloro-1,2,2-trifluoroethane	1	22.1715	24.3258	9.3	20
Methylene Chloride	1	19.5336	21.0104	7.3	20
Acrolein	1	61.6008	63.2547	2.6	20
Acrylonitrile	1	19.1508	17.1934	11	20
Iodomethane	1	16.4738	16.4531	0.13	20
Acetone	1	86.7478	94.0842	8.1	20
Carbon Disulfide	1	23.2874	26.1466	12	20
t-Butyl Alcohol	1	113.0131	121.2774	7.1	20
n-Hexane	1	25.1706	26.2949	4.4	20
Di-isopropyl-ether	1	22.5407	24.5173	8.4	20
1,1-Dichloroethene	1	22.5778	25.0515	10	20
Methyl Acetate	1	21.5425	23.279	7.7	20
Methyl-t-butyl ether	1	21.2647	23.0068	7.9	20
1,1-Dichloroethane	1	21.4328	23.6237	9.7	20
trans-1,2-Dichloroethene	1	19.4549	21.5566	10	20
Ethyl-t-butyl ether	1	21.1038	22.7066	7.3	20
cis-1,2-Dichloroethene	1	22.4463	24.2111	7.6	20
Bromochloromethane	1	22.2714	24.5455	9.7	20
2,2-Dichloropropane	1	23.0396	25.6124	11	20
Ethyl acetate	1	21.7012	24.0095	10	20
1,4-Dioxane	1	740.1694	338.561	74*	20
1,1-Dichloropropene	1	20.4409	22.6185	10	20
Chloroform	1	20.4279	22.5326	9.8	20
Cyclohexane	1	23.6985	25.8723	8.8	20
1,2-Dichloroethane	1	22.591	24.0784	6.4	20
2-Butanone	1	18.1783	17.5271	3.6	20
1,1,1-Trichloroethane	1	21.8027	23.5625	7.8	20
Carbon Tetrachloride	1	21.7304	23.4446	7.6	20
Vinyl Acetate	1	20.2385	21.7528	7.2	20
Bromodichloromethane	1	19.2114	20.6854	7.4	20
Methylcyclohexane	1	21.1095	22.1677	4.9	20
Dibromomethane	1	17.4603	18.9456	8.2	20
1,2-Dichloropropane	1	20.2318	22.2026	9.3	20
Trichloroethene	1	18.5592	19.9662	7.3	20
Benzene	**1**	**19.5796**	**21.9426**	**11**	**20**
tert-Amyl methyl ether	1	20.2947	21.7827	7.1	20
Iso-propylacetate	1	22.8853	24.7306	7.8	20
Methyl methacrylate	1	31.2459	33.8066	7.9	20
Dibromochloromethane	1	18.2225	20.032	9.5	20
2-Chloroethylvinylether	1	2.5518	0	200*	20
cis-1,3-Dichloropropene	1	20.4597	22.8286	11	20
trans-1,3-Dichloropropene	1	20.9044	22.6707	8.1	20
Ethyl methacrylate	1	25.5747	28.0655	9.3	20
1,1,2-Trichloroethane	1	19.1306	21.2193	10	20
1,2-Dibromoethane	1	18.7274	20.6755	9.9	20
1,3-Dichloropropane	1	20.1338	21.8796	8.3	20
4-Methyl-2-Pentanone	1	22.3131	24.4	8.9	20
2-Hexanone	1	22.4616	23.9198	6.3	20
Tetrachloroethene	1	18.8472	21.2479	12	20
Toluene	**1**	**19.7439**	**22.0532**	**11**	**20**
1,1,1,2-Tetrachloroethane	1	19.1635	20.5432	6.9	20
Chlorobenzene	1	19.5186	21.3729	9.1	20

* - Indicates outside of limits NA - Both concentrations=0... no result can be calculated

Bold and underline - Indicates the compounds reported on form1

Form3
RPD DATA DKQP Limits
QC Batch: MBS102306

Method: 8260D | Matrix: Aqueous | Units: ug/L | QC Type: MSD

Analyte:	Column	Dup/MSD/MBSD Conc	Sample/MS/MBS Conc	RPD	Limit
n-Butyl acrylate	1	27.9455	30.2162	7.8	20
n-Amyl acetate	1	29.6895	31.5944	6.2	20
Bromoform	1	17.9991	20.0657	11	20
Ethylbenzene	**1**	**22.3384**	**23.4631**	**4.9**	**20**
1,1,2,2-Tetrachloroethane	1	21.7761	23.1505	6.1	20
Styrene	1	21.637	23.2703	7.3	20
m&p-Xylenes	**1**	**43.0856**	**47.0069**	**8.7**	**20**
o-Xylene	**1**	**21.5417**	**23.2917**	**7.8**	**20**
trans-1,4-Dichloro-2-butene	1	23.2408	24.5745	5.6	20
1,3-Dichlorobenzene	1	19.7934	21.1153	6.5	20
1,4-Dichlorobenzene	1	19.8193	20.9417	5.5	20
1,2-Dichlorobenzene	1	19.8325	20.6095	3.8	20
Isopropylbenzene	1	22.4169	23.9793	6.7	20
Cyclohexanone	1	91.6073	72.6006	23*	20
Camphene	1	18.347	20.1883	9.6	20
1,2,3-Trichloropropane	1	20.7148	22.0239	6.1	20
2-Chlorotoluene	1	22.514	24.7146	9.3	20
p-Ethyltoluene	1	23.9322	25.4467	6.1	20
4-Chlorotoluene	1	22.352	24.5095	9.2	20
n-Propylbenzene	1	23.5712	25.044	6.1	20
Bromobenzene	1	21.7475	23.2313	6.6	20
1,3,5-Trimethylbenzene	1	21.9116	23.5766	7.3	20
Butyl methacrylate	1	27.7779	29.8884	7.3	20
t-Butylbenzene	1	21.1402	22.1814	4.8	20
1,2,4-Trimethylbenzene	1	21.9983	23.7661	7.7	20
sec-Butylbenzene	1	22.4441	23.0592	2.7	20
4-Isopropyltoluene	1	21.9569	22.9018	4.2	20
n-Butylbenzene	1	23.3286	24.2302	3.8	20
p-Diethylbenzene	1	22.2809	0	200*	20
1,2,4,5-Tetramethylbenzene	1	23.4885	25.4894	8.2	20
1,2-Dibromo-3-Chloropropane	1	19.1564	19.8939	3.8	20
Camphor	1	181.1747	176.5112	2.6	20
Hexachlorobutadiene	1	20.8968	22.7231	8.4	20
1,2,4-Trichlorobenzene	1	19.2373	20.0695	4.2	20
1,2,3-Trichlorobenzene	1	20.8747	21.712	3.9	20
Naphthalene	1	22.2456	23.4939	5.5	20

* - Indicates outside of limits NA - Both concentrations=0... no result can be calculated

Bold and underline - Indicates the compounds reported on form1

FORM 4
Blank Summary

Blank Number: DAILY BLANK
Blank Data File: 8M561184.D
Matrix: Aqueous

Blank Analysis Date: 07/07/22 08:59
Blank Extraction Date: NA
(If Applicable)
Method: EPA 8260D

Sample Number	Data File	Analysis Date
AD31818-001	8M561203.D	07/07/22 15:04
AD31818-002	8M561204.D	07/07/22 15:23
AD31818-003	8M561208.D	07/07/22 16:36
AD31818-004	8M561209.D	07/07/22 16:54
AD31826-001(MSD	8M561206.D	07/07/22 15:59
AD31826-001(MS)	8M561205.D	07/07/22 15:41
MBS102306	8M561190.D	07/07/22 10:49
AD31826-001	8M561187.D	07/07/22 09:54

Form 5

Tune Name: BFB TUNE
Instrument: GCMS 8
Data File: 8M557497.D
Analysis Date: 04/15/22 08:43
Method: EPA 8260D

Tune Scan/Time Range: Average of 7.372 to 7.391 min

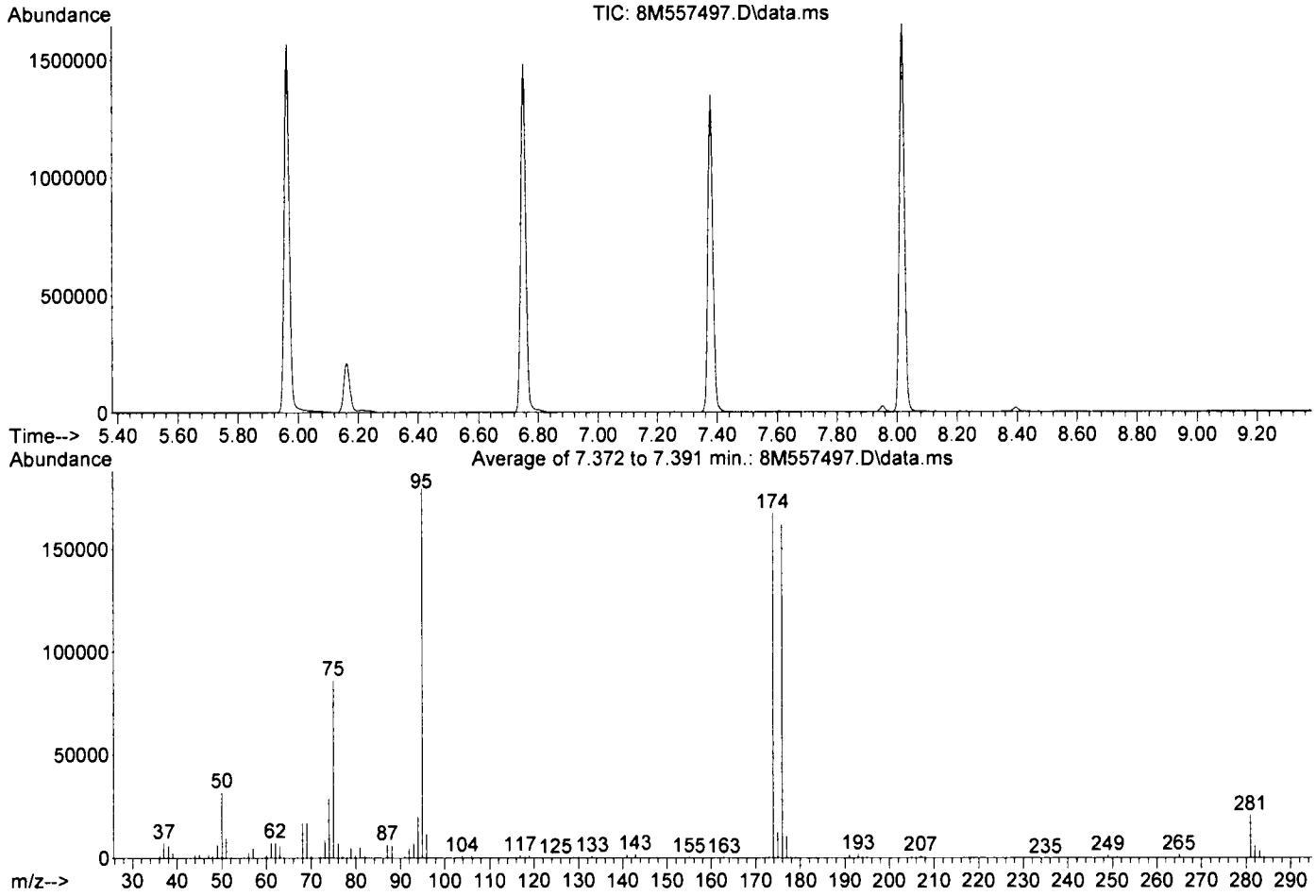
Tgt Mass	Rel Mass	Lo Lim	Hi Lim	Rel Abund	Raw Abund	Pass/ Fail
50	95	15	40	17.8	31924	PASS
75	95	30	60	48.1	86289	PASS
95	95	100	100	100.0	179525	PASS
96	95	5	9	6.6	11845	PASS
173	174	0.00	2	0.4	622	PASS
174	95	50	100	93.2	167402	PASS
175	174	5	9	7.6	12668	PASS
176	174	95	101	96.7	161833	PASS
177	176	5	9	6.6	10750	PASS

Data File	Sample Number	Analysis Date:
8M557498.D	CAL @ 0.5 PPB	04/15/22 09:02
8M557499.D	CAL @ 1 PPB	04/15/22 09:20
8M557500.D	CAL @ 5 PPB	04/15/22 09:38
8M557501.D	CAL @ 10 PPB	04/15/22 09:57
8M557502.D	CAL @ 20 PPB	04/15/22 10:15
8M557503.D	CAL @ 50 PPB	04/15/22 10:33
8M557504.D	CAL @ 100 PPB	04/15/22 10:51
8M557505.D	CAL @ 250 PPB	04/15/22 11:10
8M557506.D	CAL @ 500 PPB	04/15/22 11:28
8M557512.D	ICV	04/15/22 13:18

Data Path : G:\GcMsData\2022\GCMS_8\Data\04-15-22\
Data File : 8M557497.D
Acq On : 15 Apr 2022 08:43
Operator : SG
Sample : BFB TUNE
Misc : A,5ML
ALS Vial : 7 Sample Multiplier: 1

Integration File: RTEINT.P

Method : G:\GcMsData\2022\GCMS_8\MethodQt\8M_A0415.M
Title : @GCMS_8,ug,624,8260
Last Update : Fri Apr 15 13:40:59 2022



Spectrum Information: Average of 7.372 to 7.391 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	17.8	31924	PASS
75	95	30	60	48.1	86289	PASS
95	95	100	100	100.0	179525	PASS
96	95	5	9	6.6	11845	PASS
173	174	0.00	2	0.4	622	PASS
174	95	50	100	93.2	167402	PASS
175	174	5	9	7.6	12668	PASS
176	174	95	101	96.7	161833	PASS
177	176	5	9	6.6	10750	PASS

Form 5

Tune Name: BFB TUNE **Data File:** 8M561178.D
Instrument: GCMS 8 **Analysis Date:** 07/07/22 07:10
Method: EPA 8260D

Tune Scan/Time Range: Average of 7.362 to 7.387 min

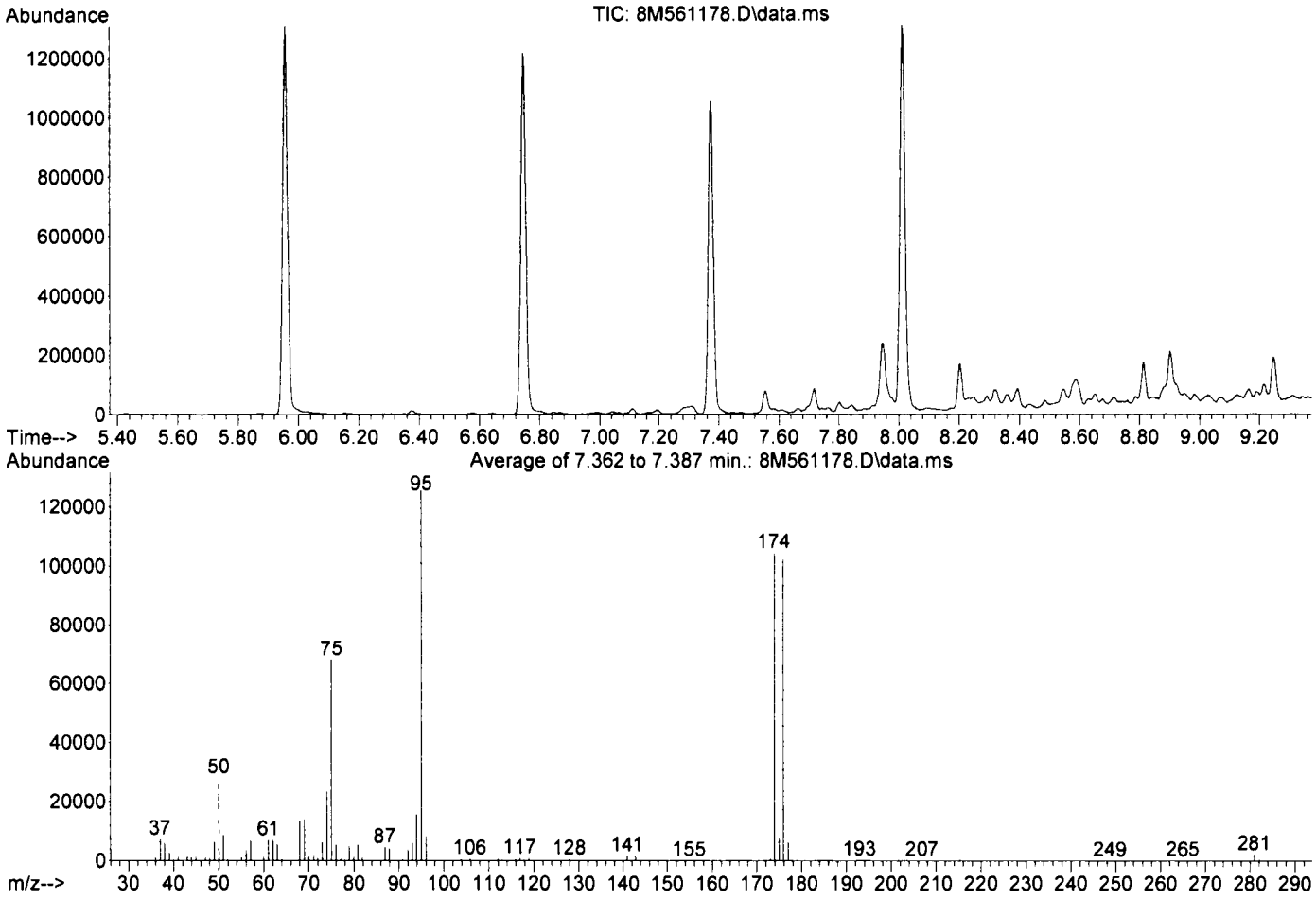
Tgt Mass	Rel Mass	Lo Lim	Hi Lim	Rel Abund	Raw Abund	Pass/ Fail
50	95	15	40	22.2	27916	PASS
75	95	30	60	54.3	68194	PASS
95	95	100	100	100.0	125512	PASS
96	95	5	9	6.7	8434	PASS
173	174	0.00	2	0.7	717	PASS
174	95	50	100	83.3	104513	PASS
175	174	5	9	7.6	7921	PASS
176	174	95	101	97.9	102367	PASS
177	176	5	9	6.1	6243	PASS

Data File	Sample Number	Analysis Date:
8M561179.D	CAL @ 20 PPB	07/07/22 07:28
8M561183.D	DAILY BLANK	07/07/22 08:41
8M561184.D	DAILY BLANK	07/07/22 08:59
8M561185.D	AD31779-001	07/07/22 09:18
8M561186.D	AD31709-003(50X)	07/07/22 09:36
8M561187.D	AD31826-001	07/07/22 09:54
8M561188.D	AD31709-001(40uL	07/07/22 10:13
8M561189.D	MBS102305	07/07/22 10:31
8M561190.D	MBS102306	07/07/22 10:49
8M561191.D	AD31811-002(10X)	07/07/22 11:08
8M561192.D	AD31763-001	07/07/22 11:26
8M561193.D	AD31811-002	07/07/22 11:44
8M561194.D	AD31763-004	07/07/22 12:03
8M561195.D	AD31763-002	07/07/22 12:21
8M561196.D	BLK	07/07/22 12:39
8M561197.D	AD31772-004	07/07/22 12:58
8M561198.D	AD31772-005	07/07/22 13:32
8M561199.D	AD31770-004	07/07/22 13:51
8M561200.D	AD31772-008	07/07/22 14:09
8M561201.D	AD31763-001(MS)	07/07/22 14:27
8M561202.D	AD31763-001(MSD	07/07/22 14:46
8M561203.D	AD31818-001	07/07/22 15:04
8M561204.D	AD31818-002	07/07/22 15:23
8M561205.D	AD31826-001(MS)	07/07/22 15:41
8M561206.D	AD31826-001(MSD	07/07/22 15:59
8M561207.D	BLK	07/07/22 16:17
8M561208.D	AD31818-003	07/07/22 16:36
8M561209.D	AD31818-004	07/07/22 16:54
8M561210.D	AD31821-001	07/07/22 17:13
8M561211.D	AD31821-002	07/07/22 17:31
8M561212.D	AD31821-003	07/07/22 17:49
8M561213.D	AD31821-004	07/07/22 18:08
8M561214.D	AD31821-005	07/07/22 18:26
8M561215.D	AD31821-006	07/07/22 18:45
8M561216.D	AD31466-015(80uL	07/07/22 19:03
8M561217.D	31466-014(80uL)	07/07/22 19:21
8M561218.D	31466-013(80uL)	07/07/22 19:40
8M561219.D	31819-001	07/07/22 19:58
8M561220.D	31819-006	07/07/22 20:17
8M561221.D	31819-011	07/07/22 20:35

Data Path : G:\GcMsData\2022\GCMS_8\Data\07-07-22\
Data File : 8M561178.D
Acq On : 07 Jul 2022 07:10
Operator : SG
Sample : BFB TUNE
Misc : A,5ML
ALS Vial : 2 Sample Multiplier: 1

Integration File: RTEINT.P

Method : G:\GcMsData\2022\GCMS_8\MethodQt\8M_A0415.M
Title : @GCMS_8,ug,624,8260
Last Update : Fri Apr 15 13:40:59 2022



Spectrum Information: Average of 7.362 to 7.387 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	22.2	27916	PASS
75	95	30	60	54.3	68194	PASS
95	95	100	100	100.0	125512	PASS
96	95	5	9	6.7	8434	PASS
173	174	0.00	2	0.7	717	PASS
174	95	50	100	83.3	104513	PASS
175	174	5	9	7.6	7921	PASS
176	174	95	101	97.9	102367	PASS
177	176	5	9	6.1	6243	PASS

2070616 0055

Method: EPA 8260D

Form 6
Initial Calibration

Instrument: GCMS_8

Level #:	Data File:	Cal Identifier:	Analysis Date/Time	Level #:	Data File:	Cal Identifier:	Analysis Date/Time
1	8M557502.D	CAL @ 20 PPB	04/15/22 10:15	2	8M557500.D	CAL @ 5 PPB	04/15/22 09:38
3	8M557501.D	CAL @ 10 PPB	04/15/22 09:57	4	8M557503.D	CAL @ 50 PPB	04/15/22 10:33
5	8M557504.D	CAL @ 100 PPB	04/15/22 10:51	6	8M557505.D	CAL @ 250 PPB	04/15/22 11:10
7	8M557506.D	CAL @ 500 PPB	04/15/22 11:28	8	8M557499.D	CAL @ 1 PPB	04/15/22 09:20
9	8M557498.D	CAL @ 0.5 PPB	04/15/22 09:02				

Compound	Col	Mr	Fit:	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8	RF9	AvgRf	RT	Corr1	Corr2	%Rsd		Calibration Level Concentrations Lvl1	Lvl2	Lvl3	Lvl4	Lvl5	Lvl6	Lvl7	Lvl8	Lvl9
Chlorodifluoromethane	1	0	Qua	0.2810	0.1573	0.1641	0.3217	0.3558	0.3785	0.3462	0.1648	-----	0.271	1.67	0.998	0.999	35	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Dichlorodifluorometha	1	0	Avg	0.1653	0.1418	0.1579	0.1758	0.1922	0.2000	0.1854	0.1500	-----	0.171	1.66	0.999	1.00	12	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Chloromethane	1	0	Avg	0.2150	0.2001	0.2228	0.2269	0.2404	0.2519	0.2309	0.2239	-----	0.227	1.84	0.998	1.00	6.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromomethane	1	0	Avg	0.1510	0.1440	0.1520	0.1707	0.1946	0.2189	0.1887	0.1615	-----	0.173	2.20	0.994	0.998	15	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Vinyl Chloride	1	0	Avg	0.2292	0.2152	0.2296	0.2488	0.2695	0.2825	0.2628	0.2253	-----	0.245	1.91	0.999	1.00	9.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Chloroethane	1	0	Avg	0.1523	0.1606	0.1589	0.1677	0.1757	0.1839	0.1655	0.1661	-----	0.166	2.28	0.997	0.999	5.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Trichlorofluoromethan	1	0	Avg	0.3369	0.3251	0.3467	0.3601	0.3925	0.4178	0.3810	0.3390	-----	0.362	2.49	0.998	0.999	8.8	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethyl ether	1	0	Avg	0.1767	0.1725	0.1833	0.1896	0.2038	0.2133	0.1921	0.1759	-----	0.188	2.71	0.997	0.999	7.6	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Furan	1	0	Avg	0.3167	0.3087	0.3303	0.3375	0.3536	0.3624	0.3204	0.3375	-----	0.333	2.75	0.996	1.00	5.5	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,2-Trichloro-1,2,2-tr	1	0	Avg	0.1834	0.1836	0.1904	0.1957	0.2123	0.2230	0.2060	0.1934	-----	0.198	2.91	0.998	1.00	7.1	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Methylene Chloride	1	0	Avg	0.2383	0.2426	0.2481	0.2581	0.2765	0.2920	0.2688	0.2471	-----	0.259	3.30	0.998	1.00	7.2	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Acrolein	1	0	Qua	0.0389	0.0353	0.0416	0.0456	0.0494	0.0521	0.0480	0.0236	-----	0.0418	2.82	0.998	1.00	22		100.0	25.00	50.00	250.0	500.0	1250.	2500.	5.00	
Acrylonitrile	1	0	Avg	0.0852	0.0740	0.0907	0.0911	0.0994	0.1029	0.0936	0.0797	-----	0.0896	3.49	0.998	1.00	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Iodomethane	1	0	Avg	0.3158	0.2828	0.3240	0.3500	0.3606	0.3641	0.3336	0.2610	-----	0.324	3.05	0.998	1.00	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Acetone	1	0	Avg	0.0594	0.0629	0.0642	0.0640	0.0670	0.0692	0.0604	0.0705	-----	0.0647	2.93	0.995	0.999	6.1	0.10 a	100.0	25.00	50.00	250.0	500.0	1250.	2500.	5.00	
Carbon Disulfide	1	0	Avg	0.5196	0.5141	0.5404	0.5862	0.6283	0.6580	0.6098	0.5479	-----	0.576	3.12	0.998	1.00	9.2	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
t-Butyl Alcohol	1	0	Avg	0.0355	0.0345	0.0367	0.0379	0.0407	0.0426	0.0384	0.0351	-----	0.0377	2.71	0.997	0.999	7.6		100.0	25.00	50.00	250.0	500.0	1250.	2500.	5.00	
n-Hexane	1	0	Avg	0.2130	0.1972	0.2206	0.2331	0.2541	0.2594	0.2420	0.2251	-----	0.231	3.77	0.999	1.00	9.1		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Di-isopropyl-ether	1	0	Avg	0.6691	0.6481	0.6876	0.7085	0.7611	0.7746	0.6902	0.6604	-----	0.700	3.92	0.997	1.00	6.6		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1-Dichloroethene	1	0	Avg	0.3277	0.3147	0.3368	0.3526	0.3789	0.3926	0.3555	0.3355	-----	0.349	2.91	0.998	1.00	7.5	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Methyl Acetate	1	0	Avg	0.1629	0.1909	0.1897	0.1765	0.1838	0.1920	0.1724	0.2085	-----	0.185	3.20	0.997	0.999	7.6	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Methyl-t-butyl ether	1	0	Avg	0.6308	0.6058	0.6649	0.6870	0.7196	0.7617	0.6913	0.6253	0.6330	0.669	3.52	0.998	0.999	7.6	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	0.50
1,1-Dichloroethane	1	0	Avg	0.4016	0.3962	0.4182	0.4261	0.4611	0.4740	0.4360	0.4098	-----	0.428	3.89	0.998	1.00	6.5	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
trans-1,2-Dichloroethe	1	0	Avg	0.2367	0.2320	0.2451	0.2583	0.2812	0.2925	0.2715	0.2472	-----	0.258	3.54	0.999	1.00	8.4	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethyl-t-butyl ether	1	0	Avg	0.6721	0.6576	0.7032	0.7279	0.7737	0.8070	0.7319	0.6983	-----	0.722	4.22	0.998	1.00	6.9	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
cis-1,2-Dichloroethene	1	0	Avg	0.3889	0.3857	0.4044	0.4220	0.4462	0.4634	0.4206	0.3900	-----	0.415	4.35	0.998	1.00	6.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromochloromethane	1	0	Avg	0.1954	0.1907	0.2041	0.2073	0.2125	0.2067	0.1824	0.1970	-----	0.200	4.52	0.996	1.00	5.0		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
2,2-Dichloropropane	1	0	Avg	0.3307	0.3157	0.3352	0.3456	0.3712	0.3844	0.3511	0.3245	-----	0.345	4.35	0.998	1.00	6.8		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethyl acetate	1	0	Avg	0.2002	0.1994	0.2117	0.2176	0.2335	0.2377	0.2206	0.2363	-----	0.220	4.38	0.999	1.00	7.0		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,4-Dioxane	1	0	Avg	0.0028	0.0027	0.0031	0.0031	0.0033	0.0035	0.0031	0.0028	-----	0.00309	5.49	0.997	0.999	9.0		1000.	250.0	500.0	2500.	5000.	12500	25000	50.00	
1,1-Dichloropropene	1	0	Avg	0.3179	0.3114	0.3344	0.3412	0.3631	0.3794	0.3480	0.3189	-----	0.339	4.80	0.998	1.00	7.0		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Chloroform	1	0	Avg	0.4212	0.4231	0.4477	0.4511	0.4775	0.4987	0.4604	0.4123	-----	0.449	4.55	0.998	1.00	6.6	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Dibromofluoromethan	1	0	Avg	0.2746	0.2701	0.2712	0.2801	0.2781	0.2789	0.2808	0.2722	0.2757	0.276	4.66	-1	-1	1.4		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Cyclohexane	1	0	Avg	0.2979	0.2902	0.3188	0.3228	0.3539	0.3692	0.3410	0.3131	-----	0.326	4.75	0.998	1.00	8.3	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dichloroethane-d4	1	0	Avg	0.1470	0.1465	0.1485	0.1474	0.1459	0.1451	0.1454	0.1463	0.1481	0.147	4.88	-1	-1	0.80		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
1,2-Dichloroethane	1	0	Avg	0.3428	0.3349	0.3574	0.3585	0.3744	0.3812	0.3329	0.3637	0.3917	0.360	4.93	0.996	1.00	5.7	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	0.50
2-Butanone	1	0	Avg	0.0873	0.0868	0.0937	0.1000	0.1035	0.1095	0.0931	0.0985	-----	0.0966	4.34	0.993	0.999	8.2	0.10 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,1-Trichloroethane	1	0	Avg	0.3836	0.3749	0.4018	0.4093	0.4314	0.4577	0.4264	0.3785	-----	0.408	4.70	0.999	1.00	7.1	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Carbon Tetrachloride	1	0	Avg	0.3416	0.3257	0.3547	0.3645	0.3903	0.4113	0.3825	0.3595	-----	0.366	4.81	0.999	1.00	7.5	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Vinyl Acetate	1	0	Avg	0.7130	0.6208	0.7138	0.7807	0.8402	0.8578	0.7691	0.5843	-----	0.735	3.92	0.997	1.00	13		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromodichloromethan	1	0	Avg	0.3366	0.3355	0.3552	0.3639	0.3868	0.4107	0.3835	0.3418	-----	0.364	5.56	0.999	1.00	7.5	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	

Flags

a - failed the min rf criteria

c - failed the minimum correlation coeff criteria(if applicable)

Note: Avg Rsd: 8.169

Corr 1 = Correlation Coefficient for linear Eq.

Corr 2 = Correlation Coefficient for quad Eq.

Fit = Indicates whether Avg RF, Linear, or Quadratic Curve was used for compound.

Method: EPA 8260D

Form 6
Initial Calibration

Instrument: GCMS_8

Level #	Data File	Cal Identifier	Analysis Date/Time	Level #	Data File	Cal Identifier	Analysis Date/Time
1	8M557502.D	CAL @ 20 PPB	04/15/22 10:15	2	8M557500.D	CAL @ 5 PPB	04/15/22 09:38
3	8M557501.D	CAL @ 10 PPB	04/15/22 09:57	4	8M557503.D	CAL @ 50 PPB	04/15/22 10:33
5	8M557504.D	CAL @ 100 PPB	04/15/22 10:51	6	8M557505.D	CAL @ 250 PPB	04/15/22 11:10
7	8M557506.D	CAL @ 500 PPB	04/15/22 11:28	8	8M557499.D	CAL @ 1 PPB	04/15/22 09:20
9	8M557498.D	CAL @ 0.5 PPB	04/15/22 09:02				

Compound	Col	Mr	Fit:	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8	RF9	AvgRf	RT	Corr1	Corr2	%Rsd		Calibration Level Concentrations Lvl1	Lvl2	Lvl3	Lvl4	Lvl5	Lvl6	Lvl7	Lvl8	Lvl9
Methylcyclohexane	1	0	Avg	0.3035	0.2797	0.3120	0.3254	0.3584	0.3787	0.3581	0.3154	-----	0.329	5.41	0.999	1.00	10	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Dibromomethane	1	0	Avg	0.1919	0.1909	0.2061	0.2098	0.2242	0.2398	0.2274	0.1733	-----	0.208	5.49	0.999	1.00	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dichloropropane	1	0	Avg	0.2340	0.2368	0.2482	0.2536	0.2699	0.2889	0.2649	0.2316	-----	0.254	5.42	0.998	0.999	7.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Trichloroethene	1	0	Avg	0.2750	0.2691	0.2807	0.2943	0.3169	0.3385	0.3235	0.2662	-----	0.296	5.29	0.999	1.00	9.3	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Benzene	1	0	Avg	0.9258	0.9138	0.9693	0.9820	1.0468	1.0878	0.9708	0.9609	0.9158	0.975	4.93	0.997	0.999	6.1	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	0.50
tert-Amyl methyl ether	1	0	Avg	0.6511	0.6179	0.6767	0.6936	0.7376	0.7702	0.6956	0.6268	-----	0.684	4.98	0.997	1.00	7.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Iso-propylacetate	1	0	Avg	0.5037	0.4820	0.4768	0.4664	0.4888	0.4819	0.4026	0.6842	-----	0.498	4.93	0.992	1.00	16	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Methyl methacrylate	1	0	Avg	0.2113	0.2119	0.2315	0.2252	0.2326	0.2366	0.2043	0.2696	-----	0.228	5.46	0.995	0.999	9.0	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Dibromochloromethan	1	0	Avg	0.3206	0.2880	0.3266	0.3384	0.3647	0.3864	0.3575	0.2915	-----	0.334	6.44	0.998	1.00	10	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
2-Chloroethylvinylethe	1	0	Avg	0.0240	0.0210	0.0259	0.0280	0.0311	0.0342	0.0315	0.0234	-----	0.0274	5.72	0.998	0.999	17		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
cis-1,3-Dichloropropen	1	0	Avg	0.4323	0.4046	0.4526	0.4581	0.4868	0.5128	0.4636	0.4194	-----	0.454	5.81	0.997	0.999	7.8	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
trans-1,3-Dichloroprop	1	0	Avg	0.4067	0.3935	0.4122	0.4304	0.4646	0.4882	0.4338	0.3854	-----	0.427	6.10	0.997	0.999	8.3	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethyl methacrylate	1	0	Avg	0.2182	0.1949	0.2233	0.2328	0.2457	0.2531	0.2204	0.2047	-----	0.224	6.13	0.995	0.999	8.7	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,2-Trichloroethane	1	0	Avg	0.2545	0.2571	0.2631	0.2642	0.2782	0.2930	0.2661	0.2601	-----	0.267	6.21	0.998	0.999	4.8	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dibromoethane	1	0	Avg	0.2779	0.2634	0.2893	0.2887	0.3085	0.3275	0.2982	0.2773	-----	0.291	6.51	0.998	0.999	6.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,3-Dichloropropane	1	0	Avg	0.4308	0.4254	0.4541	0.4546	0.4744	0.4924	0.4347	0.4185	-----	0.448	6.30	0.996	0.999	5.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
4-Methyl-2-Pentanone	1	0	Avg	0.2151	0.2144	0.2289	0.2327	0.2449	0.2542	0.2263	0.2328	-----	0.231	5.88	0.997	0.999	5.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
2-Hexanone	1	0	Avg	0.1511	0.1395	0.1584	0.1603	0.1688	0.1755	0.1517	0.1384	-----	0.156	6.32	0.995	0.999	8.4	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Tetrachloroethene	1	0	Avg	0.2470	0.2344	0.2545	0.2549	0.2747	0.2912	0.2675	0.2484	-----	0.259	6.31	0.998	0.999	6.9	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Toluene-d8	1	0	Avg	1.1404	1.1237	1.1438	1.1208	1.1224	1.1035	1.0935	1.1324	1.1388	1.12	5.97	-1	-1	1.5		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Toluene	1	0	Avg	0.6878	0.6838	0.7038	0.7082	0.7561	0.7854	0.7074	0.7077	-----	0.718	6.00	0.997	1.00	4.9	0.40	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,1,2-Tetrachloroeth	1	0	Avg	0.2767	0.2634	0.2930	0.2905	0.3116	0.3331	0.3016	0.2607	-----	0.291	6.81	0.998	0.999	8.4		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Chlorobenzene	1	0	Avg	0.7787	0.7588	0.8084	0.8091	0.8610	0.9053	0.8077	0.8023	0.7627	0.811	6.77	0.997	0.999	5.8	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	0.50
n-Butyl acrylate	1	0	Avg	0.7905	0.6847	0.7586	0.8523	0.9171	0.9743	0.8823	0.6373	-----	0.812	7.02	0.998	0.999	14	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
n-Amyl acetate	1	0	Avg	0.6495	0.5726	0.6530	0.6921	0.7379	0.7580	0.6717	0.5588	-----	0.662	7.14	0.996	1.00	11	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromoform	1	0	Avg	0.4000	0.3735	0.4069	0.4261	0.4632	0.5096	0.4774	0.3436	-----	0.425	7.22	0.999	0.999	13	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Ethylbenzene	1	0	Avg	0.6351	0.5869	0.6741	0.6832	0.7297	0.7785	0.6894	0.6277	-----	0.676	6.82	0.996	0.999	8.9	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,1,2,2-Tetrachloroeth	1	0	Avg	0.5739	0.5354	0.5861	0.5855	0.6181	0.6578	0.6006	0.5640	-----	0.590	7.43	0.998	0.999	6.2	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromofluorobenzene	1	0	Avg	0.8069	0.8084	0.7927	0.7944	0.8004	0.8068	0.8100	0.8089	0.7996	0.803	7.38	-1	-1	0.81		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Styrene	1	0	Avg	1.5225	1.4035	1.5342	1.5741	1.6958	1.7651	1.5280	1.3815	-----	1.55	7.10	0.995	0.999	8.4	0.30	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
m&p-Xylenes	1	0	Avg	0.8938	0.8553	0.9178	0.9205	0.9852	1.0303	0.8841	0.8584	0.8552	0.911	6.87	0.994	0.999	6.7	0.10	40.00	10.00	20.00	100.0	200.0	500.0	1000.	2.00	1.00
o-Xylene	1	0	Avg	0.8783	0.8688	0.9104	0.9157	0.9756	1.0257	0.9069	0.8585	-----	0.918	7.09	0.996	0.999	6.2	0.30	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
trans-1,4-Dichloro-2-b	1	0	Avg	0.2230	0.2078	0.2276	0.2278	0.2460	0.2516	0.2127	0.2272	-----	0.228	7.46	0.993	0.999	6.5		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,3-Dichlorobenzene	1	0	Avg	1.0710	1.0277	1.1048	1.1051	1.1825	1.2491	1.1232	1.0657	-----	1.12	7.99	0.997	0.999	6.3	0.60	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,4-Dichlorobenzene	1	0	Avg	1.0904	1.0791	1.1406	1.1258	1.2073	1.2735	1.1512	1.1050	-----	1.15	8.03	0.997	0.999	5.7	0.50	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dichlorobenzene	1	0	Avg	1.0223	0.9824	1.0320	1.0408	1.1180	1.1866	1.0724	0.9546	-----	1.05	8.25	0.997	0.999	7.1	0.40	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Isopropylbenzene	1	0	Avg	2.1700	2.0726	2.1995	2.2280	2.3826	2.4558	1.9549	2.0278	-----	2.19	7.29	0.986	0.999	7.8	0.10	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Cyclohexanone	1	0	Avg	0.0155	0.0182	0.0170	0.0158	0.0161	0.0178	0.0151	0.0164	-----	0.0166	7.36	0.993	0.998	6.6		100.0	25.00	50.00	250.0	500.0	1250.	2500.	5.00	
Camphene	1	0	Avg	0.5302	0.5007	0.5332	0.5418	0.5883	0.6184	0.5628	0.5359	-----	0.551	7.45	0.998	0.999	6.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,3-Trichloropropane	1	0	Avg	0.7305	0.6712	0.7567	0.7539	0.7970	0.8333	0.7393	0.7590	-----	0.755	7.47	0.996	0.999	6.3		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
2-Chlorotoluene	1	0	Avg	1.3730	1.3613	1.3998	1.4086	1.4813	1.5190	1.2856	1.3984	-----	1.40	7.57	0.993	0.999	5.1		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	

Avg Rsd: 8.169

Flags

a - failed the min rf criteria

c - failed the minimum correlation coeff criteria(if applicable)

Note:

Corr 1 = Correlation Coefficient for linear Eq.

Corr 2 = Correlation Coefficient for quad Eq.

Fit = Indicates whether Avg RF, Linear, or Quadratic Curve was used for compound.

2070616 0057

Method: EPA 8260D

Form 6
Initial Calibration

Instrument: GCMS_8

Level #:	Data File:	Cal Identifier:	Analysis Date/Time	Level #:	Data File:	Cal Identifier:	Analysis Date/Time
1	8M557502.D	CAL @ 20 PPB	04/15/22 10:15	2	8M557500.D	CAL @ 5 PPB	04/15/22 09:38
3	8M557501.D	CAL @ 10 PPB	04/15/22 09:57	4	8M557503.D	CAL @ 50 PPB	04/15/22 10:33
5	8M557504.D	CAL @ 100 PPB	04/15/22 10:51	6	8M557505.D	CAL @ 250 PPB	04/15/22 11:10
7	8M557506.D	CAL @ 500 PPB	04/15/22 11:28	8	8M557499.D	CAL @ 1 PPB	04/15/22 09:20
9	8M557498.D	CAL @ 0.5 PPB	04/15/22 09:02				

Compound	Col	Mr	Fit:	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8	RF9	AvgRf	RT	Corr1	Corr2	%Rsd		Calibration Level Concentrations Lvl1	Lvl2	Lvl3	Lvl4	Lvl5	Lvl6	Lvl7	Lvl8	Lvl9
p-Ethyltoluene	1	0	Avg	2.1016	1.9744	2.1154	2.1200	2.2539	2.3381	1.9299	1.8926	-----	2.09	7.57	0.991	0.999	7.4		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
4-Chlorotoluene	1	0	Avg	1.3588	1.3430	1.3880	1.3894	1.4893	1.5355	1.2878	1.2969	-----	1.39	7.63	0.992	0.999	6.3		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
n-Propylbenzene	1	0	Avg	2.4070	2.3357	2.4760	2.4659	2.6263	2.6760	1.9993	2.3302	-----	2.41	7.51	0.977	0.998	8.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Bromobenzene	1	0	Avg	1.1848	1.1351	1.2958	1.2278	1.3085	1.3557	1.1973	1.2721	-----	1.25	7.48	0.996	0.999	5.9		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,3,5-Trimethylbenzen	1	0	Avg	1.6674	1.6543	1.7340	1.7526	1.8715	1.9125	1.5697	1.6408	-----	1.73	7.59	0.990	0.999	6.8		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Butyl methacrylate	1	0	Avg	0.5523	0.4875	0.5476	0.5739	0.6083	0.6038	0.4907	0.4618	-----	0.541	7.60	0.988	0.999	10	0.50 a	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
t-Butylbenzene	1	0	Avg	1.6754	1.5873	1.7125	1.7360	1.8681	1.9673	1.7618	1.5968	-----	1.74	7.79	0.997	0.999	7.4		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,4-Trimethylbenzen	1	0	Avg	1.7801	1.6939	1.8022	1.8392	1.9608	2.0377	1.7355	1.7086	-----	1.82	7.81	0.993	0.999	6.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
sec-Butylbenzene	1	0	Avg	1.9666	1.8959	2.0123	2.0446	2.1953	2.2755	1.8690	1.9244	-----	2.02	7.91	0.990	0.999	7.2		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
4-Isopropyltoluene	1	0	Avg	1.7179	1.6012	1.7047	1.7735	1.9102	1.9993	1.6943	1.6130	-----	1.75	7.97	0.993	0.999	7.9		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
n-Butylbenzene	1	0	Avg	1.7241	1.6280	1.7545	1.7884	1.9102	1.9712	1.7339	1.6328	-----	1.77	8.20	0.996	0.999	6.9		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
p-Diethylbenzene	1	0	Avg	0.9729	0.8922	0.9769	1.0304	1.1077	1.1808	1.0714	0.9300	-----	1.02	8.18	0.998	0.999	9.4		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,4,5-Tetramethylbe	1	0	Avg	1.3150	1.1895	1.3233	1.4036	1.5212	1.6273	1.4607	1.1468	-----	1.37	8.63	0.997	0.999	12		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2-Dibromo-3-Chloro	1	0	Avg	0.1284	0.1130	0.1318	0.1369	0.1532	0.1677	0.1565	0.1202	-----	0.139	8.68	0.999	0.999	14	0.05	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Camphor	1	0	Avg	0.0395	0.0359	0.0428	0.0436	0.0478	0.0517	0.0493	0.0353	0.0373	0.0426	9.11	0.999	0.999	14		200.0	50.00	100.0	500.0	1000.	2500.	5000.	10.00	5.00
Hexachlorobutadiene	1	0	Avg	0.2433	0.2152	0.2396	0.2517	0.2747	0.2924	0.2712	0.2168	-----	0.251	9.25	0.998	0.999	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,4-Trichlorobenzen	1	0	Avg	0.5466	0.5198	0.5562	0.5760	0.6226	0.6748	0.6185	0.5389	-----	0.582	9.16	0.998	0.999	9.0	0.20	20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
1,2,3-Trichlorobenzen	1	0	Avg	0.4344	0.4070	0.4498	0.4643	0.5023	0.5394	0.5069	0.4293	-----	0.467	9.45	0.999	0.999	9.7		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	
Naphthalene	1	0	Avg	1.3119	1.1650	1.3315	1.4054	1.5057	1.6165	1.4643	1.1831	-----	1.37	9.32	0.998	0.999	11		20.00	5.00	10.00	50.00	100.0	250.0	500.0	1.00	

Flags	*Note:* Avg Rsd: 8.169
a - failed the min rf criteria	*Corr 1 = Correlation Coefficient for linear Eq.*
c - failed the minimum correlation coeff criteria(if applicable)	*Corr 2 = Correlation Coefficient for quad Eq.*
	Fit = Indicates whether Avg RF, Linear, or Quadratic Curve was used for compound.

Form7

Continuing Calibration

Calibration Name: CAL @ 20 PPB **Data File:** 8M561179.D **Instrument:** GCMS 8

Cont Calibration Date/Time 7/7/2022 7:28:00 AM **Method:** EPA 8260D

TxtCompd:	Col#	Multi Num	Type	RT	Conc	Conc Exp	Lo Lim	MIN RF	Initial RF	RF	%Diff	Flag
Fluorobenzene	1	0	I	5.08	30.00	30	**			0.000	0.00	
Chlorodifluoromethane	1	0		1.69	17.71	20	20	0.1	0.271	0.340	11.44	
Dichlorodifluoromethane	1	0		1.66	29.02	20	20	0.1	0.171	0.248	45.12	C1
Chloromethane	1	0		1.85	21.67	20	20	0.1	0.227	0.245	8.37	
Bromomethane	1	0		2.20	14.87	20	20	0.1	0.173	0.128	25.66	C1
Vinyl Chloride	1	0		1.91	21.19	20	20	0.1	0.245	0.260	5.96	
Chloroethane	1	0		2.28	19.85	20	20	0.1	0.166	0.165	0.76	
Trichlorofluoromethane	1	0		2.49	22.69	20	20	0.1	0.362	0.411	13.43	
Ethyl ether	1	0		2.71	21.17	20	20	0.5	0.188	0.199	5.84	
Furan	1	0		2.75	24.86	20	20	0.5	0.333	0.414	24.31	C1
1,1,2-Trichloro-1,2,2-trifluoroetha	1	0		2.91	20.24	20	20	0.1	0.198	0.201	1.22	
Methylene Chloride	1	0		3.30	18.19	20	20	0.1	0.259	0.236	9.07	
Acrolein	1	0		2.82	61.04	100	20		0.042	0.032	38.96	C1
Acrylonitrile	1	0		3.49	17.63	20	20		0.090	0.079	11.83	
Iodomethane	1	0		3.05	11.73	20	20		0.324	0.190	41.36	C1
Acetone	1	0		2.93	77.38	100	20	0.1	0.065	0.050	22.62	C1
Carbon Disulfide	1	0		3.12	21.49	20	20	0.1	0.576	0.619	7.46	
t-Butyl Alcohol	1	0		2.71	105.75	100	20		0.038	0.040	5.75	
n-Hexane	1	0		3.76	22.23	20	20		0.231	0.256	11.16	
Di-isopropyl-ether	1	0		3.92	21.39	20	20		0.700	0.749	6.93	
1,1-Dichloroethene	1	0		2.91	21.00	20	20	0.1	0.349	0.367	5.01	
Methyl Acetate	1	0		3.20	19.90	20	20	0.1	0.185	0.184	0.51	
Methyl-t-butyl ether	1	0		3.52	19.80	20	20	0.1	0.669	0.662	0.98	
1,1-Dichloroethane	1	0		3.89	20.20	20	20	0.2	0.428	0.432	0.99	
trans-1,2-Dichloroethene	1	0		3.53	17.84	20	20	0.1	0.258	0.230	10.79	
Ethyl-t-butyl ether	1	0		4.21	19.80	20	20	0.5	0.722	0.714	1.00	
cis-1,2-Dichloroethene	1	0		4.34	21.16	20	20	0.1	0.415	0.439	5.80	
Bromochloromethane	1	0		4.51	21.54	20	20		0.200	0.215	7.71	
2,2-Dichloropropane	1	0		4.35	23.21	20	20		0.345	0.400	16.05	
Ethyl acetate	1	0		4.37	20.38	20	20		0.220	0.224	1.90	
1,4-Dioxane	1	0		5.49	165.79	1000	20		0.003	0.001	83.42	C1
1,1-Dichloropropene	1	0		4.80	18.64	20	20		0.339	0.316	6.81	
Chloroform	1	0		4.55	19.78	20	20	0.2	0.449	0.444	1.12	
Dibromofluoromethane	1	0	S	4.66	30.80	30	**		0.276	0.283	2.67	
Cyclohexane	1	0		4.74	20.59	20	20	0.1	0.326	0.336	2.95	
1,2-Dichloroethane-d4	1	0	S	4.88	34.42	30	**		0.147	0.168	14.74	
1,2-Dichloroethane	1	0		4.92	21.75	20	20	0.1	0.360	0.391	8.74	
2-Butanone	1	0		4.34	18.43	20	20	0.1	0.097	0.089	7.84	
1,1,1-Trichloroethane	1	0		4.70	20.13	20	20	0.1	0.408	0.411	0.67	
Carbon Tetrachloride	1	0		4.81	19.65	20	20	0.1	0.366	0.360	1.77	
Vinyl Acetate	1	0		3.91	19.23	20	20		0.735	0.707	3.83	
Bromodichloromethane	1	0		5.56	18.37	20	20	0.2	0.364	0.335	8.14	
Methylcyclohexane	1	0		5.41	18.71	20	20	0.1	0.329	0.308	6.47	
Dibromomethane	1	0		5.48	16.05	20	20		0.208	0.167	19.73	
1,2-Dichloropropane	1	0		5.42	19.22	20	20	0.1	0.254	0.244	3.89	
Trichloroethene	1	0		5.29	16.54	20	20	0.2	0.296	0.244	17.29	
Benzene	1	0		4.92	18.54	20	20	0.5	0.975	0.904	7.30	
tert-Amyl methyl ether	1	0		4.97	19.32	20	20		0.684	0.661	3.38	
Chlorobenzene-d5	1	0	I	6.75	30.00	30	**			0.000	0.00	
Iso-propylacetate	1	0		4.93	21.45	20	20	0.5	0.498	0.535	7.27	
Methyl methacrylate	1	0		5.45	23.24	20	20	0.5	0.228	0.265	16.22	
Dibromochloromethane	1	0		6.43	17.49	20	20	0.1	0.334	0.292	12.53	

S-Surrogate Compound I-Internal Standard Compound

N/O or N/Q - Not applicable for this run C1-Compound %Diff exceeds limits ** - No limit specified in method

Note: 8260/8270 limits are compared against the %DIFF/R.F. 625 limits are compared against the %DIFF.

624 limits are compared against the concentration found. 524.2 limits are compared against the %DIFF

Form7

Continuing Calibration

Calibration Name: CAL @ 20 PPB **Data File:** 8M561179.D **Instrument:** GCMS 8

Cont Calibration Date/Time 7/7/2022 7:28:00 AM Method: EPA 8260D

TxtCompd:	Col#	Multi Num	Type	RT	Conc	Conc Exp	Lo Lim	MIN RF	Initial RF	RF	%Diff	Flag
2-Chloroethylvinylether	1	0		5.71	44.75	20	20		0.027	0.061	123.76	C1
cis-1,3-Dichloropropene	1	0		5.81	20.40	20	20	0.2	0.454	0.463	2.02	
trans-1,3-Dichloropropene	1	0		6.09	20.19	20	20	0.1	0.427	0.431	0.94	
Ethyl methacrylate	1	0		6.12	24.54	20	20	0.5	0.224	0.275	22.69	C1
1,1,2-Trichloroethane	1	0		6.20	18.45	20	20	0.1	0.267	0.246	7.74	
1,2-Dibromoethane	1	0		6.51	17.90	20	20	0.1	0.291	0.261	10.50	
1,3-Dichloropropane	1	0		6.30	19.49	20	20		0.448	0.437	2.53	
4-Methyl-2-Pentanone	1	0		5.87	20.88	20	20	0.1	0.231	0.241	4.42	
2-Hexanone	1	0		6.32	19.83	20	20	0.1	0.156	0.154	0.83	
Tetrachloroethene	1	0		6.30	17.89	20	20	0.2	0.259	0.232	10.53	
Toluene-d8	1	0	S	5.96	32.53	30	**		1.124	1.219	8.42	
Toluene	1	0		6.00	18.74	20	20	0.4	0.718	0.672	6.31	
1,1,1,2-Tetrachloroethane	1	0		6.80	18.03	20	20		0.291	0.263	9.87	
Chlorobenzene	1	0		6.76	18.58	20	20	0.5	0.811	0.753	7.11	
1,4-Dichlorobenzene-d4	1	0	I	8.01	30.00	30	**			0.000	0.00	
n-Butyl acrylate	1	0		7.02	25.11	20	20	0.5	0.812	1.020	25.55	C1
n-Amyl acetate	1	0		7.13	26.22	20	20	0.5	0.662	0.867	31.08	C1
Bromoform	1	0		7.21	16.89	20	20	0.1	0.425	0.359	15.57	
Ethylbenzene	1	0		6.81	20.09	20	20	0.1	0.676	0.679	0.47	
1,1,2,2-Tetrachloroethane	1	0		7.43	19.96	20	20	0.1	0.590	0.589	0.19	
Bromofluorobenzene	1	0	S	7.37	30.68	30	**		0.803	0.821	2.26	
Styrene	1	0		7.09	19.99	20	20	0.3	1.551	1.550	0.03	
m&p-Xylenes	1	0		6.87	39.54	40	20	0.1	0.911	0.901	1.16	
o-Xylene	1	0		7.09	19.79	20	20	0.3	0.918	0.908	1.03	
trans-1,4-Dichloro-2-butene	1	0		7.45	24.66	20	20		0.228	0.281	23.29	C1
1,3-Dichlorobenzene	1	0		7.98	18.08	20	20	0.6	1.116	1.009	9.61	
1,4-Dichlorobenzene	1	0		8.03	18.24	20	20	0.5	1.147	1.046	8.80	
1,2-Dichlorobenzene	1	0		8.24	17.79	20	20	0.4	1.051	0.935	11.03	
Isopropylbenzene	1	0		7.28	19.86	20	20	0.1	2.186	2.172	0.68	
Cyclohexanone	1	0		7.35	44.55	100	20		0.017	0.007	55.45	C1
Camphene	1	0		7.45	22.61	20	20		0.551	0.624	13.07	
1,2,3-Trichloropropane	1	0		7.46	19.69	20	20		0.755	0.744	1.53	
2-Chlorotoluene	1	0		7.57	20.90	20	20		1.403	1.467	4.52	
p-Ethyltoluene	1	0		7.56	21.24	20	20		2.091	2.221	6.21	
4-Chlorotoluene	1	0		7.63	20.69	20	20		1.386	1.434	3.44	
n-Propylbenzene	1	0		7.50	21.11	20	20		2.415	2.549	5.57	
Bromobenzene	1	0		7.47	22.66	20	20		1.247	1.413	13.30	
1,3,5-Trimethylbenzene	1	0		7.59	19.79	20	20		1.725	1.707	1.07	
Butyl methacrylate	1	0		7.60	25.33	20	20	0.5	0.541	0.685	26.65	C1
t-Butylbenzene	1	0		7.78	18.99	20	20		1.738	1.651	5.04	
1,2,4-Trimethylbenzene	1	0		7.80	19.67	20	20		1.820	1.790	1.66	
sec-Butylbenzene	1	0		7.90	19.66	20	20		2.023	1.989	1.69	
4-Isopropyltoluene	1	0		7.97	19.71	20	20		1.752	1.726	1.46	
n-Butylbenzene	1	0		8.19	21.18	20	20		1.768	1.872	5.89	
p-Diethylbenzene	1	0		8.18	19.74	20	20		1.020	1.007	1.29	
1,2,4,5-Tetramethylbenzene	1	0		8.62	20.55	20	20		1.373	1.411	2.76	
1,2-Dibromo-3-Chloropropane	1	0		8.67	15.83	20	20	0.05	0.139	0.110	20.87	C1
Camphor	1	0		9.10	98.18	200	20		0.043	0.021	50.91	C1
Hexachlorobutadiene	1	0		9.24	20.03	20	20		0.251	0.251	0.17	
1,2,4-Trichlorobenzene	1	0		9.15	17.52	20	20	0.2	0.582	0.509	12.42	
1,2,3-Trichlorobenzene	1	0		9.45	18.89	20	20		0.467	0.441	5.53	
Naphthalene	1	0		9.31	18.84	20	20		1.373	1.294	5.79	

S-Surrogate Compound I-Internal Standard Compound

N/O or N/Q - Not applicable for this run C1-Compound %Diff exceeds limits ** - No limit specified in method

Note: 8260/8270 limits are compared against the %DIFF/R.F. 625 limits are compared against the %DIFF.

624 limits are compared against the concentration found. 524.2 limits are compared against the %DIFF

2070616 0060

FORM8

Internal Standard Areas

Evaluation Std Data File: 8M557502.D Method: EPA 8260D

Analysis Date/Time: 04/15/22 10:15

Lab File ID: CAL @ 20 PPB

	I1		I2		I3		I4		I5		I6		I7	
	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT
Eval File Area/RT:	708804	5.08	631558	6.75	351886	8.02								
Eval File Area Limit:	354402-1417608		315779-1263116		175943-703772									
Eval File Rt Limit:	4.58-5.58		6.25-7.25		7.52-8.52									
Data File Sample#														
8M557498.D CAL @ 0.5 PPB	673269	5.08	602815	6.75	336532	8.02								
8M557499.D CAL @ 1 PPB	677571	5.08	598717	6.75	337938	8.02								
8M557500.D CAL @ 5 PPB	690154	5.08	618822	6.75	346663	8.02								
8M557501.D CAL @ 10 PPB	669250	5.08	599966	6.75	340178	8.02								
8M557502.D CAL @ 20 PPB	708804	5.08	631558	6.75	351886	8.02								
8M557503.D CAL @ 50 PPB	676310	5.08	625719	6.75	354229	8.02								
8M557504.D CAL @ 100 PPB	638187	5.08	594836	6.75	336099	8.02								
8M557505.D CAL @ 250 PPB	610490	5.08	580750	6.75	327122	8.02								
8M557506.D CAL @ 500 PPB	662473	5.08	647988	6.75	359332	8.02								
8M557512.D ICV	736505	5.08	670801	6.75	378050	8.02								

I1 = Fluorobenzene
I2 = Chlorobenzene-d5
I3 = 1,4-Dichlorobenzene-d4
I4 =
I5 =
I6 =
I7 =

625/8270 Internal Standard concentration = 40 mg/L (in final extract)
624/8260 Internal Standard concentration = 30ug/L
524 Internal Standard concentration =5ug/L

Internal Standard Areas

Upper Limit = + 100% of internal standard area from daily cal or mid pt.

Lower Limit = - 50% of internal standard area from daily cal or mid pt.

Flags:

A - Indicates the compound failed the internal standard area criteria

R - Indicates the compound failed the internal standard retention time criteria.

Retention Times: Limit = within +/- 0.5 min of internal standard retention time from the daily cal or mid pt.

FORM8

Internal Standard Areas

Evaluation Std Data File: 8M561179.D Method: EPA 8260D

Analysis Date/Time: 07/07/22 07:28

Lab File ID: CAL @ 20 PPB

	I1		I2		I3		I4		I5		I6		I7	
	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT
Eval File Area/RT:	556283	5.08	483508	6.75	255305	8.01								
Eval File Area Limit:	278142-1112566		241754-967016		127652-510610									
Eval File Rt Limit:	4.58-5.58		6.25-7.25		7.51-8.51									

Data File	Sample#													
8M561183.D	DAILY BLANK	502100	5.08	435671	6.75	218804	8.01							
8M561184.D	DAILY BLANK	538835	5.08	471296	6.75	246399	8.01							
8M561185.D	AD31779-001	490865	5.08	426317	6.75	220439	8.01							
8M561186.D	AD31709-003(50X)	500457	5.08	441012	6.75	226145	8.01							
8M561187.D	AD31826-001	500771	5.08	435728	6.75	218663	8.01							
8M561188.D	AD31709-001(40uL)	520515	5.08	455502	6.75	169105	8.01							
8M561189.D	MBS102305	547250	5.08	463607	6.75	246303	8.01							
8M561190.D	MBS102306	521779	5.08	443841	6.75	233392	8.01							
8M561192.D	AD31763-001	484383	5.08	422584	6.75	219167	8.01							
8M561194.D	AD31763-004	511326	5.08	454020	6.75	242581	8.01							
8M561195.D	AD31763-002	621926	5.08	540356	6.75	286557	8.01							
8M561196.D	BLK	604195	5.08	529834	6.75	273064	8.01							
8M561197.D	AD31772-004	584122	5.08	510384	6.75	273208	8.01							
8M561198.D	AD31772-005	626486	5.08	543401	6.75	284798	8.01							
8M561199.D	AD31770-004	565247	5.08	488438	6.75	268282	8.01							
8M561200.D	AD31772-008	578028	5.08	495512	6.75	276672	8.01							
8M561201.D	AD31763-001(MS)	580571	5.08	504781	6.75	266985	8.01							
8M561202.D	AD31763-001(MSD)	597520	5.08	524303	6.75	277698	8.01							
8M561203.D	AD31818-001	546388	5.08	483603	6.75	256613	8.01							
8M561204.D	AD31818-002	548545	5.08	485497	6.75	251698	8.01							
8M561205.D	AD31826-001(MS)	580915	5.08	506855	6.75	265858	8.01							
8M561206.D	AD31826-001(MSD)	622410	5.08	547403	6.75	284460	8.01							
8M561207.D	BLK	649644	5.08	566534	6.75	290248	8.01							
8M561208.D	AD31818-003	570676	5.08	494585	6.75	252014	8.01							
8M561209.D	AD31818-004	589274	5.08	517719	6.75	264738	8.01							
8M561210.D	AD31821-001	600055	5.08	531538	6.75	269572	8.01							
8M561211.D	AD31821-002	521948	5.08	456083	6.75	235157	8.01							
8M561212.D	AD31821-003	516173	5.08	447749	6.75	234899	8.01							
8M561213.D	AD31821-004	518506	5.08	458649	6.75	231044	8.01							
8M561214.D	AD31821-005	517967	5.08	454504	6.75	231421	8.01							
8M561215.D	AD31821-006	538175	5.08	475517	6.75	243350	8.01							
8M561216.D	AD31466-015(80uL)	557079	5.08	494410	6.75	258570	8.01							

I1 = Fluorobenzene
I2 = Chlorobenzene-d5
I3 = 1,4-Dichlorobenzene-d4
I4 =
I5 =
I6 =
I7 =

625/8270 Internal Standard concentration = 40 mg/L (in final extract)
624/8260 Internal Standard concentration = 30ug/L
524 Internal Standard concentration =5ug/L

Internal Standard Areas

Upper Limit = + 100% of internal standard area from daily cal or mid pt.

Lower Limit = - 50% of internal standard area from daily cal or mid pt.

Flags:

A - Indicates the compound failed the internal standard area criteria

R - Indicates the compound failed the internal standard retention time criteria.

Retention Times: Limit = within +/- 0.5 min of internal standard retention time from the daily cal or mid pt.

FORM8

Internal Standard Areas

Evaluation Std Data File: 8M561179.D Method: EPA 8260D

Analysis Date/Time: 07/07/22 07:28

Lab File ID: CAL @ 20 PPB

	I1		I2		I3		I4		I5		I6		I7	
	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT
Eval File Area/RT:	556283	5.08	483508	6.75	255305	8.01								
Eval File Area Limit:	278142-1112566		241754-967016		127652-510610									
Eval File Rt Limit:	4.58-5.58		6.25-7.25		7.51-8.51									

Data File	Sample#													
8M561217.D	31466-014(80uL)	544130	5.08	471146	6.75	252413	8.01							
8M561218.D	31466-013(80uL)	533523	5.08	468380	6.75	250196	8.01							
8M561219.D	31819-001	594364	5.08	511456	6.75	265114	8.01							
8M561220.D	31819-006	531365	5.08	471713	6.75	249535	8.01							
8M561221.D	31819-011	563253	5.08	488815	6.75	249375	8.01							

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625/8270 Internal Standard concentration = 40 mg/L (in final extract)
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Hampton-Clarke
Analytical & Field Services

Last Page of Report

APPENDIX **G**: NJDEP EDD Submission Confirmation Email

APPENDIX **H**:
Well Abandonment Report

Dewberry Engineers Inc.
600 Parsippany Road, Suite 301
Parsippany, NJ 07054-3715
973.739.9400
973.739.9710 fax
www.dewberry.com

August 25, 2022

New Jersey Department of Environmental Protection
Mail Code 401-04Q
Division of Water Supply and Geoscience
Bureau of Water Allocation and Well Permitting
401 East State Street – P.O. Box 420
Trenton, New Jersey 08625-0420

RE: *Abandonment of Lost Wells: PI 012948 Allied Building Supply Co., a.k.a. NJ TRANSIT Linden Station Lot 2*.

Dear NJDEP Representative,

On behalf of NJ TRANSIT, Dewberry Engineers Inc. is sending this letter to inform you that six monitoring wells at the former Allied Building Supply Co. facility, now known as the NJ TRANSIT Linden Station Lot 2, cannot be located. The site has been paved over with asphalt. A geophysical investigation conducted at the six well locations was unsuccessful in locating these wells. A request for information was submitted to the NJDEP office of Well Permitting. Well abandonment reports for five of the wells were located (attached). No information was recovered for monitoring well MW-1. The information regarding the wells is summarized below:

1. Responsible party/property owner:

   Mr. John Geitner
   Director of Site Remediation, Tanks, and Waste
   NJ TRANSIT Corporation
   One Penn Plaza East, 7th Floor
   Newark, New Jersey 07105

2. The facility and location information:

   NJ TRANSIT Linden Station Lot 2, 101 Elizabeth Ave., City of Linden, Union County, Block 254 Lot 10. NJ State Plane Coordinates: North 654269, East 560658

3. NJDEP **PI No. 012948**

4. Date when it was discovered that the well was lost: **March 10, 2022 Site Visit**

5. The approximate date the wells were lost: **2001**

6. Circumstances resulting in the well being lost: T**he site was paved to create a rail commuter parking lot and it is not known if well MW-1 was abandoned.**

7. Detailed description of the action(s) taken to locate all monitoring wells including MW-1: **A geophysical investigation consisting of the collection of electromagnetic (EM) metal detection data in the vicinity of each former monitoring well was conducted along parallel transects separated by five feet. Ground penetrating radar (GPR), metal detection and**

magnetometry data were collected over the former and proposed (MW-1R) well locations. Line tracing data was also collected in an effort to detect buried utilities. The results indicated that two subsurface metallic anomalies were detected in the vicinity of MW-3 and MW-5, but none of the six former monitoring wells were identified. Well abandonment reports have subsequently been found for wells MW-3 and MW-5.

Well permit number and well construction specifications, if known**. A completed individual well search questionnaire was submitted for each of the six former monitoring wells. The well permit number for former monitoring well MW-1 is 26-34471. According to the NJDEP Bureau of Records, records of the well is not available (Attachment 2). The well abandonment reports for the other five former monitoring wells (MW-2, MW-3, MW-4, MW-5, and MW-6, from the Bureau of Records) are presented in Attachment 3. MW-1 was likely abandoned with the other five monitoring wells at the site.**

Sincerely,

John Robinson

John Q. Robinson, Jr., PG, CPG, GISP, LSRP (No. 748586)
Senior Hydrogeologist

Attachment 1

Geophysical Survey

Subsurface Environmental Technologies, LLC
230 Route 130 South
Bordentown, New Jersey
Phone: 609-730-0005
Fax: 609-730-1222

June 6, 2022
SET Proposal No: **22-095GD**

Mr. John Robinson
Dewberry
600 Parsippany Road
Parsippany, New Jersey

Subject: Geophysical Investigation Results
Alfred Building Products Site
101 Elizabeth Avenue
Linden, New Jersey

Dear Mr. Robinson,

Subsurface Environmental Technologies (SET) Geophysics Department presents this report to Dewberry of Parsippany, New Jersey describing the methods and results of a geophysical investigation conducted at the Alfred Building Products Site located at 101 Elizabeth Avenue in Linden, New Jersey. For this project, SET surveyed several locations where buried monitoring wells (MW) may be present, as defined by Dewberry in the field. The field activities for this investigation were completed by SET on Thursday April 14, 2022.

Objectives

The primary objective of this geophysical survey was to locate six (6) buried monitoring wells that were though to exist at the site. The geophysical data was analyzed closely for these targets. To meet the objective of the investigation, SET used the hand-held electromagnetic (HHEM), radiofrequency (RF), and ground-penetrating radar (GPR) methods.

Survey Grids

The HHEM, GPR and RF data were acquired in the scan mode over the discrete areas described above. Scans were collected in a radial pattern about each discrete location to provide optimal subsurface coverage. In the event that a buried utility or feature was detected, the boring location was moved to a location where no buried anomalies were observed. The positions of all detected pipelines and anomalies were marked on the ground with spray paint.

Geophysical Methods

<u>Hand-Held Electromagnetic Methods</u>

The hand-held electromagnetic method uses the principle of electromagnetic induction to detect shallowly-buried metal objects such as underground storage tanks (USTs), metal utility conduits,

reinforced concrete slabs, manhole covers, and miscellaneous metal debris. To complete this task, the operator carries the hand-held radio transmitter-receiver unit above the ground and continually scans the surface. A primary coil broadcasts a radio signal from the transmitter. This primary radio signal induces secondary electrical currents in metal objects. These secondary currents, in turn, produce a magnetic field which is detected by the receiver.

The HHEM instrument SET typically uses for shallow investigations is a Fisher TW-6 pipe and cable locator by Fischer, Inc. This instrument operates by generating both a unitless meter reading and an audible signal response when near a metal object. The peak instrument response usually occurs when the unit is directly over the object.

Ground Penetrating Radar (GPR) Method

The ground-penetrating radar (GPR) method was used to provide subsurface imaging information throughout the areas of investigation. The GPR method is based upon the transmission of repetitive, radio-frequency electromagnetic (EM) pulses into the subsurface. When the transmitted energy of down-going wave contacts an interface of dissimilar electrical character, part of the energy is returned to the surface in the form of a reflected signal. This reflected signal is detected by a receiving transducer and is displayed on the screen of the GPR unit as well as being recorded on the internal hard drive. The received GPR response remains constant as long as the electrical contrast between media is present and constant. Lateral or vertical changes in the electrical properties of the subsurface result in equivalent changes in the GPR responses. The system records a continuous image of the subsurface by plotting two-way travel time of the reflected EM pulse versus distance traveled along the ground surface. Two-way travel time values are then converted to depth using known soil velocity functions.

The GPR field procedures involved (1) instrument calibration, (2) test run completion, (3) production profile collection and recording, and (4) data storage for subsequent processing and analysis in the office. Each radar profile was examined for characteristic GPR signatures that may indicate the presence of buried targets. A Geophysical Survey System SIR System 2 and a 400 megahertz (MHz) antenna were used with a recording window of 60 nanoseconds (ns) to provide the required depth penetration and subsurface detail.

Radio-Frequency Method

The RadioDetection RD4000 multi-frequency utility locating system was used for this project. This instrument consists of a receiver/tracer and a remote transmitter, which operates at frequencies between 8 kHz and 200 kHz. The unit provides audio and visual feedback to the operator when a utility that is coupled with the transmitted signal is crossed. The transmitter produces a radio-frequency signal in the utility to be traced by either induction coupling or direct hookup. The receiver output provides measured field strength of the received signal and varies an audible pitch that is dependent upon the distance to the utility. By carefully adjusting the gain of the receiver, it is possible to determine the location of the utility and to separate it from possible adjacent utilities. In addition, the receiver can be used in 60 Hz passive mode to identify active electrical lines or lines that possess an induced current.

Results

SET has enclosed 2 figures with this report. Figure 1 is an annotated, geo-referenced orthophoto that shows the approximate locations of the six wells as placed by Dewberry, and Figure 2 shows site photographs of five of the well locations. The results of the geophysical survey are summarized below.

Buried Monitoring Wells

SET detected a few "spot" anomalies near the marked well locations where historic data indicated their presence. SET placed pink circles at those locations where the geophysical data provided responses that were consistent with a possible buried metal object roughly the size of a metal well cap. The site photos presented in Figures 2 and 3 show these locations for MW-1 through MW-5. No photograph of MW-6 was available, however SET did not detect any suspicious anomalies in that survey area. For those locations where no metal anomalies were detected, it may be that the metal well caps were removed during the parking lot construction. PVC wells are extremely difficult to detect.

Data Quality

The data quality for this project was good. The HHEM, RF, and GPR responses at the site were consistent and correlated well between profiles. The interpretations presented in this report are based on observed geophysical responses, visual observations, and historical information.

Closing

The geophysical data collection and interpretation methods used in this investigation are consistent with standard practices applied to similar geophysical investigations. The correlation of geophysical responses is based on the past results of similar surveys, although it is possible that some variation could exist at this site. Due to the nature of geophysical data, no guarantees have been made or inferred regarding the presence or absence of additional objects or targets beyond those identified or beyond the detection limits of the instrumentation used in this investigation.

If you have any questions, please contact me 609-480-9382. It was a pleasure working with you on this project, and look forward to conducting geophysical investigations for you in the future.

Sincerely,

Peter Miller

Peter T. Miller PhD, P.G.
Senior Geophysicist, SET

encl.: Figure 1: Annotated Geo-Referenced Orthophoto Showing MW Locations Placed by Dewberry, and Site Features
Figures 2-3: Annotated Site Photographs Showing MW Locations Placed by Dewberry, and Site Features



Alfred Building Products Site

101 Elizabeth Avenue
Linden, New Jersey

Legend:

⊙ MW Location defined by Dewberry

Notes:

(1) The primary objectives of this geophysical survey were to locate 6 buried wells. To meet the objectives of the investigation, SET used a SIR System 3000 Ground Penetrating Radar (GPR) unit with a 400 MHz antenna, a TW-6 hand-held electromagnetic (HHEM) instrument by Fisher, Inc., and a Radiofrequency (RF) device by Radiodetection, Inc. Their approximate locations were marked on the ground by Dewberry prior to the start of the geophysical investigation.

(2) SET detected a few "spot" anomalies near the marked well locations where historic data indicated their presence. SET placed pink circles at those locations where the geophysical data provided responses that were consistent with a possible buried metal object roughly the size of a metal well cap. The site photos presented in Figures 2 and 3 show these locations.

(3) The positions on this map should be considered approximate. They were not surveyed by a licenced surveyor.

(4) The items on this figure may not be all inclusive. SET does not warrant the fact that additional buried features may be present at this site.

SET GEOPHYSICS & DRILLING SERVICES

SUBSURFACE ENVIRONMENTAL TECH., LLC.
19 BROOKSIDE AVENUE
PENNINGTON, NJ 08534

PROJECT #:	22-095G
FIGURE DATE:	JUNE 21, 2021

ALFRED BUILDING PRODUCTS SITE
ANNOTATED GEO-REFERENCED ORTHOPHOTO
SHOWING MW LOCATIONS PLACED BY DEWBERRY,
AND SITE FEATURES

ADDRESS: 101 ELIZABETH AVENUE, LINDEN, NEW JERSEY
CLIENT: DEWBERRY
SUBSURFACE ENVIRONMENTAL TECHNOLOGIES, LLC.
DRAWN BY: P. MILLER, SENIOR GEOPHYSICIST

FIGURE 1

Alfred Building Products Site

101 Elizabeth Avenue
Linden, New Jersey

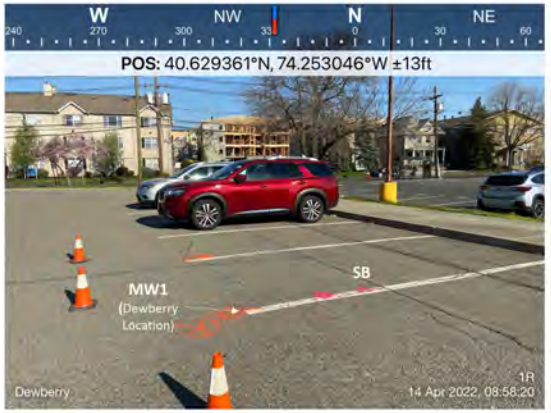


Photo 1: The photo shows the MW1 position placed by Dewberry, and a preferred boring location. SET did not detect MW1 in this area. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.



Photo 2: The photo shows the MW2 position placed by Dewberry, and an anomaly. The anomaly might be associated with buried MW2. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.



Photo 5: The photo shows the MW5 position placed by Dewberry. No anomalies were detected by SET in this area. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.



Photo 3: The photo shows the MW3 position placed by Dewberry, and 2 anomalies. Either anomaly might be associated with buried MW3. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.



Photo 4: The photo shows the MW4 position placed by Dewberry. No anomalies were detected by SET in this area. The photo also shows the approximate photo location, direction the photo was taken, and the date and time of the photo is presented.

Legend:

⊙ Anticipated MW Location

Notes:

(1) The primary objectives of this geophysical survey were to locate 6 buried wells. To meet the objectives of the investigation, SET used a SIR System 3000 Ground Penetrating Radar (GPR) unit with a 400 MHz antenna, a TW-6 hand-held electromagnetic (HHEM) instrument by Fisher, Inc., and a Radiofrequency (RF) device by Radiodetection, Inc. Their approximate locations were marked on the ground by Dewberry prior to the start of the geophysical investigation.

(2) SET detected a few "spot" anomalies near the marked well locations where historic data indicated their presence. SET placed pink circles at those locations where the geophysical data provided responses that were consistent with a possible buried metal object roughly the size of a metal well cap. The site photos presented in Figures 2 and 3 show these locations.

(3) The positions on this map should be considered approximate. They were not surveyed by a licenced surveyor.

(4) The items on this figure may not be all inclusive. SET does not warrant the fact that additional buried features may be present at this site.

SET GEOPHYSICS & DRILLING SERVICES		ALFRED BUILDING PRODUCTS SITE ANNOTATED SITE PHOTOGRAPHS SHOWING MW LOCATIONS PLACED BY DEWBERRY, ANOMALIES, AND SITE FEATURES	
SUBSURFACE ENVIRONMENTAL TECH., LLC. 19 BROOKSIDE AVENUE PENNINGTON, NJ 08534		ADDRESS: 101 ELIZABETH AVENUE, LINDEN, NEW JERSEY	
		CLIENT: DEWBERRY	FIGURE
PROJECT #:	22-095G	SUBSURFACE ENVIRONMENTAL TECHNOLOGIES, LLC.	2
FIGURE DATE:	JUNE 21, 2021	DRAWN BY: P. MILLER, SENIOR GEOPHYSICIST	

Attachment 2

August 15, 2022 Response Letter From the NJDEP Bureau Well Permitting Dept. of Records

From: Herbert, Michelle [DEP]
To: Robinson, John
Cc: McCullic, Rebecca [DEP]; McGowan, Imani [DEP]
Subject: RE: Lost Monitoring Wells: Allied Building Supply Co., PI-012948, a.k.a. NJ TRANSIT Linden Station Lot 2
Date: Monday, August 15, 2022 12:14:32 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
GenericDocument-10795036-Attachment-10795037-Scanned%20Images.pdf
GenericDocument-16154220-Attachment-16154221-Scanned%20Images.pdf
GenericDocument-11537666-Attachment-11537667-Scanned%20Images.pdf
GenericDocument-14613079-Attachment-14613080-Scanned%20Images.pdf
GenericDocument-12715089-Attachment-12715090-Scanned%20Image.pdf
GenericDocument-14484741-Attachment-14484742-Scanned%20Images.pdf
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GenericDocument-14613086-Attachment-14613087-Scanned%20Images.pdf
GenericDocument-16154232-Attachment-16154233-Scanned%20Images.pdf

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[CAUTION] External Email. DO NOT click links or open attachments unless expected. Please use the "Phish Alert" button to report all suspicious emails.

Good Morning,

Please see the attached as requested for permit numbers 26-34471, 26-38851, 26-35296, 26-35298, 26-35297 and 26-38852.

Please note for permit number 26-34471(the unknown one) we have no record on file.

Thank you.

Michelle Herbert
New Jersey Dept. Environmental Protection
401 E State St.
Trenton, NJ 08625
(609) 984-6831
Michelle.Herbert @dep.nj.gov



From: McCullic, Rebecca [DEP]
Sent: Thursday, August 11, 2022 3:25 PM
To: McCullic, Rebecca [DEP] <Rebecca.McCullic@dep.nj.gov>
Subject: FW: Lost Monitoring Wells: Allied Building Supply Co., PI-012948, a.k.a. NJ TRANSIT Linden Station Lot 2

The fee for this request has been waived.

From: Robinson, John <jrobinson@Dewberry.com>
Sent: Thursday, July 28, 2022 11:44 AM
To: DEP Wellpermitting [DEP] <Wellpermitting@dep.nj.gov>
Subject: [EXTERNAL] Lost Monitoring Wells: Allied Building Supply Co., PI-012948, a.k.a. NJ TRANSIT Linden Station Lot 2

Hi,

We are completing a Remedial Action Report for the above references site and request a search for well abandonment records for six historical monitoring wells. The individual well search questionnaires are attached for MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6. The well locations have been paved over, and a geophysical survey did not indicate their presence.

Thank you,

John

John Robinson, PG, CPG, GISP, LSRP

Senior Hydrogeologist
Environmental Services
600 Parsippany Road, Suite 301
Parsippany, NJ 07054-3715
D 973.576.9635 C 201.602.2407
LICENSED PG: PA, NY, GA| LSRP: NJ

Dewberry [dewberry.com]

[linkedin.com] [twitter.com] [instagram.com] [youtube.com]

www.dewberry.com [dewberry.com]

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Attachment 3

Well Abandonment Records (MW-2, MW-3, MW-4, MW-5, and MW-6)

DWR-020
8/97

New Jersey Department of Environmental Protection
Water Supply Element - Bureau of Water Allocation

09 Jr
39

WELL ABANDONMENT REPORT

MAIL TO: **Bureau of Water Allocation**
PO Box 426
Trenton, NJ 08625-0426

WELL PERMIT # 26-35296 of well sealed

DATE WELL SEALED 12-15-98

PROPERTY OWNER 101 West Elizabeth Ave.

ADDRESS 581 Rahway Ave., Union, NJ

WELL LOCATION 101 West Elizabeth Ave., XXXXX Linden, Union County
Street & No., Township, County

MW 2	10	254
Well No.	Lot No.	Block No.

USE OF WELL PRIOR TO ABANDONMENT: monitoring

REASON FOR ABANDONMENT: no longer in use

WAS A NEW WELL DRILLED? ☐ YES ☒ NO PERMIT # OF NEW WELL

TOTAL DEPTH OF WELL 20 ft.
DIAMETER 4 in.
CASING LENGTH 10 ft.
SCREEN LENGTH 10 ft.
NUMBER OF CASINGS 1

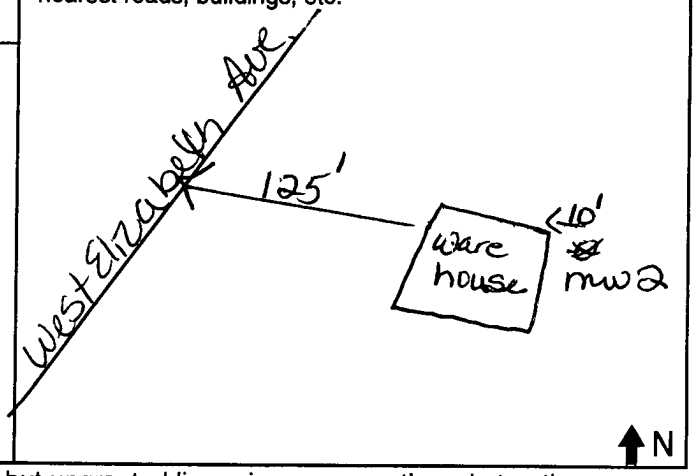
MATERIAL USED TO DECOMMISSION WELL:

12 Gallons of Water
140 Lbs. of Cement
8 Lbs. of Bentonite
~~none~~ Lbs. of Sand/Gtravel
(none if well is contaminated)

FORMATION: ____ Consolidated
x Unconsolidated

Cross-section of sealed well
ground
10 ft. of 4" pvc casing
10 ft. of 4" .020 slot pvc screen

Draw a sketch showing distance and relations of well site to nearest roads, buildings, etc.



To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☒ YES ☐ NO CASING MATERIAL: sch 40 pvc

WERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES ☒ NO WHAT WERE THE OBSTRUCTIONS: none

IF "YES", AUTHORIZATION GRANTED BY _____ ON _____
(NJDEP Official) (Date)

Was an alternative decommissioning method used? ☐ YES ☒ NO

IF "YES", authorization granted by _____ ON _____
(NJDEP Official) (Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9-9.1 et seq.

Allen J. Wilson	500 Allens Mill Road, Phillipsburg, NJ 08865	1-27-99
Performing Work (Print or Type) Name of NJ Certified Well Sealer	Address	Mailing Date
Allen J. Wilson		J1278
Signature of NJ Certified Well Sealer Performing Work		Registration #

COPIES: *White - Water Allocation* *Yellow - Owner* *Pink - Health Dept.* *Goldenrod - Driller*

DWR-020
8/97

ENTERED

New Jersey Department of Environmental Protection
Water Supply Element - Bureau of Water Allocation

09/39

WELL ABANDONMENT REPORT

MAIL TO: **Bureau of Water Allocation**
PO Box 426
Trenton, NJ 08625-0426

WELL PERMIT # 26-35297 of well sealed

DATE WELL SEALED Dec. 15, 1998

PROPERTY OWNER 101 West Elizabeth Ave.

ADDRESS 581 Rahway Ave., Union, NJ

WELL LOCATION 101 West Elizabeth Ave., Linden, Union County
Street & No., Township, County

MW 3 (Well No.) | 10 (Lot No.) | 254 (Block No.)

USE OF WELL PRIOR TO ABANDONMENT: monitoring

REASON FOR ABANDONMENT: no longer in ~~use~~ use

WAS A NEW WELL DRILLED? ☐ YES ☒ NO PERMIT # OF NEW WELL

TOTAL DEPTH OF WELL 15 ft.
DIAMETER 4 in.
CASING LENGTH 5 ft.
SCREEN LENGTH 10 ft.
NUMBER OF CASINGS 1

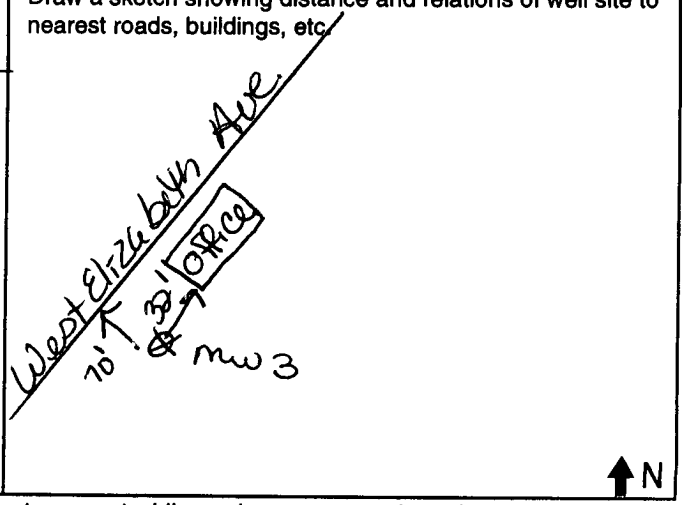
MATERIAL USED TO DECOMMISSION WELL:

~~10~~ Gallons of Water
~~115~~ Lbs. of Cement
~~7~~ Lbs. of Bentonite
~~none~~ Lbs. of Sand/Gtravel
(none if well is contaminated)

FORMATION:
____ Consolidated
XX Unconsolidated

Cross-section of sealed well
ground
5 ft. of 4" pvc casing
-----
10 ft. of 4" .020-slot pvc screen

Draw a sketch showing distance and relations of well site to nearest roads, buildings, etc.



To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☒ YES ☐ NO CASING MATERIAL: sch 40 pvc

WERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES ☒ NO WHAT WERE THE OBSTRUCTIONS: none

IF "YES", AUTHORIZATION GRANTED BY _____ ON _____
(NJDEP Official) (Date)

Was an alternative decommissioning method used? ☐ YES ☒ NO

IF "YES", authorization granted by _____ ON _____
(NJDEP Official) (Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9-9.1 et seq.

Allen J. Wilson — 500 Allens Mill rd., Phillipsburg, NJ 08865 — 1-27-99
Performing Work (Print or Type) Name of NJ Certified Well Sealer — Address — Mailing Date

Signature of NJ Certified Well Sealer Performing Work — J1278 Registration #

COPIES: *White - Water Allocation* *Yellow - Owner* *Pink - Health Dept.* *Goldenrod - Driller*

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39

DWR-020
8/97

New Jersey Department of Environmental Protection
Water Supply Element - Bureau of Water Allocation

WELL ABANDONMENT REPORT

MAIL TO: **Bureau of Water Allocation**
PO Box 426
Trenton, NJ 08625-0426

WELL PERMIT # 26-35298 of well sealed

DATE WELL SEALED Dec. 15, 1998

PROPERTY OWNER 101 West Elizabeth Ave.

ADDRESS 581 Rahway Ave., Union, NJ

WELL LOCATION 101 West Elizabeth Ave., Linden, Union County
Street & No., Township, County

MW 4	10	254
Well No.	Lot No.	Block No.

USE OF WELL PRIOR TO ABANDONMENT: monitoring

REASON FOR ABANDONMENT: no longer in use

WAS A NEW WELL DRILLED? ☐ YES ☒ NO PERMIT # OF NEW WELL

TOTAL DEPTH OF WELL 20 ft.
DIAMETER 4 in.
CASING LENGTH 5 ft.
SCREEN LENGTH 15 ft.
NUMBER OF CASINGS 1

MATERIAL USED TO DECOMMISSION WELL:

12 Gallons of Water
140 Lbs. of Cement
8 Lbs. of Bentonite
~~none~~ Lbs. of Sand/Gtravel
(none if well is contaminated)

FORMATION: ____ Consolidated
xx Unconsolidated

Cross-section of sealed well

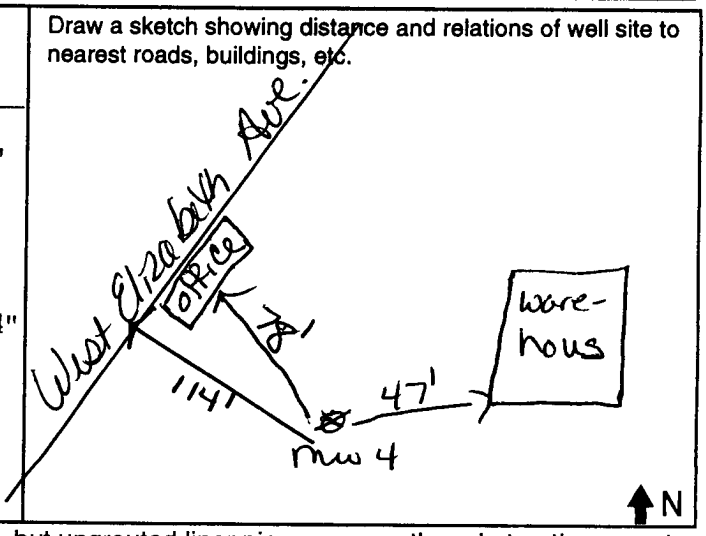
ground

5 ft. of 4" pvc casing

---

15 ft. of 4" .020 slot pvc screen

Draw a sketch showing distance and relations of well site to nearest roads, buildings, etc.



To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☒ YES ☐ NO CASING MATERIAL: ~~sch 40 pvc~~

WERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES ☒ NO WHAT WERE THE OBSTRUCTIONS: none

IF "YES", AUTHORIZATION GRANTED BY _____ ON _____
(NJDEP Official) (Date)

Was an alternative decommissioning method used? ☐ YES ☒ NO

IF "YES", authorization granted by _____ ON _____
(NJDEP Official) (Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9-9.1 et seq.

Allen J. Wilson	500 Allens Mill Road, Phillipsburg, NJ 08865	1-27-99
Performing Work (Print or Type) Name of NJ Certified Well Sealer	Address	Mailing Date
	Signature of NJ Certified Well Sealer Performing Work	J1278 Registration #

COPIES: *White - Water Allocation* *Yellow - Owner* *Pink - Health Dept.* *Goldenrod - Driller*

DWR-020
8/97

ENTERED

New Jersey Department of Environmental Protection
Water Supply Element - Bureau of Water Allocation

WELL ABANDONMENT REPORT

09 92
39

MAIL TO: **Bureau of Water Allocation**
PO Box 426
Trenton, NJ 08625-0426

WELL PERMIT # 26-38851 of well sealed

DATE WELL SEALED Dec. 15, 1998

PROPERTY OWNER ~~101 West Elizabeth Ave.~~

ADDRESS ~~581 Rahway Ave., Union, NJ~~

WELL LOCATION 101 West Elizabeth Ave., Linden, Union County
Street & No., Township, County

MW 5	10	254
Well No.	Lot No.	Block No.

USE OF WELL PRIOR TO ABANDONMENT: monitoring

REASON FOR ABANDONMENT: no longer in use

WAS A NEW WELL DRILLED? ☐ YES ☒ NO PERMIT # OF NEW WELL

TOTAL DEPTH OF WELL	13 ft.
DIAMETER	4 in.
CASING LENGTH	3 ft.
SCREEN LENGTH	10 ft.
NUMBER OF CASINGS	1

MATERIAL USED TO DECOMMISSION WELL:

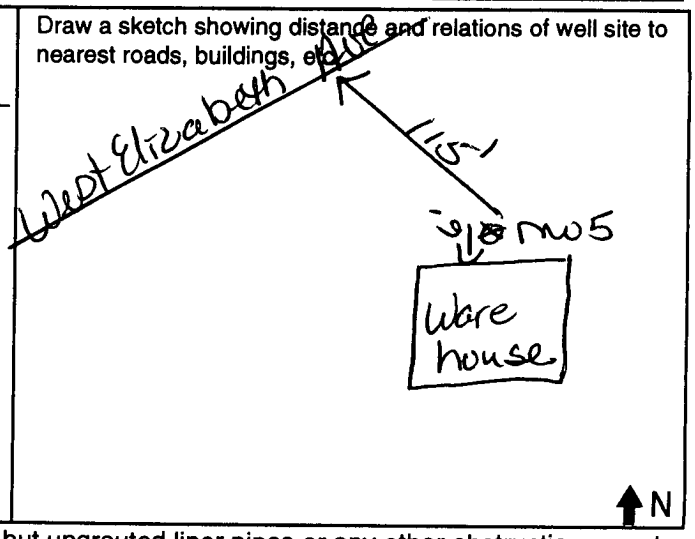
8	Gallons of Water
94	Lbs. of Cement
6	Lbs. of Bentonite
~~none~~	Lbs. of Sand/Gtravel (none if well is contaminated)

FORMATION:
____ Consolidated
xx Unconsolidated

Cross-section of sealed well

ground
3 ft. Of 4" pvc casing
10 ft. of 4" .020 slot pvc screen

Draw a sketch showing distance and relations of well site to nearest roads, buildings, etc.



To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☒ YES ☐ NO CASING MATERIAL: sch 40 pvc

WERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES ☒ NO WHAT WERE THE OBSTRUCTIONS: none

IF "YES", AUTHORIZATION GRANTED BY _____ ON _____
(NJDEP Official) (Date)

Was an alternative decommissioning method used? ☐ YES ☒ NO

IF "YES", authorization granted by _____ ON _____
(NJDEP Official) (Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9-9.1 et seq.

Allen J. Wilson	500 Allens Mill Road, Phillipsburg, NJ 08865	1-27-99
Performing Work (Print or Type) Name of NJ Certified Well Sealer	Address	Mailing Date
	Signature of NJ Certified Well Sealer Performing Work	J1278 Registration #

COPIES: *White - Water Allocation* *Yellow - Owner* *Pink - Health Dept.* *Goldenrod - Driller*

DWR-020
8/97

New Jersey Department of Environmental Protection
Water Supply Element - Bureau of Water Allocation

WELL ABANDONMENT REPORT

09 39

MAIL TO: **Bureau of Water Allocation**
PO Box 426
Trenton, NJ 08625-0426

WELL PERMIT # 26-38852 of well sealed

DATE WELL SEALED Dec. 15, 1998

PROPERTY OWNER 101 West Elizabeth Ave.

ADDRESS 581 Rahway Ave., Union, NJ

WELL LOCATION 101 West Elizabeth Ave., Linden, Union County
Street & No., Township, County

MW 6 (Well No.) | 10 (Lot No.) | 254 (Block No.)

USE OF WELL PRIOR TO ABANDONMENT: monitoring

REASON FOR ABANDONMENT: no longer in use

WAS A NEW WELL DRILLED? ☐ YES ☒ NO PERMIT # OF NEW WELL

TOTAL DEPTH OF WELL	17.5 ft.
DIAMETER	4 in.
CASING LENGTH	7.5 ft.
SCREEN LENGTH	10 ft.
NUMBER OF CASINGS	1

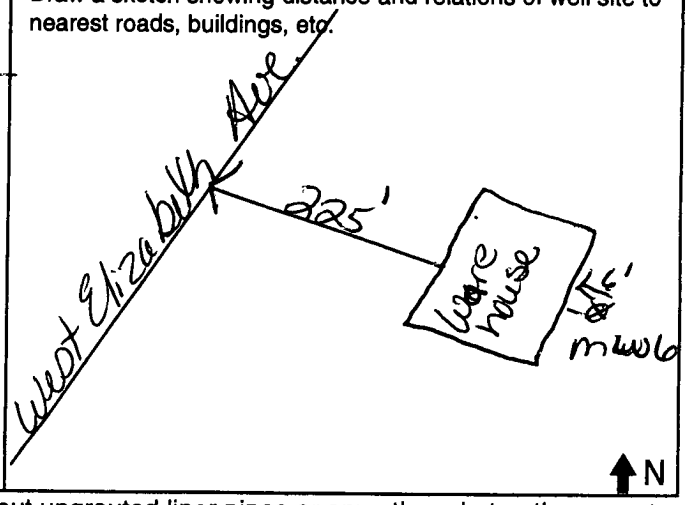
Cross-section of sealed well

ground

7.5 ft. of 4" pvc casing

10 ft. of 4" .020 slot pvc screen

Draw a sketch showing distance and relations of well site to nearest roads, buildings, etc.



MATERIAL USED TO DECOMMISSION WELL:

10	Gallons of Water
120	Lbs. of Cement
7	Lbs. of Bentonite
none	Lbs. of Sand/Gtravel (none if well is contaminated)

FORMATION: ____ Consolidated ___xx Unconsolidated

To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☒ YES ☐ NO CASING MATERIAL: sch 40 pvc

WERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES ☒ NO WHAT WERE THE OBSTRUCTIONS: none

IF "YES", AUTHORIZATION GRANTED BY _____ ON _____
(NJDEP Official) (Date)

Was an alternative decommissioning method used? ☐ YES ☒ NO

IF "YES", authorization granted by _____ ON _____
(NJDEP Official) (Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9-9.1 et seq.

Allen J. Wilson	500 Allens Mill Road, Phillipsburg, NJ	08865	1-27-99
Performing Work (Print or Type) Name of NJ Certified Well Sealer	Address		Mailing Date
Allen J. Wilson		J1278	
Signature of NJ Certified Well Sealer Performing Work		Registration #	

COPIES: *White - Water Allocation* *Yellow - Owner* *Pink - Health Dept.* *Goldenrod - Driller*

New Jersey State Department of Environmental Protection
Bureau of Water Allocation and Well Permitting
Mail Code 401-04Q PO BOX 420 Trenton, NJ 08625-0420 Tel: 609-984-6831

Well Permit Number
E202203885

WELL DECOMMISSIONING REPORT

PROPERTY OWNER: NEW JERSEY TRANSIT

Company/Organization: New Jersey Transit

Address: One Penn Plaza East Newark, New Jersey 07105

WELL LOCATION: Dewberry/Linden/22-095GD

Address: 101 W Elizabeth Ave

County: Union Municipality: Linden City Lot: 10 Block: 254

Easting (X): 560661 Northing (Y): 654267
Coordinate System: NJ State Plane (NAD83) - USFEET

DATE WELL DECOMMISSIONED: August 3, 2022

WELL USE: MONITORING

Other Use(s):

Local ID: MW-1R

Reason for Decommissioning: No longer in use

Finished Well Depth (ft.): 15

Was a New Well Drilled? N

Formation Type: Unconsolidated

New Well Permit Number:

WELL DECOMMISSIONING INFORMATION

	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt/Rating/Screen # Used (lbs/ch no.)
Borehole					
Casing	0	5	2	PVC	Sch 40
Screen	5	15	2	PVC	10

MATERIALS USED

	Depth to Top (ft.)	Depth to Bottom (ft.)	Outer Diameter (in.)	Inner Diameter (in)	Material		
					Bentonite (lbs.)	Neat Cement (lbs.)	Water (gal.)
Grout	0	15	2	0	5	94	8
Sand/Gravel							

ADDITIONAL INFORMATION

Obstructions: No

Authorization Official:

Obstruction Type:

Authorization Number:

Alternative Decomm. Method? No

Authorization Date:

Method Used

ATTACHMENTS:

Mike Parell
ENV RESOURCE GEOTEC
Sealing Driller: LICENSE # 690171

SUBSURFACE ENVIRONMENTAL TECHNOLOGIES, LLC
230 RT 130 SOUTH
Company: Bordentown Twp (Burlington), NJ 08505

New Jersey Department of Environmental Protection
Mail Code 401-04Q
Division of Water Supply & Geoscience
Bureau of Water Allocation & Well Permitting
401 E. State St - P.O. Box 420
Trenton, New Jersey 08625-0420
Tel (609) 984-6831, Fax (609) 633-1231
Email: wellpermitting@dep.nj.gov

Guidance for Damaged, Destroyed, or Lost Wells

In the event that a well has been damaged, destroyed, and/or lost such that it cannot be decommissioned in accordance with Well Construction & Maintenance; Sealing of Abandoned Wells, N.J.A.C. 7:9D Subchapter 3, the property owner or its agent shall contact the Bureau of Water Allocation and Well Permitting (BWAWP) in writing and provide the following information:

1. The name, address, telephone number of the responsible party/property owner for the well;
2. The facility and location information where the well was located including county, township, lot, block, and the known or approximate coordinates;
3. New Jersey Department of Environmental Protection (NJDEP) issued Program Interest ID (PI ID), if applicable;
4. Date when it was discovered that the well was damaged, destroyed, or lost;
5. The approximate date the well was damaged, destroyed, or lost;
6. Circumstances resulting in the well being damaged, destroyed, or lost;
7. Detailed description of the action(s) taken to locate the well in the case of lost wells, or action(s) taken to clear obstruction to facilitate decommissioning in the case of damaged or destroyed wells;
8. Well permit number and well construction specifications, if known. If the well permit number or a copy of the well record is not available, a completed individual well search questionnaire shall be submitted by following the well search directions on the Department's website, which can be located at www.nj.gov/dep/watersupply/pw_permit.html.

Examples of action(s) taken to locate lost wells include, but are not limited to: interviewing the original well driller (if possible), interviewing site employees, metal detection, magnetometer, ground penetrating radar (GPR), obtaining original survey information, Open Public Records Act (OPRA) request of Licensed Site Remediation Professional (LSRP) Form A and Form B, site excavation, etc. As mentioned above, a detailed description of whatever actions were employed must be included in the letter to the BWAWP. Please include photographs, drawings, diagrams, maps, survey data, LSRP reports that contain site details, original correspondence with the Department or any other State, County, or Local agencies, and/or well driller notes in order to document the actions that were taken.

Once the provided information has been received and reviewed, the BWAWP will evaluate the information submitted to make a determination whether additional efforts must be made to locate and decommission the well. If the BWAWP determines that additional actions are needed to facilitate the proper decommissioning of the well, the responsible party/property owner shall undertake actions to determine the condition of the well. Failure to comply with the decommissioning requirements of N.J.A.C. 7:9D-3.1 et seq. is considered a violation of the regulations and subject to enforcement action.

OCTOBER 2022

Dewberry

SUBMITTED BY:
Dewberry Engineers Inc.
600 Parsippany Road, Suite 301
Parsippany, NJ 07054