

SUPERFUND SUPPORT TEAM

SAMPLING REPORT

for the LOOHN's DRY CLEANERS and LAUNDERERS PROPERTY at the OLEAN WELLFIELD

in OLEAN, CATTARAUGUS COUNTY, NEW YORK

September 24-25, 2018

Participating Personnel:

United States Environmental Protection Agency Robert C. Finke, Sampling Project Manager Mark Denno, Superfund Support Team, Physical Scientist Amelia Jackson, Superfund Support Team, Team Leader

11/6/2018

Robert C. Finke, Physical Scientist, DESA/HWSB/SST

Date Prepared:

Report Prepared by:

November 6, 2018

12018 Approved for the Director by: Amelia Jackson, Team Leader, DESA/HWSB/S

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ATTACHMENT I SAMPLE DATA SUMMARY

REFERENCES

REFERENCE 1: New York State Groundwater Classifications: https://www.dec.ny.gov/chemical/23853.html

1.0 SAMPLING EVENT SUMMARY

The Loohn's Dry Cleaners and Launderers property is one of four operable units (OU) that make up the Olean Well Field Superfund Site. The Site is located in the City of Olean, Cattaraugus County, New York. The 1.5 square mile Olean Wellfield site is comprised of three public and 50 private wells which are contaminated with trichloroethene (TCE). The public wells were constructed in the 1970s but were closed after the city officials detected TCE in the groundwater. In 1990, the public wells were reactivated after two air strippers were constructed to treat the groundwater. Site-related contaminants have migrated from shallow groundwater to deeper levels. The groundwater located in the upper level flows toward and discharges into the Allegheny River.

Assessments were conducted in 1983 and 1985 by EPA. The New York State Department of Environmental Conservation (NYSDEC) and the EPA developed an interim cleanup action that provided for regular monitoring and the installation of additional carbon adsorption units, as necessary, until a permanent remedy was put in place. In separate remedial actions implemented in 1990, 2000, 2003, several tons of contaminated soils were excavated and removed from several of the Olean Well Field facilities.

Groundwater sampling is required to assess post-removal groundwater conditions at the Loohn's Dry Cleaners and Launderers property. The primary volatile organic compounds (VOCs) of concern in the groundwater beneath and downgradient of the site are cis-1, 2-dichloroethene, trichloroethene, tetrachloroethene and vinyl chloride.

The Division of Environmental Science and Assessment (DESA), Hazardous Waste Support Branch (HWSB), Superfund Support Team (SST) has been requested by the Emergency and Remedial Response Division (ERRD) to establish a post-removal sampling protocol for the Loohn's Cleaners and Launderers property facility which has a total of five groundwater monitoring wells.

Groundwater samples were collected from the five separate monitoring wells at the Loohn's Cleaner and Launderers site, Olean Well Field site, Olean, NY between September 24-25, 2018. The samples were denoted as follows: MW-01-SEP18, MW-02-SEP18, MW-03-SEP18, MW-04-SEP18, MW-05-SEP18, MW-06-SEP18 with MW-06-SEP18 being a field Duplicate of MW-05-SEP18. The Trip Blank was denoted as TB-01-SEP18 and the Rinsate Blank as RB-01-SEP18. All samples were submitted to the U.S. EPA Region 2 DESA Lab Branch for the analysis of trace level Volatile Organic Compounds (VOCs). All monitoring wells wells were purged and the samples collected by the EPA Region 2 Low Flow procedure.

2.0 LABORATORY RESULTS

The Laboratory results in this report consist only of the data provided by the EPA, Region 2, DESA Laboratory located in Edison, New Jersey. Quality Control (QC) sample data can be found in Table 1. The Trip Blank was collected for quality control (QC) to determine if any extraneous contamination was introduced to the samples. Field duplicate, and matrix spike/matrix spike duplicate (MS/MSD) samples were collected for laboratory quality control. Field duplicate samples were compared to their respective pairs via Relative Percent Difference (RPD). The RPD is only calculated for analytes that are detected in both the sample and the associated duplicate. The RPD is used to assess the precision of sampling in the field. Although the overall decision lies with the data user, it is the opinion of this office that an RPD of less than or equal to 50% indicates acceptable comparability.

A summary of the results of the September 24-25, 2018 sampling are listed Attachment I. This table identifies the sample location, parameters detected and New York State H(WS) Class GA groundwater exceedances shaded in red. The laboratory report can be found in Appendix C. The suffix "-SEP18" at the end of each sample identification string expresses the sampling month and year of September 2018.

3.0 CONCLUSION:

Tetrachloroethene, trichloroethene and cis-1,2-Dichloroethene exceeded the New York State Criteria for H(WS) in Class GA groundwater in samples MW-02-SEP18, MW-03-SEP18 and MW-04-SEP18. Vinyl Chloride exceeded the New York State Criteria for H(WS) in Class GA groundwater criterion in samples MW-02-SEP18 and MW-03-SEP18. No New York State H(WS) Class GA groundwater VOC exceedances were seen in the samples collected from MW-01 (MW-01-SEP18) or MW-05 (MW-05-SEP18). In terms of data usability, it is the position of this office that, based on the acceptability of the relevant quality controls implemented during sampling and analysis, the data be deemed usable for making environmental decisions. cis-1,2-Dichloroethene and tetrachloroethene in sample MW-05-SEP18 are considered estimated "J" values due to the RPDs between it and the field duplicate (MW-06-SEP18) being greater than 50%.

TABLE 1 LOOHN'S CLEANERS AND LAUNDERERS MONITORING WELL SAMPLING							
QC FIELD DUPLICATE SAMPLE DATA (µg/L)							
	September 2018						
ANALYTE NAME	MW-05-SEP18 RESULT	MW-06-SEP18 RESULT	RPD				
cis-1,2-Dichloroethene	0.71	1.4	65.4				
Trichloroethene	2.2	3.0	30.8				
Tetrachloroethene	4.1	7.7	61.0				
QC FIELD RIN	ISATE BLANK SAMPLE D	ATA (µg/L)					
ANALYTE NAME	RB-01-SEP18 RESULT						
Acetone	16.0		-				
QC FIELD TRIP BLANK SAMPLE DATA (µg/L)							
ANALYTE NAME	TB-01-SEP18 RESULT						
NON-DETECTED	NON-DETECTED		-				
NG N (G 1 1 1 1							

NC=Not Calculable





Apr-'09 Sep-'09 Apr-'10 Aug-'11 Apr-'12 Apr-'13 Apr-'14 Apr-'15 Jun-'16 Aug-'17 Sep-'18









Apr-'09 Aug-'09 Apr-'10 Aug-'11 Apr-'12 Apr-'13 Apr-'14 Apr-'15 Jun-'16 Aug-'17 Sep-'18





Vinyl Chloride/MW-04

Apr-'09 Sep-'09 Apr-'10 Aug-'11 Apr-'12 Apr-'13 Apr-'14 Apr-'15 Jun-'16 Aug-'17 Sep-'18



□ cis-1,2-Dichloroethene/MW-04

Apr-'09 Aug-'09 Apr-'10 Aug-'11 Apr-'12 Apr-'13 Apr-'14 Apr-'15 Jun-'16 Aug-'17 Sep-'18







Apr-'09 Sep-'09 Apr-'10 Apr-'11 Aug-'11 Apr-'12 Apr-'13 Apr-'14 Apr-'15 Jun-'16 Aug-'17 Sep-'18



Vinyl Chloride/MW-05

Apr-'09 Sep-'09 Apr-'10 Aug-'11 Apr-'12 Apr-'13 Apr-'14 Apr-'15 Jun-'16 Aug-'17 Sep-'18



Apr-'09 Sep-'09 Apr-'10 Aug-'11 Apr-'12 Apr-'13 Apr-'14 Apr-'15 Jun-'16 Aug-'17 Sep-'18

APPENDIX A

Site Map

LOOHN'S DRY CLEANERS AND LAUNDERERS PROPERTY AT THE OLEAN WELL FIELD

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MW-4MW-5

© 2013 Google

⊙ MW-2

• MW-1

• MW-3

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APPENDIX B

Olean Well Fields Superfund Site Quality Assurance Project Plan

NINTH ADDENDUM

UNIFORM FEDERAL POLICY (UFP) QUALITY ASSURANCE PROJECT PLAN (QAPP)

FOR THE

LOOHN'S DRY CLEANERS AND LAUNDERERS PROPERTY AT THE OLEAN WELL FIELD

GROUNDWATER WELL SAMPLING

September 2018



Original UFP-QAPP Document Control Number (DCN): Olean UFPQAPP-4-201	0	
This Document DCN: Olean_UFPQAPP_9thAddendum_Sep2018		
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Project Officers Signature:	rem		_ Date: _	7/18	10
Project Officers Name:	Robert C. Finke	n (.		1 /	1
Project Quality Assurance Of	ficers Signature	melegaller	_Date:	9/18//	8
Project Quality Assurance Of	ficers Name:	Amelia Jackson		1	en e

Date Prepared: September 17, 2018

- Subject: Ninth Addendum to the April 2010 Olean Wellfield/Loohn's Site Groundwater Sampling UFP-QAPP
- From: Robert C. Finke, Physical Scientist Superfund Contract Support Team
- To: Amelia Jackson, Lead Chemist Superfund Support Team

This memorandum is to request an addendum to the Loohn's Dry Cleaners property located on the Olean Wellfield Superfund Site Groundwater Sampling QAPP dated April 22, 2010. On April 22, 2010, the UFP-QAPP was prepared and signed for a groundwater sampling event at the Loohn's Cleaners Site as part of the Olean Wellfield Superfund site located in Olean, Cattaraugus County, New York. Another round of sampling the same wells as specified in the UFP-QAPP and previous addendums is proposed for September 24-26, 2018 by EPA Region 2 DESA/HWSB/SST personnel. The changes to the UFP-QAPP are the dates of the event and support personnel. The samples collected will be analyzed by the Region 2 EPA DESA Lab Branch laboratory for trace level volatile organics utilizing their SOP: *Analysis of Volatile Organic Compounds in Drinking Water by Purge and Trap GC/MS*, most recent revision.

All analytical results will be compared to the New York State Department of Environmental Conservation (NYSDEC) Protection of Groundwater, New York State Class "GA" standards. See: http://www.dec.ny.gov/regs/2485.html and Attachment I

The sampling personnel scheduled are Mark Denno and Robert Finke of EPA Region 2 DESA/HWSB/SST. There are no other changes to the April 22, 2010 UFP-QAPP.

This memo will be attached to the copy of the UFP-QAPP on file as well as the field copy as an addendum.

If you have any questions, please call me at 732-906-6802.

ATTACHMENT I

QAPP Worksheet #15 - Reference Limits and Evaluation Table

QAPP Worksheet #15 Reference Limits and Evaluation Table

Matrix:	Aqueous (Olean Well Field/Loohn's Cleaners Site)
Analytical Group:	Volatile Organic Compounds
Concentration Level:	Trace

		Project (PRP) Quantification Limit (NYS		Achievable Laboratory (DESA) Limits	
Analyte	CAS Number	Criterion for H(WS) in Class GA Groundwater (µg/L)	Method QLs (µg/L)	MDLs µg/L	RLs μg/L
Dichlorodifluoromethane	75-71-8	5.0	0.5	0.147	0.5
Chloromethane	74-87-3	5.0	0.5	0.528	0.5
Vinyl Chloride	75-01-4	2.0	0.5	0.199	0.5
Bromomethane	74-83-9	5.0	0.5	0.778	0.5
Chloroethane	75-00-3	5.0	0.5	0.75	0.5
Trichlorofluoromethane	75-69-4	5.0	0.5	0.0613	0.5
1,1-Dichloroethene	75-35-4	5.0	0.5	0.165	0.5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	-	0.5	0.167	0.5
Carbon Disulfide	75-15-0	60.0	0.5	0.156	0.5
Acetone	67-64-1		5.0	0.964	5.0
Methyl Acetate	79-20-9	-	0.5	0.167	0.5
Methylene Chloride	75-09-2	5.0	0.5	0.153	0.5
trans-1,2-Dichloroethene	156-60-5	5.0	0.5	0.178	0.5
cis-1,2-Dichloroethene	156-59-2	5.0	0.5	0.217	0.5
Methyl tert-Butyl Ether	1634-04-4	-	0.5	0.0679	0.5
1,1-Dichloroethane	75-34-3	5.0	0.5	0.165	0.5
2-Butanone	78-93-3	-	5.0	0.582	5.0
Chloroform	67-66-3	7.0	0.5	0.16	0.5
1,2-Dichloroethane	107-06-2	0.6	0.5	0.114	0.5
1,1,1-Trichloroethane	71-55-6	5.0	0.5	0.117	0.5
Cyclohexane	110-82-7	-	0.5	0.188	0.5
Carbon Tetrachloride	56-23-5	5.0	0.5	0.115	0.5
Benzene	71-43-2	1.0	0.5	0.125	0.5
Trichloroethene	79-01-6	5.0	0.5	0.219	0.5
Methylcyclohexane	108-87-2		0.5	0.129	0.5
1,2-Dichloropropane	78-87-5	1.0	0.5	0.155	0.5
Bromodichloromethane	75-27-4	5.0	0.5	0.21	0.5
cis-1,3-Dichloropropene	10061-01-5	0.4	0.5	0.149	0.5
trans-1,3-Dichloropropene	10061-02-6	0.4	0.5	0.149	0.5
1,1,2-Trichloroethane	79-00-5	1.0	0.5	0.224	0.5
Dibromochloromethane	124-48-1	-	0.5	0.0629	0.5
4-Methyl-2-Pentanone (MIBK)	108-10-1	-	5.0	0.446	5.0

-	CAS Number	Project (PRP) Quantification Limit (NYS		Achievable Laboratory (DESA) Limits	
Analyte		Criterion for H(WS) in Class GA Groundwater (μ g/L)	Method QLs (µg/L)	MDLs µg/L	RLs µg/L
Toluene	108-88-3	5.0	0.5	0.0905	0.5
1,2-Dibromoethane	106-93-4	5.0	0.5	0.251	0.5
Chlorobenzene	108-90-7	5.0	0.5	0.138	0.5
Tetrachloroethene	127-18-4	5.0	0.5	0.186	0.5
2-Hexanone	591-78-6	-	5.0	0.522	5.0
Ethylbenzene	100-41-4	5.0	0.5	0.107	0.5
m,p-Xylene	179601-23-1	•	0.5	0.276	0.5
o-Xylene	95-47-6	5.0	0.5	0.139	0.5
Styrene	100-42-5	5.0	0.5	0.128	0.5
Bromoform	75-25-2	-	0.5	0.128	0.5
Isopropylbenzene	98-82-8	5.0	0.5	0.095	0.5
1,1,2,2-Tetrachloroethane	79-34-5	5.0	0.5	0.183	0.5
1,3-Dichlorobenzene	541-73-1	3.0	0.5	0.157	0.5
1,4-Dichlorobenzene	106-46-7	3.0	0.5	0.107	0.5
1,2-Dichlorobenzene	95-50-1	3.0	0.5	0.0878	0.5
1,2-Dibromo-3-Chloropropane	96-12-8	0.04	0.5	0.353	0.5
1,2,4-Trichlorobenzene	120-82-1	5.0	0.5	0.161	0.5
1,2,3-Trichlorobenzene	87-61-6	5.0	0.5	0.159	0.5
Bromochloromethane	74-97-5	5.0	0.5	0.19	0.5

*

ATTACHMENT I

QAPP Worksheet #15 - Reference Limits and Evaluation Table

UNIFORM FEDERAL POLICY QUALITY ASSURANCE PROJECT PLAN FOR

LOOHN'S DRY CLEANERS AND LAUNDERERS PROPERTY AT THE OLEAN WELL FIELD

GROUNDWATER WELL SAMPLING

April 22, 2010

REVISION 2

Document Control Number: Olean UFPQAPP-4-2010

Prepared by:

Date

Michael A. Mercado Project Manager EPA/DESA/HWSB/SST

Approved by: <u> 01/8/</u>10

Patricia Sheridan QA Officer EPA/DESA/HWSB/SST Appendix A: UFP QAPP Worksheets

Appendix B: Site Map

 Appendix C: U.S. Code of Federal Regulations (CFR), Title 40: Protection of Environment, Part 141: National Primary Drinking Water Regulations, Subpart G: National Revised Primary Drinking Water Regulations: Maximum Contaminant Levels, Section 61: Maximum Contaminant Levels for Organic Contaminants, 7-1-97 Edition.

 Appendix D - U.S. EPA (Environmental Protection Agency) Region 2 March 1998, Ground Water Sampling Procedure - Low Stress (Low Flow)Purging and Sampling, GW Sampling SOP, Final, Division of Environmental Science and Assessment, Edison, NJ.

Appendix E - U.S. EPA Region 2, Division of Environmental Science and Assessment, Laboratory Branch, SOP C-89, March 2007, Analysis of VOCs in Drinking Water By Purge and Trap GC/MS.

 Appendix F - U.S.EPA Region 2, Division of Environmental Science and Assessment (DESA), Hazardous Waste Support Branch (HWSB), Superfund Support Team (SST), Field and Sample Documentation Examples including: Field Data Sheets, Organic Traffic Report & Chain-of-Custody Record.

1.0 INTRODUCTION

1.1 Site Description and History

Loohn's Dry Cleaners and Launderers Property is one of four operation units (OU) that a part of Olean Well Field Superfund Site. The Site is located in the City of Olean, Cattaraugus County, New York. The 1.5 square mile site is comprised of three public and 50 private wells which are contaminated with trichloroethylene (TCE). The public wells were constructed in the 1970s but were closed discontinued after the city officials detected TCE in the groundwater. In 1990, the public wells were reactivated after two air strippers were constructed to treat the groundwater. Site-related contaminants have migrated from shallow groundwater to deeper levels. The groundwater located in the upper level flows toward and discharges into the Allegheny River. Approximately 18,200 people live in the City of Olean.

An assessment was conducted in 1983 and 1985 by EPA. The New York State Department of Environmental Conservation (NYSDEC) and the EPA developed an interim cleanup action that provided for regular monitoring and the installation carbon adsorption units in thirty-two home, and more units as necessary, until a permanent remedy was put in place. In separate remedial actions implemented in 1990, 2000, 2003, several tons of contaminated soils were excavated and removed from several of the Olean Well Field facilities.

Groundwater: Based on the results of the initial site investigation, the remedies selected to clean up the site included:

1. Reactivation of the three public wells and treatment of the groundwater using air strippers to reduce the TCE contamination to a level that protects human health;

2. Extension of the city waterlines from the Town of Olean to connect approximately 93 residences served by private wells;

3. Inspection of the McGraw-Edison industrial sewer and performing any necessary repair and/or replacement; and

4. Recommendation of institutional controls to restrict withdrawal of contaminated groundwater for drinking purposes.

Five thousand feet of sewer line have been replaced or cleaned. Water main extension work was completed in 1989. The extended water main also provides hydrants and fire protection to the targeted areas. Two air strippers were constructed at the public (municipal) wells in 1989 and, in 1990, the wells were reactivated.

1.2 Problem Definition

The primary VOC of concern in the groundwater beneath and downgradient of the site are cisdichloroethene, trichloroethene, tetrachloroethene and vinyl chloride. The contamination of the upper levels of the Aquifer which flows toward and discharges into the Allegheny River requires the semi-annual monitoring of the groundwater to assess if there is a need for further response action at the site.

4

2.0 PROJECT ORGANIZATION

2.1 Personnel

BROJECT PERSONNEL	RESPONSIBILITA
Michael A Mercado, Project Officer	Project Management/
DESA/HWSB Superfund Support Team	Sampling Operations
Steven J. Wall Environmental Scientist	Sampling Operations/
DESA/HWSB Superfund Support Team	Field Support
Pat Sheridan, Project Quality Assurance Officer	Report OA
DESA/HWSB Superfund Support Team	
U.S. EPA, DESA Laboratory	Laboratory Analysis
	Laboratory QC
	Data Processing Activities
$\left\{\begin{array}{cccc} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 &$	Data Quality Review
Not Applicable	Performance Auditing
Not Applicable	Systems Auditing
DESA/Hazardous Waste Support Branch	Overall QA
Michael Walters, ERRD	Overall Project Coordination

3.0 PROJECT QUALITY OBJECTIVES

3.1 Data Usability.

The date will be used to evaluate potential health risks, and determine the necessity corrections needed to safe guard human life.

4.0 PROJECT OVERVIEW

4.1 Tasks

- Sampling Tasks: Well Water samples will be collected from all 5 monitoring wells on the site.
- Analysis Tasks: Samples collected will be analyzed for TCL VOAs
- Quality Control Tasks: Five monitoring well water samples will have the following QC samples analyzed: one field duplicates, one matrix spike, trip blanks, and rinsate blanks for a total of 8 samples. See worksheet #20 for the field quality control sample summary table.

4

- Data Management Tasks: Data management tasks include data receipt, checking, uploading, usability evaluations, and the preparation of reports, tables, and figures. The sample handling and custody requirements, including field logbook and generation of sample paperwork, sample labels, are discussed in worksheets #26 and #27 of the UFP QAPP Worksheets found in Appendix A. Analytical data collected during the field effort will be entered into an appropriate relational database management system (DBMS) software and/or standard commercial software packages. This system will include both location and environmental data. Data tables that compare the results of the various sampling efforts will be prepared and evaluated. Data tables that illustrate statistical trends from tests performed on the data will be prepared. Figures that illustrate monotonic changes will be prepared. Data management will utilize personal computers, local area networks, and electronic communications to support the software.
- Assessment/Audit Tasks: No performance audit of field operations is anticipated at this time. If conducted, performance and systems audits will be in accordance with the U.S: EPA Region 2, SST SOP #01, Performing Oversight of CERCLA Field Operations, Revision 0, April 2000.
- **Data Review Tasks:** All U.S. EPA, Region II, DESA, Laboratory data will be validated by USEPA Region II DESA/LB in accordance with USEPA Region II DESA LB SOP No. G-26: Guidance for Laboratory Data Review, Date August 2008, Rev #1.0.

ACTIVITY	DATE
Date of the request which initiates the project.	April 21, 2010
Review and Background information	April 22, 2010
Date by which the project plan will be submitted to all interested parties.	April 22, 2010
Obtain site access	Prearranged by ERRD
Date by which comments on the plan are to be received by the project officer.	April 26, 2010
Date(s) of the field reconnaissance.	April 27, 2010
Date(s) of the field sampling activities.	April 27-29, 2010
Date(s) the samples will be submitted to the laboratory for analysis.	Samples will be received within 24 hours by USEPA RegionII,DESA/LB.
Date(s) by which all analyses are to be completed and the data submitted to the project officer.	Within 45 days of sample receipt.
Date of the completion of the draft interim/final project report. (Sampling Trip Report)	Within two week of completing the sampling event
Date for the issuance of the final project report.	Within 30 of receipt of Validated Data.

4.2 Schedule

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5.0 Sampling

5.1 Sampling Tasks

Five monitoring well located on the Loohn's Dry Cleaners and Launderers Property site in Olean Well Field OU2, are to be sampled for VOCs using the Low Flow Groundwater Sampling Method.

5.1.2 Site Access

To be provided by ERRD.

5.1.3 Field Planning

Each team member will review all project plans and participate in a field planning meeting. The meeting will be conducted by the EPA HWSB/SST Project Lead. The meeting objective is to allow team members to become familiar with the site history and special project requirements

5.1.4 Decontamination Procedures: In accordance with EPA, Region 2, DESA, HWSB, SST SOP#7

5.1.5 Rationale

The primary use of data from the event will be utilized to determine potential health risks, and determine the necessity corrections needed to safe guard human life.

5.1.6 Well Selection Rationale:

The wells that were selected to be sampled were chosen based on the direction of groundwater flow relative to the source.

5.2 Quality Control

Refer to Attachment 1, Worksheet #28 for sample QC and analytical QC.

6.0 ANALYSIS

6.1 Analytical Tasks

The analytical method, equipment and method performance requirements for Trace VOCs analysis are in accordance with U.S.EPA Region II, DESA, LB SOP DW-1. Standard methods and references will be used as guidelines for data reduction and reporting. All data validation reports will be summarized according to EPA Laboratory SOP G-26.

7.0 DOCUMENTATION

7.1 Sample Documentation and Custody

Field notebook will be completed for each sample collected. All field and sample documents will be legibly written in indelible ink. Any corrections or revisions will be made by lining through the original entry and initialing the change. The field notebook will be used by field personnel to record all aspects of sample collection and handling, visual observations, and field measurements. The field logbook is a descriptive notebook detailing site activities and observations so that an accurate, factual account of field procedures may be reconstructed. The sample team or individuals performing a particular sampling activity are required to maintain a field notebook. This field notebook will be a bound weatherproof logbook that shall be filled out at the location of sample collection immediately after sampling. All entries will be signed by the individuals making them. At a minimum, the logbook will contain sample particulars including sample number, collection time, location, descriptions, methods used, daily weather conditions, field measurements, name of sampler(s), sample preservation, names of contractor/subcontractor personnel, and other site-specific observations including any deviations from protocol.

Sample labels will be securely affixed to the sample container and include only the sample identification number as per protocol. Once sealed, samples will be placed in waterproof High Density Polyethylene (HDPE) coolers. The coolers will be packed with sufficient wet ice to cool the samples to 4°C along with non-combustible absorbent cushioning material to minimize the possibility of container breakage and movement during shipment. All samples will be packaged and shipped in accordance with USEPA, Department of Transportation (DOT), and International Air Transport Association (IATA) procedures.

The Organic Traffic Report & Chain of Custody Records will be maintained from the time of sample collection until final deposition. Every transfer of custody will be noted and signed for and a copy of the record will be kept for each individual who has signed it. The chain-of-custody records will include, at a minimum, sample identification number, number of samples collected, sample collection date and time, sample type, sample matrix, sample container type, sample analysis requested, sample preservation, and the name(s) and signature(s) of samplers and all individuals who have had custody.

Examples of the above field documents can be found in Appendix F.

7.2 Project Documentation

The following project personnel will receive copies of the approved QAPP and any subsequent revisions.

Project Personnel	Diffe
Michael Walters ERRD	Remedial Project Manager
Michael A Mercado DESA/HWSB	Project Officer
Pat Sheridan DESA/HWSB	Quality Assurance Officer

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7.3 Reports to Management

The data collected as a result of sampling activities will be organized, analyzed and summarized in a final project report that will be submitted to the RPM according to the Project Schedule in section 4.2 of the QAPP summary. The report will be prepared by the project officer or project quality assurance officer and include appropriate data quality assessment.

8.0 ASSESSMENT

8.1 Assessment Findings

Procedures are provided for project personnel to make changes, take corrective actions and document the process through Corrective Action Request Forms. Corrective action can occur during field activities, laboratory analysis, data validation, and data assessment.

Corrective action in the field may be necessary when the monitoring network design is changed. A change in the field includes: increasing the number or type of samples or analyses; changing sampling locations; and/or modifying sampling protocol. When this occurs, the project officer or project QA officer will identify any suspected technical or QA deficiencies and note them in the field logbook. The project QA officer will be responsible for assessing the suspected deficiency and determining the impact on the quality of the data. Development of the appropriate corrective action will be the responsibility of the RPM.

Data validation and data assessment corrective action will be in accordance with EPA Laboratory SOP G-26.

DATA USABILITY

9.0

A Data Evaluation Report will describe the rationale for the data used and present any data limitations. The report will include a discussion of the accuracy, precision, representativeness, completeness and comparability of the data set and deviations from planned procedures and analysis. Tables will be prepared, including: a summary of samples collected and parameters analyzed; detections in field blanks; comparison of field duplicates.

Title: Revision No. Revision Date Section No. Olean Well Field Quality Assurance Project Plan Revision 0 22 April 2010 Crosswalk

TABLE OF CONTENTS

<u>Worksheet</u>

Title

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Title: Olean Well Field Quality Assurance Project Plan Revision No. Revision 0 Revision Date 22 April 2010 Section No. Crosswalk

CROSSWALK

The following table provides a "cross-walk" between the QAPP elements outlined in the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP Manual), the necessary information, and the location of the information within the text document and corresponding QAPP Worksheet. Any QAPP elements and required information that are not applicable to the project are circled.

QAP	P Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
	Project l	Management and Objectives		
2.1	Title and Approval Page	- Title and Approval Page	Approval Page	1
2.2	Document Format and Table of Contents	- Table of Contents	TOC	
2.2	2.2.1 Document Control Format	- QAPP Identifying	Approval Page	2
	2.2.2 Document Control Numbering System	Information		
	2.2.3 Table of Contents			
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2.4	Project Organization	- Project Organizational	2	5
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• :	2.4.2 Communication Pathways	- Communication		6
	2.4.3 Personnel Responsibilities and	Pathways		
	Qualifications	- Personnel		
	2.4.4 Special Training Requirements and	Responsibilities and		
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		- Special Personnel		0
		Training Requirements		
2.5	Project Planning/Problem Definition	- Project Planning		
•	2.5.1 Project Planning (Scoping)	Cincluding Data Needs		
	2.5.2 Problem Definition, Site History,	(including Data Necus		
	and Background	- Project Sconing Session		(9)
		Participants Sheet		
-		- Problem Definition, Site		10
•		History, and Background		
•		- Site Maps (historical		
		and present)		
2.6	Project Quality Objectives and	- Site-Specific PQOs	3	11.
	Measurement Performance Criteria	- Measurement		12
•	2.6.1 Development of Project Quality	Performance Criteria		•
•	Objectives Using the Systematic Planning			
•	Process			
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		· · ·	
QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
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	- Secondary Data Criteria		
	and Limitations	- · · · ·	
2.8 Project Overview and Schedule	- Summary of Project	1	
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Title: Olean Well Field Quality Assurance Project Plan Revision No. Revision 0 Revision Date 22 April 2010 Section No. QAPP Worksheet#1

QAPP Worksheet #1 Title and Approval Page

Title: Quality Assurance Project Plan Site Name/Project Name: Loohn's Dry Cleaner and Launders Property Olean Well Field Superfund Site Site Location: Olean, Cattaraugus County, NY Revision Number: 00 Revision Date: 22 April 2010

U.S. Environmental Protection Agency, Region II Lead Organization

Michael A. Mercado U.S. EPA Region II 2890 Woodbridge Ave. Edison, NJ 08837 (732)906-6808 mercado.michael@epa.gov

April 22, 2010

Preparation Date (Day/Month/Year)

Project Officer:

 Michael A. Mercado, EPA Region 2
 Signature

 Printed Name/Organization/Date
 QA Officer:

 Patricia Sheridan, EPA Region 2
 Signature

Printed Name/Organization/Date

Document Control Number: OleanUFPQAPP-4-2010

Title:Olean Well Field Quality Assurance Project PlanRevision No.Revision 0Revision Date22 April 2010Section No.QAPP Worksheet#2

QAPP Worksheet #2 QAPP Identifying Information

Title: Quality Assurance Project Plan

Site Name/Project Name: Loohn's Dry Cleaner and Launders Property Olean Well Field Superfund Site Site Location: Olean, Cattaraugus County, NY

Revision Number: 00

Revision Date: 22 April 2010 Title: Ouality Assurance Project Plan

1. Identify guidance used to prepare QAPP: Uniform Federal Policy for Quality Assurance Project Plans

2. Identify regulatory program: EPA Region 2

3. Identify approval entity: EPA Region 2

4. Indicate whether the QAPP is a generic or a project-specific QAPP. (circle one)

5. List dates of scoping sessions that were held: N/A

6. List dates and titles of QAPP documents written for previous site work, if applicable:

7. List organizational partners (stakeholders) and connection with lead organization: None

8. List data users:

EPA Region 2 (see Worksheet #4 for individuals)

9. If any required QAPP elements and required information are not applicable to the project, then provide an explanation for their exclusion below:

QAPP Worksheet #9 is not applicable because there is no projected Scoping Session

QAPP Worksheet #13 is not applicable because there are no secondary data criteria

10. Document Control Number: OleanUFPOAPP-4-2010

Title:Olean Well Field Quality Assurance Project PlanRevision No.Revision 0Revision Date22 April 2010Section No.QAPP Worksheet#3

QAPP Worksheet #3 Distribution List

[List those entities to whom copies of the approved QAPP, subsequent QAPP revisions; addenda, and amendments are sent]

QAPP Recipient	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control
Michael Walters	Remedial Project	EPA, Region 2	(212) 637-4279	[]	Walter.michael@epa gov	Number
Patricia Sheridan	Manager	EDA Dagion 2	(720) 201 (720			
		EFA, Region 2	(732) 321-6780	(732) 906-6824	Sheridan.Patricia@epa.gov	OleanUFPQAPP-4-2010
Michael A. Mercado	Project Manager	EPA, Region 2	(732) 906-6808	(732) 906-6824	Mercado.michael@epa.gov	OleanUFPQAPP-4-2010
		<u> </u>		· ·		· · ·

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Ölean Well Field Quality Assurance Project Plan Revision 0 Revision No. 22 April 2010 **Revision Date**

QAPP Worksheet#4 Section No.

QAPP Worksheet #4 Project Personnel Sign-Off Sheet

Title:

[Have copies of this form signed by key project personnel from each organization to indicate that they have read the applicable sections of the QAPP and will perform the tasks as described; add additional sheets as required. Ask each organization to forward signed sheets to the central project file.]

Organization:	EPA Region 2			
Project Personnel	Title	Telephone Number		
Michael Walters	Remedial Project Manager	212- 637-4279		
Patricia Sheridan	QA Officer	732-321-6780		
Michael A. Mercado	Project Manager	732- 906-6808		
Steven Wall	Field Support	732-906-6170		

Title:Olean Well Field Quality Assurance Project PlanRevision No.Revision 0Revision Date22 April 2010Section No.QAPP Worksheet#5

QAPP Worksheet #5 Project Organizational Chart

Lead Organization: EPA Region 2

Sample Lead: Michael A. Mercado EPA Region 2, DESA

Patricia Sheridan EPA Region 2, DESA

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QA Officer:

Project Lead:

Michael Walters EPA Region 2, ERRD

Sample Assistance Steven Wall and EPA Region 2, DESA

Title:Olean Well Field Quality Assurance Project PlanRevision No.Revision 0Revision Date22 April 2010Section No.QAPP Worksheet#6

QAPP Worksheet #6 Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Sampling Request	Remedial Project Manager	Michael Walters	(212) 637-4279	All technical, QA and decision-making matters in regard to the project (verbal, written or electronic)
Adjustments to OAPP	Quality Assurance Officer	P. Sheridan	(732) 321-6780	QAPP approval dialogue
Field Corrective Action	Field Team	HWSB/SST	(908)420-4440	DESA/HWSB/SST determines the need for corrective actions.
Analytical Data Reporting	HWSB/HWSS	Adly Michael	(732) 906-6161	HWSB/HWSS will receive and review data packages before data is used.
Health and safety decisions, reporting of safety issues and point of contact with RPM	HWSB/SST	Michael A. Mercado	(732) 906-6808	Responsible for ensuring the protocols specified in the HASP are carried out during field activities, as well as communication with RPM regarding technical and QA matter with respect to the project.
Title:	Olean Well Field Quality Assurance Project Plan			
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Revision No.	Revision 0			
Revision Date	22 April 2010			
Section No.	QAPP Worksheet#7			

QAPP Worksheet #7 Personnel Responsibilities and Qualifications Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Michael A. Mercado	Sampling Project Manager	EPA/DESA/HWSB/SST	Implementing and executing the technical, QA and health and safety during sampling event	B.S. Degree in Environmental Science. Over 10 years experience with oversight, field investigations, and
Steven Wall	Sampling Assistance	EPA/DESA/HWSB/SST	Sample activities and management	project management B.S. Degree in Environmental Sciences. Over 5 years of experience in environmental research and field activities
When a wallers	Remedial Project Manager	EPA/ERRD	Overall project coordination	Project Management and coordination expert.

QAPP Worksheet #8

Special Personnel Training Requirements Table

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training .	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates ¹
	··· · · · · · · · · · · · · · · · · ·	Specify location of tr	aining records an	d certificates for sample	ers]	
All Field	40-hour OSHA	40-hour EPA; 8-	Various	All field team	HWSB/SST staff	On-site and EPA Edison
Activities	Annual 8-hour refresher	hour web based or .	14	members		office records
		CDM training and				
		on-site safety				
	•	briefings		· · · · · · · · · · · · · · · · · · ·		
Sample Collection	Trained in EPA CERCLA	Office and on-site	Various	HWSB/SST Staff	HWSB/SST Staff	EPA Region 2 in Edison, NJ
	QA, sampling methods,	training	· . ·			
	. sample shipping					
	procedures					
Sample Analysis	Trained in EPA SOP DW-	On-site training	Various	DESA/LB analytical	DESA/LB staff	EPA Region 2 in Edison, NJ
	1 and various methods		•	personnel		
	described in the					DRA Design 2 DESA
Data Validation	CLP and non-RAS data	EPA	Various	EPA reviewers	Data Validators	EPA Region 2, DESA
	validation					Laboratory Statt
	· . · .	· · · · · · · · · · · · · · · · · · ·				
Data Daview and	Nono raviáv performed	On-site FPA	Various	Laboratory Data	Section Chief;	EPA Region 2 in Edison, NJ
Data Review and	hy experienced analytical	DESA Laboratory	, introduct	Management	Laboratory QAO;	
Assessment	nersonnel	DEGIT Educitations			Respective Section	
	personner				leaders	

¹If training records and/or certificates are on file elsewhere, document their location in this column. If training records and/or certificates do not exist or are not available, then this should be noted.

Title: Revision No. Revision 0

Olean Well Field Quality Assurance Project Plan Revision Date 22 April 2010 Section No. QAPP Worksheet#10

OAPP Worksheet #10 Problem Definition

PROBLEM DEFINITION

The groundwater sampling is required semi annually to assess post-removal groundwater conditions and the need for further response action at the site.

SITE HISTORY/CONDITIONS

Site Location and Description

Loohn's Dry Cleaner and Launders Property is one of four operation units (OU) that a part of Olean Well Field Superfund Site. The Site is located in the City of Olean, Cattaraugus County, New York. The 1.5 square mile site is comprised of three public and 50 private wells which are contaminated with trichloroethylene (TCE). The public wells were constructed in the 1970s but were closed and discontinued after the city officials detected TCE in the groundwater. The groundwater located in the upper level flows toward and discharges into the Allegheny River. Approximately 18,200 people live in the City of Olean.

Site History

An assessment was conducted in 1983 and 1985 by EPA. The New York State Department of Environmental Conservation (NYSDEC) and the EPA developed an interim cleanup action that provided for regular monitoring and the installation of additional carbon adsorption units, as necessary, until a permanent remedy was put in place.

In 1990, the public wells were reactivated after two air strippers were constructed to treat the groundwater. Site-related contaminants have migrated from shallow groundwater to deeper levels. In separate remedial actions implemented in 1990, 2000, 2003, several tons of contaminated soils were excavated and removed from several of the Olean Well Field facilities.

Five monitoring groundwater wells were developed on the Loohn's Dry Cleaner and Launders Property. The five monitoring groundwater wells are sampled semi-annually for cisdichloroethene, trichloroethene, tetrachloroethene and vinyl chloride.

Groundwater sampling is required to assess, post-removal groundwater conditions and the need for further response action at the site. The primary VOC of concern in the groundwater beneath and downgradient of the site are cis-dichloroethene, trichloroethene, tetrachloroethene and vinyl chloride.

PROJECT DECISION STATEMENTS

The purpose of the Groundwater Sampling Event is to collect valid data which are necessary and sufficient to verify that the groundwater contamination at the site does or does not pose an unacceptable risk to human health and the environment.

If the groundwater contamination at the site does not pose an unacceptable risk then semi-annual sampling of the five monitoring wells on site will continue until there is no risk.

If the groundwater contamination at the site does pose an unacceptable risk, then reassessment of the remedial actions will need to be conducted.

Unacceptable risk will be based on several factors, type of contaminates, level of contamination above the MCLs, usages of the groundwater and exposure to the environment. This sampling event will provide two of the factors needed to determent unacceptable risk. The two factors provide are the type of contaminates and the level of contamination above the MCLs.

Olean Well Field Quality Assurance Project Plan Title: Revision No. Revision 0 Revision Date 22 April 2010 Section No.

QAPP Worksheet#11

QAPP Worksheet #11

Project Quality Objectives/Systematic Planning Process Statements

Overall project objectives include:

Monitor five groundwater monitoring wells for volatile organic compounds.

Who will use the data?

Data will be used by EPA Region 2 ERRD.

What will the data be used for?

The primary use of data from the event will be utilized to verify that the groundwater contamination at the site does or does not pose an unacceptable risk to human health and the environment. The scope of the Sampling Event is to:

- to determine the quality of the ground water supply
- to monitor the on-site concentration of contaminants of concern (TCE)

What types of data are needed?

- TCL-VOC
- Water quality parameters including turbidity, pH, temperature, specific conductance, dissolved oxygen, and oxidation-reduction potential
- Low Flow sampling parameters from 5 monitoring wells

How "good" do the data need to be in order to support the environmental decision?

Definitive level data are required to meet project objectives. The quantitation limits for the samples are specified on Worksheet #15. All definitive laboratory analyses will be performed by EPA's Region 2 Laboratory. Worksheets #12 and #28 show the measurement performance criteria that are needed for the quality indicators. Worksheet #20 shows the quality control (QC) samples required. All data analyzed by the EPA DESA Laboratory will be validated by DESA Laboratory.

How much data are needed?

Each sample consists of an aqueous matrix: 5 monitoring well samples will be collected

Where, when, and how should the data be collected/generated?

Samples are scheduled to be collected during the week of April 27-29, 2010 from monitoring wells in OU2.

Who will collect and generate the data?

EPA Region II DESA/HWSB/SST will collect the analytical samples that will be hand delivered to DESA/LAB for analysis.

How will the data be reported?

Analytical data will be forwarded to the RPM and the Project Leader.

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How will the data be archived? EPA will archive DESA laboratory data.

QAPP Worksheet #12 Measurement Performance Criteria Table

....

Analytical Group ¹	VOA				
Concentration Level	Trace				
Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both
U.S. EPA DESA Region 2, Ground Water Sampling Procedure - Low Strates (Low Eland	DW-1 See worksheets #28/ #23	Precision Accuracy	% RPD < 20 Average Recovery(80- 120%)	LCS Duplicate/Field Duplicate	(3&A)
Purging and Sampling		Accuracy Accuracy	+/- 40% from the initial/continuing calibration Limits 70%-130%	Internal standards Matrix spike	A
		Accuracy Accuracy	Limits 80%-120% < RL	Surrogate Compounds Method Blank	A. A

Matrix

Aqueous

QAPP Worksheet #14 Summary of Project Tasks

Sampling Tasks: Groundwater samples will be collected from 5 monitoring wells. according to U.S. EPA DESA Region 2 Standard Operating Procedure (SOP), Ground Water Sampling Procedure - Low Stress (Low Flow) Purging and Sampling

Analysis Tasks: Samples collected from each monitoring well will be analyzed for TCL-VOCs only. Ground water samples will also be screened for pH, oxidation reduction potential, specific conductance, temperature, and DO.

Quality Control Tasks: The aqueous samples will have following QC samples analyzed: one field duplicate, one matrix spike/matrix spike duplicate, one trip blanks, and one rinsate blanks. Rinsate blank samples will be collected on decontaminated equipment at a rate of one rinsate sample per day per decontamination event, not to exceed one/day. See worksheet #20 for the field quality control sample summary table.

Data Management Tasks: Data management tasks include data receipt, checking, uploading, usability evaluations, and the preparation of reports, tables, and figures. The sample handling and custody requirements, including field logbook and generation of sample paperwork, sample labels is discussed in worksheets #26 and #27. Analytical data collected during the field effort will be entered into an appropriate relational database management system (DBMS) software and/or standard commercial software packages. This system will include both location and environmental data. Data tables that compare the results of the various sampling efforts will be prepared and evaluated. Data tables that illustrate statistical trends from tests performed on the data will be prepared. Figures that illustrate monotonic changes will be prepared. Data tables to support the software.

Assessment/Audit Tasks: No performance audit of field operations is anticipated at this time. If conducted, performance and systems audits will be in accordance with the U.S. EPA Region 2, SST SOP #01, Performing Oversight of CERCLA Field Operations, Revision 0, April 2000.

Data Review Tasks: All data will be validated by USEPA Region 2 DESA/LB in accordance with DESA LB SOP G-26: Guidance for Laboratory Data Review.

QAPP Worksheet #15 Reference Limits and Evaluation Table

Matrix: Analytical Concentration Level:

Aqueous Volatile Organic Compounds Trace

Analyte	CAS Number	NY State	FEDERAL	Method CRQLs	Achievable Labo	ratory (DESA)
		. MCLs	MCLs		Lim	its
Diphlom diffuser		<u> </u>			MDLs ng/l	
Chloromethane	75-71-8		• <u>N/A</u>	0.5u¢/l		
	74-87-3	<u> </u>	N/A	0.5ug/	0.07	0.5ug/1
	75-01-4	2	· · 2	0.5ug/	0.07	0.5ug/l
Bromomethane	74-83-9	5		0.5ug/l	0.12	0.5ug/l
Chloroethane	75-00-3	5	N/A	0.5ug/1	0.14	0.5ug/1
Inchlorofluoromethane	75-69-4	5	N/A	0.5ug/i	0.14	0.5ug/
1,1-Dichloroethene	75-35-4		7	0.5ug/l	0.11	0.5ug/I
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1			0.5ug/l	0.10	0.5ug/
Carbon Disulfide	75-15-0	60		0.5ug/[· · ·	0.5ug/1
Acetone	67-64-1	N/A	N/A	0.5ug/I	0.10	0.5ug/l
Methyl Acetate	79-20-9	N/A		5.0ug/	0.36	5.0ug/1
Methylene Chloride	75-09-2	5	N/A	0.5ug/l		0.5ug/l
trans-1,2-Dichloroethene	156-60-5		<u> </u>	0.5ug/l	0.18	0.5ug/l
cis-1,2-Dichloroethene	156-59-2			0.5ug/1	0.09	0.5ug/
Methyl tert-Butyl Ether	1634-04-4	<u></u>		0.5ug/l	0.06	0.5ug/1
1.1-Dichloroethane	75-34-3	NIA E	<u>N/A</u>	0.5ug/1	0.03	0.5ug/l
2-Butanone	78-93-3		N/A	0.5ug/1	0.08	0.509/
Chloroform	67-66-3	N/A	<u>N/A</u>	5.0ug/1	0.21	5 0ng/l
1,2-Dichloroethane	107.06.2		N/A	0.5ug/i	0.07	0.50g/
1,1,1-Trichloroethane	71 55 6	0.6	5	0.5ug/l	0.09	0.50g/
Cyclohexane	110 82 7	5	200	0.5ug/l	0.09	0.5ug/1
Carbon Tetrachloride	56.02.6	N/A	<u> </u>	0.5ug/1		0.5ug/1
- Benzene		5	. 5	0.5ug/l	0.10	0.500/1
Trichloroethene	/1-43-2	1	5	0.5ue/1	0.07	0
Methylcyclohexane	199-01-6	5	5	0.5ug/	0.07	<u> </u>
1.2-Dichloropropage	108-87-2	<u>N/A</u>	N/A	0.5ug/1	0.08	0.5ug/i
Bromodichloromethano	18-87-5	1	5	0.5ug/1	0.04	<u>0.5ug/i</u>
cis-1 3-Dichloropropaga	/3-27-4	N/A	N/A	0.500/1	0.04	0.5ug/i
trans-1 3-Dichloropropene	10061-01-5	. 0.4	N/A	0.500/1	0.00	0.5ug/i
1.1.2 Trichloroethano	10061-02-6	0.4	N/A	0.5110/1	0.05	0.5ug/l
Dibromochloromothana	79-00-5	<u></u>	5	0.5001	0.04	0.5ug/[
4-Methyl-2-Pentanana	124-48-1	N/A	N/A	0.5ug/1	0.08	0.5ug/l
	108-10-1	N/A	N/A	0.50g/	0.03	0.5ug/i
i oluelle	108-88-3	5	1 000	0.5ug/1	0.10	0.5ug/1.
and the second		. 1	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	o Jugh	0.08	0.5ug/

				•		
		0.0000	0.05	0.509/	0.04	0.5ug/l
1,2-Dibromoethane	106-93-4	0.0006		0.5ug/l	0.06	0.5ug/l
Chlorobenzene	108-90-7			0.5ug/l	0.09	0.5ug/i
Tetrachloroethene	127-18-4	<u> </u>		5 0ug/l	0.11	5.0ug/1
2-Hexanone	591-78-6	N/A	N/A	0.5002/1	0.06	0.5ug/l
Ethylbenzene	100-41-4			0.5ug/l	0.13	0.5ug/l
m,p-Xylene	179601-23-1	N/A	10	0.50g/1	0.05	0.5ug/1
o-Xylene	<u>95-47-6</u>	5	10	0.50g/1	0.03	0.5ug/l
Styrene	100-42-5	5	100	• 0.5ug/i	0.07	0.5ug/1
Bromoform	75-25-2	<u> </u>	N/A	0.50g/	0.06	0.5ug/l
Isopropylbenzene	98-82-8	5	N/A	0.549/	0.05	0.5ug/l
1,1,2,2-Tetrachloroethane	79-34-5	5	<u>N/A</u>	0.5ug/t	0.05	0.5ug/
1.3-Dichlorobenzene	541-73-1	3 .	<u>N/A</u>	0.502/1	0.03	0.5ug/
1,4-Dichlorobenzene	106-46-7	3	. /5	0.5ug/1	0.04	0.5ug/l
1.2-Dichlorobenzene	95-50-1	3	600	0.50g/1	0.18	0.5ug/1
1,2-Dibromo-3-Chloropropane	96-12-8	0.04	0.2	0.3027	0.06	0.5ug/
1,2,4-Trichlorobenzene	120-82-1	5	70	0.5ug/I	0.05	0.500/1
1,2,3-Trichlorobenzene	87-61-6	. 5	N/A		0.00	0.5ug/

Bromochloromethane 74-97-5 N/A

QAPP Worksheet #16 Project Schedule/Timeline Table

		Dates (M)	M/DD/YY)		
Activities	Organization	Anticipated Date(s) of Initiation	Anticipated Date of Completion	Deliverable	Deliverable Due Date
Preparation of QAPP	EPA/DESA/SST	4/22/10	4/22/10	QAPP	4/22/10
Procurement of Equipment	EPA/DESA/SST	N/A	N/A	N/A	N/A
Laboratory Request	EPA/DESA/SST	4/22/109	4/22/10	Analytical Request Form (ARF)	4/22/10
Field Reconnaissance/Access	EPA/DESA/SST	4/27/10	4/27/10	N/A	N/A
Collection of Field Samples	EPA/DESA/SST	4/27/10	4/2910	N/A	N/A
Validation of Laboratory · Results	EPA/DESA/LB	6/7/10	6/14/10	Validated data	6/28/10
Data Evaluation/ Preparation of Final Report	EPA/DESA/SST	6/30/10	7/21/10	Final Report	7/28/10

QAPP Worksheet #17 Sampling Design and Rationale

EPA will collect approximately 5 ground water samples from the Loohn's Dry Cleaner and Launders Property Olean Well Field Superfund Site. In addition for quality assurance/quality control, the following samples will be collected one rinsate blank, 1 trip blank, 1 matrix spike/matrix spike duplicate, and 1 field duplicate sample. The samples will be analyzed by the EPA Region 2 DESA Laboratory.

Site Access

The EPA RPM will be responsible for providing site access to the Team.

Field Planning

Prior to each field mobilization, each team member will review all project plans and participate in a field planning meeting. The meeting will be conducted by the EPA HWSB/SST Project Lead and attended by all field staff. The meeting objective is to allow team members to become familiar with the site history, special project requirements, and other items listed below.

-Objectives of field work

-Equipment and training needs

-Health and safety requirements

-Field operating procedures, schedules of events, communications, and individual assignments

-Required QC measures

-Documents governing field work that must be on site ,

Decontamination Procedures

There will be no field decontamination perform. All decontamination of equipment will be perform prior to departing to the field for this sampling event. The decontamination of equipment utilized during this event will be in accordance with the USEPA Region II Low Stress (LowFlow) SOP.

Describe and provide a rationale for choosing the approach:

The monitoring wells will be purged and sampled following the U.S. EPA DESA Region 2 Standard Operating Procedure (SOP), *Ground Water Sampling Procedure - Low Stress (Low Flow) Purging and Sampling*. Conventional monitoring wells will be purged and sampled with a Grundfos Redi-flo 2 submersible pumps.

Sample Selection Rationale:

Five monitoring wells are proposed for the sampling program. The wells were selected by the RPM based on data from previous sampling events and well accessibility.

. . .

QAPP Worksheet #18 Sampling Locations and Methods/SOP Requirements Table

		· ·				·	
Matrix	Sampling Location(s)	Depth (ft.)	Analytical Group(s)	Concentration Level	No. of Samples	Sampling SOP Reference	Rationale for Sampling Location***
	<u>M</u> W-1	. 23	TCL VOC	Trace: Low		Low Flow	<u>`</u> `
	MW-2	23	TCL VOC	Trace: Low	1		
Groundwater	MW-3	30	TCL VOC	Turner T			
		<u> </u>	TOL WOR	Trace; Low	1	Low Flow	
	MW-4	25		Trace; Low	1	Lów Flow	· · · · · · · · · · · · · · · · · · ·
L	<u>MW-5</u>	-35	TCL VOC	Trace; Low	1	Low Flow	·

***: See Worksheet # 17

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QAPP Worksheet #19 Analytical SOP Requirements Table

• :	Matrix	No. of Samples	Ánalytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/ analysis)
	Aqueous	5 and 1 duplicate	Trace Concentration Volatile Organics	Trace	DW-1 (<i>Ref: EPA524.2</i>)	3 X40ml 6 X 40ml (QC)	(3) VOA vial with Teflon-lined septum	Cool, 4°C ; HCL to pH < 2	Preserved w/HCL: 14 days: Unpreserved: 7 days
·	Trip Blank	I ,	Trace Concentration Volatile Organics	Trace .	DW-1 (<i>Ref: EPA524.2</i>	3 X40ml	(3) 40 ml VOA vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days
•	Equipment Blanks	1	Trace Concentration Volatile Organics	Trace	DW-1 (<i>Ref: EPA524.2</i>	3 X40ml	(3) 40 ml VOA vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days

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QAPP Worksheet #20 Field Quality Control Sample Summary Table

. Matrix .	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of Extra Volume Laboratory QC (c.g., MS/MSD) Samples	No. of Equipment Blanks*	No. of Trip. Blanks**
Aqueous ·	Volatile Organics	Trace	DW-1 (<i>Ref: EP:A524.2</i>	5	1	3х	. 1	1

-20

* : Number is based on the anticipated number of decontamination events during sampling.

**:Number is based on the quantity of coolers to the laboratory from the field.

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QAPP Worksheet #21 Project Sampling SOP References Table

	Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
	SST-07	Groundwater Sampling Procedure: Low Stress (Low flow) Purging and Sampling, March 1998.	EPA/DESA/HWSB/SST	Submersible, bladder or peristaltic (inorganic only)		
•		See Attachment 3		pump, Teflon lined tubing,	· .	
				water level meter,		
	. *			parameter meter, power		
				source		

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QAPP Worksheet #22 Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing/ Inspection Activity	Frequency	Acceptan	ce Criteria	Corrective Action	Responsible Person	SOP Reference
YSI or equivalent	Calibrate with standard solutions	NA	NA	Prior to day's activities; end of day's activities; anytime anomaly suspected	pH Meter Dissolved Oxygen Specific Conductiv ity Temperatu re	+/- 0.1 units ± 3% ± 1% ± 0.1 °C ~	Clean probe, replace battery, replace membrane, replace probe	EPA SST	
			· · ·	· · .	Turbidity	±2 NTU		• • •	
Water Level Indicator or Interface Probe	NA	NA	Visual inspection	Prior to day's activities	No defects n	loted	Replace	EPA SST	· · ·
	NA	Check/replace battery	NA	Prior to day's activities; anytime	+/- 5ppm		Replace battery; replace probe	EPA SST	
				anomaly suspected			· · · · · · · · · · · · · · · · · · ·		

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QAPP Worksheet #23 Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument .	Organization Performing Analysis	Modified for Project Work? (Y/N)*
DW-1	U.S. EPA Analysis of Volatile Organic Compounds in Aqueous, Soil/Sediment, and Waste Oil. Waste Organic Solvents Samples by Purge and Trap GC/MS	Definitive	Target Compound List Volatile Organics	GC/MS	U.S. EPA Region 2 DESA Laboratory	

* If yes, explain the modification

QAPP Worksheet #24 Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for	SOP Reference
		-Initial calibration: Before sample	-Initial calibration -Continuing	Initial calibration: inspect	EPA Region 2	<u> </u>
		-Continuing calibration:	factor (RRF) greater than or	system for problems (e.g., clean	Laboratory	
		Following initial calibration	equal to minimum acceptable	service the purge and trap		
		verification, once every 12 hours,	response factor listed in section	device), correct problem, re-		
	·	-GC/MS Tuning with 4-	less than or equal to value listed	Continuing calibration: inspect		
OC/MS	See DW 1	Bromoflurobenzene (BFB):	in section 14 of procedure.	system, recalibrate the		
001110	366 D 44-1	Beginning of each 12 hour period	GC/MS Tuning: See ion	instrument, reanalyze samples.		SOP DW-1
		samples are analyzed.	Retention Time Evaluation: +/-	system identify problem MS	•	. *
		Retention Time Evaluation: each	0.50 minute of the internal	tune criteria must be met before	-	
		anarysis.	standard retention time in the	calibration		
			verification	calibrate and verify, re-analyze		
				samples back to the last good		
	Calibrate with	-Prior to day's activities: end of	+/- 0.1 unite	calibration check verification		
	standard solutions; as	day's activities; anytime anomaly	• • • • • • • • • • • • • • •	replace membrane, replace		•
YSI	per instrument	suspected		probe	· EDA COT	Manufacturer's
	recommended	-			Ern 331	Instructions
	procedures					
	Calibrate with standard solutions: or	Prior to day's activities; end of		Replace battery, replace		· · · · · · · · · · · · · · · · · · ·
La Motte	per instrument	suspected		standards, replace bottle,		
Turbidity Meter	manufacturer's			Teprace fightouto	EPA SST	Manufacturer's
	procedures					

QAPP Worksheet #25 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing/Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
GC/MS	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	EPA Region 2 Laboratory	See LQMP, G- 10, G-11, G-12, G-19
YSI Multi- parameter meter	Check/replace battery	Visual inspection	Prior to day's activities; anytime anomaly suspected	No visual defects; +/- 0.1 units	Replace battery; replace probe	EPA SST	Manufacturer's Instructions
LaMotte Turbidity Meter	Check/replace battery	Visual inspection	Prior to day's activities; anytime anomaly suspected		Replace battery; replace light bulb	EPA SST	Manufacturer's Instructions

QAPP Worksheet #26 Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT

Sample Collection (Personnel/Organization): EPA DESA HWSB SST

Sample Packaging (Personnel/Organization): EPA DESA HWSB SST

Coordination of Shipment (Personnel/Organization): EPA DESA HWSB SST

Type of Shipment/Carrier: Hand delivered

SAMPLE RECEIPT AND ANALYSIS

Sample Receipt (Personnel/Organization): Sample Custodian, EPA DESA Laboratory

Sample Custody and Storage (Personnel/Organization): Sample Custodian, EPA DESA Laboratory

Sample Preparation (Personnel/Organization): Sample Technicians, EPA DESA Laboratory

Sample Determinative Analysis (Personnel/Organization): Sample Technicians, EPA DESA Laboratory

SAMPLE ARCHIVING

Field Sample Storage (No. of days from sample collection): Samples to be hand-delivered within 24hours, and arrive at laboratory within 24 hours (1 day) of sample shipment

Sample Extract/Digestate Storage (No. of days from extraction/digestion): As per analytical methodology; see Worksheet #19

SAMPLE DISPOSAL

Personnel/Organization: Sample Technicians, EPA DESA Laboratory

Number of Days from Analysis: Until analysis and QA/QC checks are completed; as per analytical methodology; see Worksheet #19.

QAPP Worksheet #27 Sample Custody Requirements

Sample Identification Procedures: Each sample will be labeled with a sample type letter code (MW for monitoring well and number that depicts a specific location. Since samples are analyzed by DESA, each sample will not be labeled with a CLP assigned number. Examples of field documents can be found in Appendix F.

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): Each sample will be individually identified and labeled after collection, and packed into a cooler with wet ice. The sample information will be recorded on chain-of-custody (COC) forms, and the samples hand delivered to the DESA Laboratory within twenty-four hours of sample collection.

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Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal): See LQMP, SOP G-25(OSCAR)

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Person(s)

Responsible for

Corrective Action

Lab personnel

Lab personnel

Lab personnel

Lab personnel

Lab personnel

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Measurement Performance

Criteria

Pass all PBFB tune criteria

% RSD +/- 20%

Not more than 10% of total

analytes failure

Max %D RRF +/- 30%

Not more than 10% of total

analytes failure

<RL

Limits: Average Recovery 70-

130%

No. QAPP Worksheet#28

Data Quality

Indicator (DQI)

Sensitivity

Accuracy/

Precision

Accuracy

Sensitivity

Contamination

Sensitivity

Contamination

QAPP Worksheet #28 QC Samples Table

Corrective Action

Check Instrument

Reanalyze, Retune

Check Instrument,

Reanalyze

Reanalyze, Qualify

data

Investigate source

of contamination

Investigate source

of contamination

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methylene chloride, acetone, toluene, 2butanone, and _____phthalates)

Matrix	Aqueous	
Analytical Group	voc	
Concentration Level	Trace	
Sampling SOP	SST-07	
Analytical Method/ SOP	DW-1	
Keterence	(Ref: EPA 524.2.2)	
Sampler's Name	Michael A. Mercado	1
Field Sampling Organization	EPA SST	
Analytical Organization	USEPA Region 2 Lab	
No. of Sample Locations	5	
QC Sample:	Frequency/Number	Method/SOP QC
Tuning	12 hr period	Pass all PBFB tune criteria
nitial Calibration	SOP DW-1	% RSD +/- 20% Not more than 10% of total analytes failure
		in analytoo tarraro
Continuing Calibration Theck Standard Alternate check Randard)	l per analytical batch	Max %D RRF +/- 30% Not more than 10% of total analytes failure
lethod Blank	l per extraction batch	< RL
rip Blank	1 per cooler containing VOC samples	Purgable organics < 10ppb EXCEPTIONS:
· · · ·		Common lab contaminants (i.e.

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· · · · · · · · · · · · · · · · · · ·						
	· · ·			Person(s)		
		Method/SOP QC		Responsible for	Data Quality	Measurement Performance
QC Sample:	Frequency/Number	Acceptance Limits	Corrective Action	Corrective Action	Indicator (DQI)	Criteria
LCS/LFB	2 per extraction batch	Limiter Average	Qualify data unless	Lab personnel	. Accuracy/	RPD 20%
		Dannen 70 1200	high recovery		Precision	· · · · · ·
	•		and/or Not		· · · ·	•
· · ·		70 KFD ~ 20	Detected)			
Laboratory	1 per extraction batch		Qualify data unless	Lab personnel	Accuracy	Limits 70-130%
Matrix spikes		Limite 70 1209/	-high recovery			
		Linnis 70-13076	and/or Not			
			Detected)			•
	Each sample, standard,	+/- 40% from the	Check Instrument	Lab personnel	Quantitation	+/- 40% from the
Internal	blank	initial/continuing	Analyses / Qualify	•		initial/continuing calibration
Standards		calibration	data			
Surrogates	Each sample, standard,		Reinject,	Lab personnel	Extraction efficiency,	Limits 80%-120%
	blank	Limits 80%-120%	Qualify data		Accuracy	
				· · ·	• .	
Equipment rinsate blank	1 per decon event	-	Verify results;	Laboratory Analyst/	Contamination	RPD 20%
		. <u><</u> QL :	reanalyze	Sampling Lead	Accuracy/Bias	
		· · · · · · · · · · · · · · · · · · ·			· · ·	· · · · · · · · · · · · · · · · · · ·
Field Duplicate	1 per 20 samples	1 · · ·	Data assessor to	Sampling Lead	Homogeneity/Precisi	
	collected	none	inform PM if RPD		on	RPD <u><</u> 20%
1		IIVIIC	is in exceedeance of			
•			20%		· · ·	

QAPP Worksheet #29 Project Documents and Records Table

	Sample Collection Documents and Records	Analysis Documents and Records	Data Assessment Documents and Records	Other
•	 Site and field logbooks Boring logs Well construction diagrams COC forms Well Data Sheets 	 Sample receipt logs Internal and external COC forms Equipment calibration logs Sample preparation 	 Data validation reports Field inspection checklist(s) Laboratory Audit checklist (if performed) Review forms for 	
	 Field Data Sheets Well log information sheet from Hydro Site map Signed QAPP HASP 	worksheets/logs Sample labels Sample analysis worksheets/run logs Telephone/email logs Corrective action 	electronic entry of data into database • Corrective action documentation	
	• Project Data Evaluation Report	documentation		

QAPP Worksheet #29b Project Documents and Records Table (DESA Laboratory)

Sample Collection Documents and	On-site Analysis Documents and	Off-site Analysis Documents and	Data Assessment Documents and	Other
Records	Records	Kecords	Records	
Field Chains-of-Custody	Internal Chains-of-Custody		Sample acceptance checklist	Customer Service Survey Cards
Packing Slips and Sample Tags	Sample Preparation Log		PT Sample Results	Telephone Logs
Request Forms and Associated Correspondence	Standard Traceability Record		Training Records	Procurement Request Forms
	Instrument Analysis Log			
Sample Acceptance Checklist	QC summary checklist with all relevant information		MDL Study Records	Equipment Maintenance Logs
LIMS Sample Receipts	Sample Analysis Data		Initial DOC / CDOC Records	Validated Computer Software Records
Automated OSCAR Logs	Instrument Calibration Data		Internal Audit Reports	
Laboratory sample identification	Instrument/ Computer Printouts		Corrective Action Reports	
nuniters	Definition of Qualifiers		External Laboratory Assessment	
	Cover Letter		NELAC Accreditation	
	Approval Form			
	Case Narrative			
	Final Report			

Matrix	Analytica] Group	Concentration Level	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Tolophone Number)
·	Trace Concentration VOCs	Trace	DW-1	14	Region 2 DESA Laboratory	NA
					Building 209	
Aqueous				ан — — — — — — — — — — — — — — — — — — —	2890 Woodebridge Avenue	
					Edison, NJ 08837	
		•		•	Attn : John Birri	
<u>i i</u>			<u></u>		(732)906-6886	

QAPP Worksheet #30 Analytical Services Table

QAPP Worksheet #31 Planned Project Assessments Table

- There are no planned assessments for this project.

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QAPP Worksheet #34 Verification (Step I) Process Table

Verification Input	Description	Internal/.	Responsible for Verification
Site/field logbooks	Field notes will be prepared daily by the EPA Sample Leader and will be complete, appropriate, legible and pertinent. Upon completion of field work, logbooks will be placed in the project files.	I	EPA SST Sample.Leader
Chains of custody	COC forms will be reviewed against the samples packed in the specific cooler prior to delivery. The reviewer will initial the form. An original COC will be sent with the samples to the laboratory, while copies are retained for (1) the Sampling Trip Report and (2) the project files.	I	EPA SST Sample Leader
Sampling Trip Reports	STRs will be prepared for each week of field sampling for which samples are sent to an EPA laboratory. Information in the STR will be reviewed against the COC forms, and potential discrepancies will be discussed with field personnel to verify locations, dates, etc.	I	EPA SST Sample Leader
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal in accordance with SOP G-26 Guidance for Laboratory Data Review	I	EPA Region 2 DESA Laboratory
Laboratory analytical data package	Data packages will be reviewed as to content and sample information upon receipt by EPA.	I	EPA SST Sample Leader
Final Sample Report	The project data results will be compiled in a sample report for the project. Entries will be reviewed/verified against hardcopy information.	I	EPA SST Sample Leader

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QAPP Worksheet #35 Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were	EPA SST Project Leader
		followed, and that any deviations were noted/approved.	
lilb	SOPs	Determine potential impacts from noted/approved deviations, in regard to	EPA SST Project Leader
		POOs.	
IIa	Chains of custody.	Examine COC forms against laboratory requirements (e.g., analytical	EPA Region 2 DESA Lab
114		methods, sample identification, etc.).	
	Laboratory data	Examine packages against QAPP and laboratory contract requirements;	EPA Region 2 DESA Lab
	package	and against COC forms (e.g., holding times, sample handling, analytical	
	Press B	methods, sample identification, data qualifiers, QC samples, etc.).	
Ilh	Laboratory data	Determine potential impacts from noted/approved deviations, in regard to	EPA Region 2 DESA Lab,
	nackage	POOs. Examples include PQLs and QC sample limits	EPA SST Project Leader
	Provinge	(precision/accuracy).	
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	EPA SST Project Leader

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QAPP Worksheet #36 Validation (Steps IIa and IIb) Summary Table

. ·						
i	Step Па/Пb	Matrix	Analytical Group	Concentration	Validation	Data Validator
			, and then group	Level	Criteria	(title and organizational
ſ	IIa / IIb	Aqueous	VOC	<u> </u>		affiliation)
	×		1003	Trace	EPA G-26: Guidance for	EPA DESA Laboratory
	· · · · · · · · · · · · · · · · · · ·				Laboratory Data Review	

QAPP Worksheet #37 Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:

-<u>Precision</u>: Results of laboratory duplicates will be assessed during data validation and data will be qualified according to the data validation procedures cited in worksheet# 36. Field duplicates will be assessed during by matrix using the RPD for each pair of results above the QL for the performed analyses. RPD acceptance criteria, presented in worksheet #12, will be used to access field sampling precision. Absolute difference will be used for low results as described in worksheet # #28. A discussion summarizing the results of laboratory and field precision and any limitations on the use of the data will be described.

-<u>Accuracy/Bias Contamination</u>: Results for all laboratory blanks will be assessed as part of the data validation. During the data validation process, the validating personnel will qualify the data following the procedures described on worksheet #36. A discussion summarizing the results of the laboratory accuracy and bias based on contamination will be presented and any limitations on the use of the data will be described.

-Overall Accuracy/Bias: The results of instrument calibration and matrix spike recoveries will be reviewed and data will be qualified according to the data validation procedures cited on worksheet #36. A discussion summarizing the results of laboratory accuracy and any limitations on the use of the data will be described.

-Sensitivity: Data results will be compared to criteria provided in worksheet #15. A discussion summarizing any conclusions about the sensitivity of the analyses will be presented and any limitations on the use of the data will be described.

-<u>Representativeness</u>: Data representativeness will be assessed by collecting field replicate samples. The field replicates are by definition equally representative of a given point and space and time. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. Therefore, data representativeness will be satisfied by ensuring that:

The sampling program is followed according to:

U.S. EPA (Environmental Protection Agency). October 1989. Region II CERCLA Quality Assurance Manual. Final Copy, Revision 1. Division of Environmental Services and Assessment, Edison, NJ; and

U.S. EPA (Environmental Protection Agency). December 1995. Superfund Program Representative Sampling Guidance. OSWER Directive 9360.4-10. Interim Final. EPA/540/R-95/141. Office of Emergency and Remedial Response (OERR). Washington, D.C.

U.S. EPA Environmental Response Team. Standard Operating Procedure 2007 2.0 Groundwater Well Sampling from the Compendium of ERT Groundwater Sampling Procedures, January 1991

-<u>Comparability</u>: To ensure data comparability, sampling and analysis for all samples will be performed using standardized analytical methods and adherence to the quality control procedures outlined in the methods and this QAPP. Therefore, the data will be comparable.

-<u>Reconciliation</u>: The PQOs presented in worksheet #11 will be examined against the data quality to determine if the objectives were met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of major impacts observed from data validation, data quality indicators, and measurement performance criteria assessments. Based on the results of these assessments, the usability of the data from all analyses for an objective, it will be determined if the PQOs were met and whether project goals are being achieved. Conclusions will be drawn and any limitations on the usability of the data will be described.

-<u>Completeness</u>: 1. To calculate field precision: $RPD = 100 \times \left(\frac{|X_1 - X_2|}{(X_1 + X_2)/2}\right)$ where X1 and X2 are the reported concentrations for each duplicate or replicate.

2. Calculate completeness: Data completeness will be expressed as the percentage of valid data obtained from measurement system. In other words, every well or location that was initially intended to be sampled, was sampled. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria specified by the analytical method used. Therefore, all data points critical to the sampling program in terms of completeness will be 100% validated by USEPA Region II DESA/LB according to the appropriate and current US EPA Region 2 Data Validation SOPs G-26. With 100% validation, the rationale for considering data points non-critical is not required.

Describe the evaluative procedures used to assess overall measurement error associated with the project:

EPA Region 2 DESA Laboratory will determine if quality control data is within specification through validation process IIb.

Identify the personnel responsible for performing the usability assessment:

U.S. EPA DESA Laboratory and HWSB-SST.

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

A Data Evaluation Report will describe the rationale for the data used and present any data limitations. The report will include a discussion of the accuracy, precision, representativeness, completeness and comparability of the data set and deviations from planned procedures and analysis. Tables will be prepared, including: a summary of samples collected and parameters analyzed; detections in field and trip blanks; and comparison of field duplicates.

The data will be generated through the collection of groundwater well samples at the Loohn's Dry Cleaners and Launders Property. This data will be used by the RPM to determine the presence of contamination in the local groundwater, the extent of contamination, evaluate potential health threats, and to determine the environmental impacts. If the groundwater contamination at the site does not pose an unacceptable risk then semi-annual

sampling of the five monitoring wells on site will continue until the contamination is below the MCLs. If the groundwater contamination at the site does pose an unacceptable risk, then reassessment of the remedial actions will need to be conducted. Unacceptable risk will be based on several factors, type of contaminates, level of contamination above the MCLs, usages of the groundwater, exposure to the environment, and health risk. This sampling event will provide two of the factors needed to determent unacceptable risk. The two factors provide are the type of contaminates and the level of contamination above the MCLs. Sample results data will be compared to both Federal and State's MCLs.






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Appendix C

U.S. Code of Federal Regulations (CFR) Title 40: Protection of Environment Part 141: National Primary Drinking Water Regulations Subpart G: National Revised Primary Drinking Water Regulations Maximum Contaminant Levels Section 61: Maximum Contaminant Levels for Organic Contaminants 7-1-97 Edition. Section

[Code of Federal Regulations] [Title 40, Volume 19] [Revised as of July 1, 2002] From the U.S. Government Printing Office via GPO Access [CITE: 40CFR141.61]

[Page 426-428]

TITLE 40--PROTECTION OF ENVIRONMENT

CHAPTER I -- ENVIRONMENTAL PROTECTION AGENCY (CONTINUED)

PART 141--NATIONAL PRIMARY DRINKING WATER REGULATIONS--Table of Contents

Subpart G--National Revised Primary Drinking Water Regulations: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels

Sec. 141.61 Maximum contaminant levels for organic contaminants.

(a) The following maximum contaminant levels for organic contaminants apply to community and non-transient, non-community water systems.

CAS No.	Contaminant	MCL (mg/l)
CAS NO. (1) $75-01-4$	Contaminant Vinyl chloride Benzene Carbon tetrachloride. 1,2-Dichloroethane Trichloroethylene 1,1-Dichloroethylene. 1,1,1-Trichloroethylene. 1,2-Dichloroethylene. 1,2-Dichloroethylene. 1,2-Dichlorobenzene Ethylbenzene Styrene Tetrachloroethylene. Toluene Toluene Trans-1,2- Dichloroethylene. Xylenes (total) Dichloromethane 1,2,4-Trichloro- benzene.	MCL (mg/l) 0.002 0.005 0.005 0.005 0.005 0.075 0.007 0.2 0.07 0.2 0.07 0.1 0.6 0.1 0.005 1 0.1 10 0.005 .07
(21) 79-00-5	<pre>1,1,2-Trichloro- ethane.</pre>	.005

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(b) The Administrator, pursuant to section 1412 of the Act, hereby identifies as indicated in the Table below granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OX) as the best technology treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in paragraphs (a) and (c) of this section:

BAT for Organic Contaminants Listed in Sec. 141.61 (a) and (c)

CAS NO.	Contaminant	GAC	рта Рта	OX
15972-60-8 116-06-3	Alachlor Aldicarb	x x		

http://edocket.access.gpo.gov/cfr_2002/julqtr/40cfr141.61.htm

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1646-88-4	Aldicarb sulfone	x		
1646-87-3	Aldicarb sulfoxide	х		
1912-24-9	Atrazine	х		
71-43-2	Benzene	х	х	
50-32-8	Benzo[a]pyrene	x		
1563-66-2	Carbofuran	х		
56-23-5	Carbon tetrachloride	· X	х	
57-74-9	Chlordane	х		
75-99-0	Dalapon	х		
94_75-7	2.4-D	x		
102-23-1	Di (2-ethvlhexvl) adipate	х	х	
117-91-7	Di (2-ethylhexyl) phthalate	х		
06-10-8	Dibromochloropropane (DBCP)	х	х	
0C 50-1	o-Dichlorobenzene	x	x	
106 46-7	para-Dichlorobenzene	x	x	
107 06 2	1 2-Dichloroethane	x	x	
	1,1-Dichloroethylene	x	x	
/5-35-4	cis-1 2-Dichloroethylene	x	x	
156-59-2	trans-1 2-Dickloroethylene	x	x	
156-60-5	Dichloromethane		x	
75-09-2	1.2-Dichloropropage	· · · · · · · · · · · · · · · · · · ·	x	
78-8,7-5,	Dinoseh	· A X	21	••••
88-85-7	Dimoseb	v v		• • • • • • • • •
85-00-7		v v		• • • • • • • • •
145-73-3	Endrin	· v	• • • • • • • •	
72-20-8		v	· · · · · · · · · · · · · · · · · · ·	
100-41-4	Ethylene Dibromide (EDR)	A V	× ×	
106-93-4	Runyiene Dibromide (EDB)	A	A	· · · · · · · · · · · · · · · · · · ·
1071-83-6	Gylphosace		• • • • • • • • •	
76-44-8	Heptachior,	A V		
1024-57-3	Heptachior epoxide	A V	• • • • • • • • •	• • • • • • • • •
118-74-1	Hexachiorobenzene	A V	•••••	
77-47-3	Hexachiorocyclopentadiene	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	A .	
58-89-9			• • • • • • • • •	• • • • • • • • •
72-43-5	Metnoxychior	A V		
108-90-7	Monochlorobenzene	X	X	
23135-22-0	Oxamy1 (Vydate)	X. ·	• • • • • • • •	• • • • • • • • •
87-86-5	Pentachlorophenol	· · ·	• • • • • • • •	••••
1918-02-1	Picloram	x	• • • • • • • •	
1336-36-3	Polychlorinated biphenyls (PCB)	x	•••••	••••
122-34-9	Simazine	X	••••	• • • • • • • •
100-42-5	Styrene	x	X	• • • • • • • •
1746-01-6	2,3,7,8-TCDD (Dioxin)	x	••••	• • • • • • • •
127-18-4	Tetrachloroethylene	X	X	• • • • • • • •
108-88-3	Toluene	X -	X	••••
8001-35-2	Toxaphene	X 	••••	• • • • • • • • •
93-72-1	2,4,5-TP (Silvex)	x	·····	• • • • • • • • •
120-82-1	1,2,4-Trichlorobenzene	X	X	
71-55-6	1,1,1-Trichloroethane	X ′	x	• • • • • • • • •
79-00-5	1,1,2-Trichloroethane	X	X	••••
79-01-6	Trichloroethylene	х	x	• • • • • • • •
75-01-4	Vinyl chloride	· · · · · · · · · · · ·	X	• • • • • • • • •
1330-20-7	Xylene	X	Х	• • • • • • • • •

(c) The following maximum contaminant levels for synthetic organic contaminants apply to community water systems and non-transient, non-community water systems:

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	CAS No.	Contaminant	MCL (mg/l)
(1) (2) (3) (4) (5)	15972-60-8 116-06-3 1646-87-3 1646-87-4 1912-24-9	Alachlor Aldicarb Aldicarb sulfoxide Aldicarb sulfone Atrazine	0.002 0.003 0.004 0.002 0.003

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(6)	1563-66-2	Carbofuran	0.04
(7)	57-74-9	Chlordane	0.002
(8)	96-12-8	Dibromochloropropane.	0.0002
(9)	94-75-7	2,4-D	0.07
(10)	106-93-4	Ethylene dibromide	0.00005
(11)	76-44-8	Heptachlor	0.0004
(12)	1024-57-3	Heptachlor epoxide	0.0002
(13)	58-89-9	Lindane	0,0002
(14)	72-43-5	Methoxychlor	0.04
(15)	1336-36-3	Polychlorinated	0.0005
	-	biphenyls.	
(16)	87-86-5	Pentachlorophenol	0.001
(17)	8001-35-2	Toxaphene	0.003
(18)	93-72-1	2,4,5-TP	0.05
(19)	50-32-8	Benzo[a]pyrene	0.0002
(20)	75-99-0	Dalapon	0.2
(21)	103-23-1	Di(2-ethylhexyl)	0.4
		adipate.	
(22)	117-81-7	Di(2-ethylhexyl)	0.006
·	· · · · · ·	phthalate.	
(23)	88-85-7	Dinoseb	0.007
(24)	85-00-7	Diquat	0.02
(25)	145-73-3	Endothall	0.1
(26)	72-20-8	Endrin	0.002
(27)	1071-53-6	Glyphosate	0.7
(28)	118-74-1	Hexacholorbenzene	0,001
(29)	77-47-4	Hexachlorocyclopentad	0.05
		iene.	
(30)	23135-22-0	Oxamyl (Vydate)	0.2
(31)	1918-02-1	Picloram	0.5
(32)	122-34-9	Simazine	0,004
(33)	1746-01-6	2,3,7,8-TCDD (Dioxin)	3x10 ⁻⁸
	 		

[56 FR 3593, Jan. 30, 1991, as amended at 56 FR 30280, July 1, 1991; 57 FR 31846, July 17, 1992; 59 FR 34324, July 1, 1994]

http://edocket.access.gpo.gov/cfr_2002/julqtr/40cfr141.61.htm

Appendix D U.S. EPA (Environmental Protection Agency) Region 2 Ground Water Sampling Procedure Low Stress (Low Flow) Purging and Sampling GW Sampling SOP March 1998,

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION II

GROUND WATER SAMPLING PROCEDURE LOW STRESS (Low Flow) PURGING AND SAMPLING

I. SCOPE & APPLICATION

This Low Stress (or Low-Flow) Purging and Sampling Procedure is the EPA Region II standard method for collecting low stress (low flow) ground water samples from monitoring wells. Low stress Purging and Sampling results in collection of ground water samples from monitoring wells that are representative of ground water conditions in the . This is accomplished by minimizing stress on geological formation. the geological formation and minimizing disturbance of sediment that has collected in the well. The procedure applies to monitoring wells that have an inner casing with a diameter of 2.0 inches or greater, and maximum screened intervals of ten feet unless multiple intervals are sampled. The procedure is appropriate for collection of ground water samples that will be analyzed for volatile and semi-volatile organic compounds (VOCs and SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and microbiological and other contaminants in association with all EPA programs.

This procedure does not address the collection of light or dense nonaqueous phase liquids (LNAPL or DNAPL) samples, and should be used for aqueous samples only. For sampling NAPLs, the reader is referred to the following EPA publications: DNAPL Site Evaluation (Cohen & Mercer, 1993) and the <u>RCRA Ground-Water Monitoring: Draft Technical Guidance</u> (EPA/530-R-93-001), and references therein.

II. METHOD SUMMARY

The purpose of the low stress purging and sampling procedure is to collect ground water samples from monitoring wells that are representative of ground water conditions in the geological formation. This is accomplished by setting the intake velocity of the sampling pump to a flow rate that limits drawdown inside the well casing. Sampling at the prescribed (low) flow rate has three primary benefits. First, it minimizes disturbance of sediment in the bottom of the well; thereby producing a sample with low turbidity (i.e., low concentration of suspended particles). Typically, this saves time and analytical costs by eliminating the need for collecting and analyzing an additional filtered sample from the same well. Second, this procedure minimizes aeration of the ground water during sample collection, which improves the sample quality for VOC analysis. Third, in most cases the procedure significantly reduces the volume of ground water purged from a well and the costs associated with its proper treatment and disposal.

III. ADDRESSING POTENTIAL PROBLEMS

Problems that may be encountered using this technique include a) difficulty in sampling wells with insufficient yield; b) failure of one or more key indicator parameters to stabilize; c) cascading of water and/or formation of air bubbles in the tubing; and d) cross-contamination between wells.

Insufficient Yield

Wells with insufficient yield (i.e., low recharge rate of the well) may dewater during purging. Care should be taken to avoid loss of pressure in the tubing line due to dewatering of the well below the level of the pump's intake. Purging should be interrupted before the water level in the well drops below the top of the pump, as this may induce cascading of the sand pack. Pumping the well dry should therefore be avoided to the extent possible in all cases. Sampling should commence as soon as the volume in the well has recovered sufficiently to allow collection of samples. Alternatively, ground water samples may be obtained with techniques designed for the unsaturated zone, such as lysimeters.

Failure to Stabilize Key Indicator Parameters

If one or more key indicator parameters fails to stabilize after 4 hours, one of three options should be considered: a) continue purging in an attempt to achieve stabilization; b) discontinue purging, do not collect samples, and document attempts to reach stabilization in the

log book; c) discontinue purging, collect samples, and document attempts to reach stabilization in the log book; or d) Secure the ~~ well, purge and collect samples the next day (preferred). The key indicator parameter for samples to be analyzed for VOCs is dissolved. oxygen. The key indicator parameter for all other samples is turbidity.

Cascading

To prevent cascading and/or air bubble formation in the tubing, care should be taken to ensure that the flow rate is sufficient to maintain pump suction. Minimize the length and diameter of tubing (i.e., 1/4 or 3/8 inch ID) to ensure that the tubing remains filled with ground water during sampling.

Cross-Contamination

To prevent cross-contamination between wells, it is strongly recommended that dedicated, in-place pumps be used. As an alternative, the potential for cross-contamination can be reduced by performing the more thorough "daily" decontamination procedures between sampling of each well in addition to the start of each sampling day (see Section VII, below).

Equipment Failure

Adequate equipment should be on-hand so that equipment failures do not adversely impact sampling activities.

IV. PLANNING DOCUMENTATION AND EQUIPMENT

Approved site-specific Field Sampling Plan/Quality Assurance Project Plan (QAPP). This plan must specify the type of pump and other equipment to be used. The QAPP must also specify the depth to which the pump intake should be lowered in each well. Generally, the target depth will correspond to the mid-point of the most permeable zone in the screened interval. Borehole geologic and geophysical logs can be used to help select the most permeable zone. However, in some cases, other criteria may be used to select the target depth for the pump intake. In all cases, the target depth must be approved by the EPA hydrogeologist or EPA project scientist.

- Well construction data, location map, field data from last sampling event.
- Polyethylene sheeting.
- Flame Ionization Detector (FID) and Photo Ionization Detector (PID).
- Adjustable rate, positive displacement ground water sampling pump (e.g., centrifugal or bladder pumps constructed of stainless steel or Teflon). A peristaltic pump may only be used for inorganic sample collection.
- Interface probe or equivalent device for determining the presence or absence of NAPL.
- Teflon or Teflon-lined polyethylene tubing to collect samples for organic analysis. Teflon or Teflon-lined polyethylene, PVC, Tygon or polyethylene tubing to collect samples for inorganic analysis. Sufficient tubing of the appropriate material must be available so that each well has dedicated tubing.
- Water level measuring device, minimum 0.01 foot accuracy, (electronic preferred for tracking water level drawdown during all pumping operations).
- Flow measurement supplies (e.g., graduated cylinder and stop . watch or in-line flow meter).
- Power source (generator, nitrogen tank, etc.).
- Monitoring instruments for indicator parameters. Eh and dissolved oxygen must be monitored in-line using an instrument with a continuous readout display. Specific conductance, pH, and temperature may be monitored either in-line or using separate probes. A nephalometer is used to measure turbidity.
- Decontamination supplies (see Section VII, below).
- Logbook (see Section VIII, below).

- Sample bottles.
- Sample preservation supplies (as required by the analytical methods).
- Sample tags or labels, chain of custody.
- V. SAMPLING PROCEDURES

Pre-Sampling Activities

- Start at the well known or believed to have the least contaminated ground water and proceed systematically to the well with the most contaminated ground water. Check the well, the lock, and the locking cap for damage or evidence of tampering. Record observations.
- 2. Lay out sheet of polyethylene for placement of monitoring and sampling equipment.
- 3. Measure VOCs at the rim of the unopened well with a PID and FID instrument and record the reading in the field log book.
- 4. Remove well cap.
- 5. Measure VOCs at the rim of the opened well with a PID and an FID instrument and record the reading in the field log book.
- 6. If the well casing does not have a reference point (usually a Vcut or indelible mark in the well casing), make one. Note that the reference point should be surveyed for correction of ground water elevations to the mean geodesic datum (MSL):
- 7. Measure and record the depth to water (to 0.01 ft) in all wells to be sampled prior to purging. Care should be taken to minimize disturbance in the water column and dislodging of any particulate matter attached to the sides or settled at the bottom of the well.
- 8. If desired, measure and record the depth of any NAPLs using an interface probe. Care should be taken to minimize disturbance of

GW Sampling SOP FINAL March 16, 1998

any sediment that has accumulated at the bottom of the well. Record the observations in the log book. If LNAPLs and/or DNAPLs are detected, install the pump at this time, as described in step 9, below. Allow the well to sit for several days between the measurement or sampling of any DNAPLs and the low-stress purging and sampling of the ground water.

Sampling Procedures

- 9. Install Pump: Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well in the EPA-approved QAPP or a depth otherwise approved by the EPA hydrogeologist or EPA project scientist. The pump intake must be kept at least two (2) feet above the bottom of the well to prevent disturbance and resuspension of any sediment or NAPL present in the bottom of the well: Record the depth to which the pump is lowered.
- 10. Measure Water Level: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.
- 11. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.
- 12. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):

±0.1 for pH
±3% for specific conductations (concurring)
±10 mv for redux potential
±10% for DO and turbidity

Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

13. Collect Samples: Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.

Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and equal volume of water (e.g., 40 ml). Ground water purged from the well prior to sampling can be used for this purpose.

- 14. Remove Pump and Tubing: After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.
- 15. Measure and record well depth.
- 16. Close and lock the well.
- VI. FIELD QUALITY CONTROL SAMPLES

Quality control samples must be collected to determine if sample collection and handling procedures have adversely affected the quality of the ground water samples. The appropriate EPA Program Guidance should be consulted in preparing the field QC sample requirements of the site-spectfic QAPP

All field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples should be collected during the sampling event:

- Field duplicates
- Trip blanks for VOCs only
- Equipment blank (not necessary if equipment is dedicated to the well)

As noted above, ground water samples should be collected systematically from wells with the lowest level of contamination through to wells with highest level of contamination. The equipment blank should be collected after sampling from the most contaminated well.

VII. DECONTAMINATION

Non-disposable sampling equipment, including the pump and support cable and electrical wires which contact the sample, must be decontaminated thoroughly each day before use ("daily decon") and after each well is sampled ("between-well decon"). Dedicated, in-place pumps and tubing must be thoroughly decontaminated using "daily decon" procedures (see #17, below) prior to their initial use. For centrifugal pumps, it is strongly recommended that non-disposable sampling equipment, including the pump and support cable and electrical wires in contact with the sample, be decontaminated thoroughly each day before use ("daily decon").

EPA's field experience indicates that the life of centrifugal pumps may be extended by removing entrained grit. This also permits inspection and replacement of the cooling water in centrifugal pumps. All non-dedicated sampling equipment (pumps, tubing, etc.) must be decontaminated after each well is sampled ("between-well decon," see #18 below).

17. Dail<u>y Decon</u>

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A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Disassemble pump.

E) Wash pump parts: Place the disassembled parts of the pump into a deep basin containing 8 to 10 gallons of non-phosphate detergent solution. Scrub all pump parts with a test tube brush.

F) Rinse pump parts with potable water.

G) Rinse the following pump parts with distilled/ deionized water: inlet screen, the shaft, the suction interconnector, the motor lead assembly, and the stator housing.

H) Place impeller assembly in a large glass beaker and rinse with 1% nitric acid (HNO₃).

I) Rinse impeller assembly with potable water.

J) Place impeller assembly in a large glass bleaker and rinse with isopropanol.

K) Rinse impeller assembly with distilled/deionized water.

18. Between-Well Decon

A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Final Rinse: Operate pump in a deep basin of distilled/deionized water to pump out 1 to 2 gallons of this final rinse water.

VIII. FIELD LOG BOOK

A field log book must be kept each time ground water monitoring activities are conducted in the field. The field log book should document the following:

- Well identification number and physical condition.
- Well depth, and measurement technique.
- Static water level depth, date, time, and measurement technique. Presence and thickness of immiscible liquid layers and detection method.
- Collection method for immiscible liquid layers.
- Pumping rate, drawdown, indicator parameters values, and clock time, at three to five minute intervals; calculate or measure total volume pumped.
- Well sampling sequence and time of sample collection.
- Types of sample bottles used and sample identification numbers.
- Preservatives used.
- Parameters requested for analysis.
- Field observations of sampling event.
- Name of sample collector(s).
- Weather conditions.
- QA/QC data for field instruments.

IX. REFERENCES

Cohen, R.M. and J.W. Mercer, 1993, DNAPL Site Evaluation, C.K. Smoley Press, Boca Raton, Florida.

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Puls, R.W. and M.J. Barcelona, 1996, Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures, EPA/540/S-95/504.

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U.S. EPA, 1993, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001.

U.S. EPA Region II, 1989, CERCLA Quality Assurance Manual.

Appendix E U.S. EPA Region 2 Division of Environmental Science and Assessment Laboratory Branch Analysis of VOCs in Drinking Water By Purge and Trap GC/MS SOP C-89 March 2007,



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STANDARD OPERATING PROCEDURE

ANALYSIS OF VOLATILE ORGANIC COMPOUNDS IN AQUEOUS, SOIL/SEDIMENT, AND WASTE OIL/WASTE ORGANIC SOLVENTS SAMPLES BY PURGE AND TRAP GC/MS

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1. Scope and Application

The analytical SOP that follows is designed to analyze water, soil/sediment, waste oil, and non-aqueous phase liquid from hazardous waste sites for the organic compounds on the target analytes list in Table 1. This SOP is based on 40 CFR Method 624

This SOP can be used to quantitate most volatile organic compounds that have boiling points below 200°C and are insoluble or slightly soluble in water. The reporting limits are 5.0 ug/L and 500 ug/kg for water and soil, respectively. See Table 1 for a list of compounds, retention times, and their characteristic ions that have been evaluated on a purge-and-trap GC/MS system.

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2. Summary of SOP

2.1 Aqueous Samples

A 5mL aliquot of water or waste water containing internal and surrogate standards is purged with helium via purge-and trap apparatus and collected on a VOCARB3000/K trap.

2.2 Soil/Sediment Sample

A measured amount of soil/sediment is extracted with methanol. A portion of the methanol extract is diluted to 5mL with reagent water containing internal and surrogate standards are purge with helium via purge and trap apparatus and collected on a VOCARB3000/K trap.

2.3 Waste Oils and Waste Organic Solvents Samples (NAPLs)

A measured amount of waste oil or non-aqueous phase liquids is extracted with methanol. A portion of the methanol extract is diluted to 5mL with reagent water containing internal and surrogate standards, is purged with helium via purge and trap apparatus and collected on a tenax/silica gel column.

2.4 Analysis

The trap is heated. Then the volatile organic are desorb into a helium carrier gas and collected on a gas chromatographic column. The GC column is temperature programmed to separate the analytes, which are then detected with a mass selective detector (MSD). Qualitative identification of target analytes is accomplished by using the retention time and relative abundance of characteristic masses (m/z). Quantitation is performed by the data system.

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4. Interferences

4.1 Method Interferences

Spurious chromatographic peaks from glassware, reagents or equipment may be present in the chromatogram of the sample extract. Impurities in the purge gas, organic compounds outgassing from the plumbing ahead of the trap, and solvent vapors in the laboratory account for a majority of contamination problems.

4.2 Matrix Interferences

Compounds present in the sample with similar retention times and common ions may interfere with the compounds of interest. To eliminate interferences from equipment or reagents, a laboratory method blank is analyzed every 12 hours samples are to be analyzed. The blank should be analyzed before the samples but after the calibration curve/check standard and AQCs.

4.3 Cross Contamination

Cross contamination can occur whenever high-concentration and lowconcentration samples are analyzed sequentially. To reduce carryover, the purging device and sampling syringe must be rinsed with reagent water between sample analysis. For samples containing large amounts of water-soluble materials, suspended solids, high-boiling compounds, or high purgeable levels, it may be necessary to wash out the purging device with a detergent solution between analysis, rinse it with distilled water, and then dry it in an oven at 105 °C. The trap and other parts of the system are also subjected to contamination; therefore, frequent bakeout and purging of the entire system may be required.

4.3.1 Field Blank - To eliminate the interference caused by the diffusion of volatile organic into the sample during shipment & storage, a field reagent blank/trip blank is prepared by field personnel from "organic free" water and carried through the sampling & handling activities, is also analyzed for contamination.

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Safety

The toxicity and carcinogenicity of each reagent used in this method have not been precisely defined; however, each chemical compound is treated as a potential health hazard. From this viewpoint, exposure to these chemicals is kept to an absolute minimum by use of standard procedures such as use of gloves & hoods for handling. Refer to the Edison Facility Chemical Hygiene Plan, for specific guidelines,

The following analytes covered by this method have been tentatively classified as known or suspected mammalian carcinogens: Benzene, Carbon Tetrachloride, Chloroform, Vinyl Chloride, and Methylene Chloride.

Materials Safety Data Sheets (MSDS) are available to all laboratory staff and a current inventory of MSDS's is stored in the safety supply cabinets in Bay C.

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Apparatus & Materials

6.

6.1 Gas Chromatography

Hewlett Packard MSD Model 5973 with Vectra data system and Chemstation software or equivalent. The gas chromatography (GC) system unit must be capable of temperature programming and have a flow controller that maintains a constant column flow rate throughout desorption and temperature program operations. The system must include or be interfaced to a purge and trap system, and have all required accessories including syringes, analytical columns, and gases. All GC carrier gas lined must be constructed from stainless steel or copper tubing. Non-PTFE thread sealants, or flow controllers with rubber components are not to be used.

6.2 GC column

The GC column is a fused silica megabore column with the following characteristics. The specific column and manufacturer are for illustration only:equivalent columns are available form other suppliers.

Manufacturer	:	J&W Scientific, P/N 12	2-1364
Length :		60 meters	
Inside diameter	:	0.25 millimeter	

6.3 Mass Spectrometer

Capable of scanning from 35 to 260 amu every 1 sec or less, using 70 volts (nominal) electron energy in the electron impact ionization mode. The mass spectrometer must be capable of producing a mass spectrum for Para-Bromofluorobenzene (PBFB) which meets the criteria in Table 2 when 2μ L of the GC/MS tuning standard is injected or purged through the GC (50 η g of PBFB).

Data System.

6.4

The Data System is interfaced to the gas chromatograph and the mass spectrometer. The system allows the continuous acquisition and storage of data coming from these two entities during an analytical run. The Data System uses computer software that plots ion abundances of specific masses versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). The software also integrates the abundances in any EICP between specified retention time windows. All these data and informations of a given

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analytical run is grouped into a "datafile".

6.5 Tekmar

Tekmar purge and trap concentrator, model 3100 or equivalent with an autosampler unit, model Solatek 72 or equivalent. The outlet from this concentrator is connected to the GC injection port.

The trap used is the K-trap(vocarb3000)which is purchased from Tekmar company or equivalent supplier. The trap is replaced when bromoform and gases determinations become erratic.

6.6 Miscellaneous

The following Apparatus and materials used commonly in these three different types of Samples are as follows:

- Syringes-10 μ L to 1000 μ L capacity with fixed needle, Hamilton or equivalent. Syringes mL 5mL Hamilton or equivalent, equipped with a Luer lock value, Becton-Dickinson or equivalent.
- Laboratory convection oven capable of holding temperature of 105°C and having internal dimensions of about 2 feet by 2 feet.
- Vials crimp top, Teflon sealed, 1mL, 5mL, 10mL, 15mL, manufactured by Wheaton Inc., or equivalent supplier.
- Aluminum crimp tops and Teflon/Silicone septa for 1mL, 5mL, and 15mL vials, manufactured by Pierce Inc., or equivalent supplier.
- Pasteur Pipets: Disposable
- Volumetric flasks
- pH Paper
 - balances- analytical, capable of weighing 0.0001g, and a top-loading balance capable of weighing 0.01g - 100 g. The balances must be calibrated with class s weights or known reference weights at a minimum of once per month. The balance must also be annually checked by a certified technician.

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40 ml teflon screw-top vials.

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7. Reagents and Solutions Preparation

7.1 Reagents

Reagents are either supplied by GSA approved vendor or equivalent and/or generated at the laboratory facilities.

7.1.1 Reagent Grade Water - Organic free water demonstrated to be free of target analytes. A water purification system (Millipore Super-Q or equivalent) may be used to generate reagent grade water. An inert gas such as nitrogen or helium is bubbled through the water for between 30 and 60 min. as an additional precaution to rid it of volatile contaminants.

7.1.2 Methanol - As a dilution solvent, purge and trap grade.

7.2 Solution Preparations

All solutions prepared by the analyst are permanently recorded in the Standard Preparation Logbook located in the GC/MS Laboratory.

- 7.2.1 Tuning Solution Mass calibration standard, PBFB(25 ng/ul) : prepared from purchased concentrate in methanol. Store in a crimp top vial. 2 μ L will be injected. The solution's expiration date is the same as the stock provided by the vendor.
- 7.2.2 Internal Standard/Surrogate Standard(IS/SS) Solution The concentration and name of the components of the IS/SS solution are given below:

1,2-Dichloroethane- $d_4(IS)$	30 ug/ml
Fluorobenzene(IS)	30 ug/ml
Chlorobenzene-d ₅ (IS)	30 ug/ml
1,4-Difluorobenzene(SS)	100 ug/ml
2-Bromo-1-chloropropane(SS)	100 ug/ml
1,4-dichlorobutane(SS)	100 ug/ml

Five µLs of this laboratory standard solution added to 5 mLs of

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water or sample extract provides a concentration of $30 \ \mu g/L$ of each internal standard and $100 \ \mu g/L$ of each surrogate standard.

7.2.3 Calibration and Check Standard Solutions.

A calibration range of 5.0 to 200 ug/L consisting of at least three points and daily check standard of 50 ng/L is usually run. However, the calibration range and the concentration of the check standard may change due to project specific objectives. Working standard solutions are made from puchased stock standards or prepared in methanol from pure materials. They are stored in teflon/silicone vials. These solutions may be used up to three months from date of preparation. Each vial is to be marked with the date of first use.

Note: All Purgeable standards are to be prepared using Purge and Trap grade methanol

Five μ L of the above listed standards added to 5 mLs of reagent grade water (see sec 7.1.1) provides a concentration 50 μ g/L of each analytes listed in the attached mixture list. For calibration aliquots and concentrations in 5 mLs of water see section 10.2 on calibration.

7.2.4 Analytical Quality Control (AQC)- The AQC should be prepared using a stock standard from a different vendor than the calibration standards. Working solutions are prepared in methanol from these stock solutions.

7.2.5 Matrix Spike Solution - The calibration stock solution in section 7.2.3 may be used to prepare the matrix spike solution.

All standard preparation procedures are entered into the GC/MSstandards preparation book located in the GC/MS laboratory.

Note: These solutions may be used up to three months from date of preparation, or sooner if comparison with quality control check standard indicates a problem. Stock standards are transfered to a teflon capped vial for storage and protect from light at -5 to 6° C. The IS/SS solution is stored at room temperature under pressure on the instrument.

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7.3 Standard Preparation Log Book

Standard preparation log book is for standard, matrix Spike, and analytical quality control only. The following information must be entered on the log book:

- date,
- standard name and lot number,
- concentration,
- Chemist's initials,
- Expiration date

If a stock concentrate is used for the first time to prepare a working standard, the vendor's "Certificate of Analysis" marked with the date of first use(opened) must be compiled into a folder in the GC/MS Laboratory. If the concentrate is reused the working standards prepared from it must have entries of date of first use of that concentrate in the logbook.

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8. Sample Collection, Preservation, Storage, & Holding Time.

8.1 Aqueous Samples

Samples are collected in the field and presented to the laboratory for analysis. The samples must be in 40mL Teflon-faced silicone rubber capped vials. They are stored at $4^{\circ}C\pm 2C$ until analyzed. If samples contain air bubble or head space a case narrative would have to indicate the condition. All samples must be analyzed within 7 days of collection, unless preserved with hydrochloric acid, then the sample must be analyzed within 14 days of collection.

8.2 Soil & Sediment

Samples are collected in the field and store at $4^{\circ}C\pm 2^{\circ}C$ until analyzed. Soil/sediment samples have 14 days for extraction and analysis.

Irregular solid samples such as wood, gauze wipes, or cement do not have holding times.

8.3 Waste Oil and Organic Waste Solvent (NAPLs)

These samples are collected in the field and stored at $4^{\circ}C \pm 2^{\circ}C$ until analyzed. NAPL have 14 days for extraction and analysis, unless the section chief determines the holding to be longer in case by case basis.

8.4 Drum samples do not have holding times and may be stored at room temperature.

Note: Criminal enforcement samples are locked up at all times in the criminal enforcement room.

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-9. Sample Preparation

9.1 Aqueous Samples

There is no preparation for aqueous samples. They are ready for analysis after collection.

9.2 Soil/Sediment Samples

The medium level method is based on extracting the soil/sediment with methanol. A waste sample is either extracted or diluted.

The sample consists of the entire contents of the sample container. Do not discard any of the supernatant liquids. Rapidly mix the contents of the sample container with a narrow metal spatula. Weigh 5.00g into a tare 20 mL crimp top vial using a top loading balance, with a tolerance of 0.10 grams. Add 9.0 mL of methanol and 1.0 mL of the surrogate spiking solution into the vial and immediately seal with a Teflon faced silicone/ rubber septum and aluminum crimp top seal. Shake the vial and contents for two minutes and allow the resultant slurry to settle.

Prepare a method blank by weighting 5.00g of clean sand into a 20 mL crimp top vial using a top loading balance, with a tolerance of 0.10g. Add 9.0 mL of methanol and 1.0 mL of the surrogate spiking solution into the vial and immediately seal with a Teflon faced silicone/rubber septum and aluminum crimp top seal. Shake the vial and contents for two minutes and allow the resultant slurry to settle.

Prepare MS for the medium level soil/sediment samples, by adding 8.0 mL of methanol, 1.0 mL of the matrix spike solution, and 1.0 mL of surrogate solution to each of the two aliquots of the sample chosen for spiking.

Determine the percent dry weight of the soil/sediment sample. This includes waste samples that are amenable to percent dry weight determination. Other wastes should be reported on a wet-weight basis. Immediately after weighing the sample for extraction, weigh 5-10 g of the sample by drying overnight at 105 °C. Allow to cool in a desiccator before re-weighing. Concentrations of individual analytes are reported relative to the dry weight of sample.

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$\frac{g \text{ of } dry \text{ sample}}{g \text{ of sample}} X 100 = \% \text{ solids}$

9.3 Waste Oils and Waste Solvents (NAPLs) Samples

With a clean Pasteur pipette transfer and weigh 0.5g to 1.0g base on the matrix of sample into a clean 20 mL crimp top vial, using a top loading balance with a tolerance of 0.1g. Add 9.0 mL of methanol and 1.0 mL of the surrogate spiking solution into vial and immediately seal with a Teflon faced silicone/rubber septum and aluminum crimp top. Shake the vial for two minutes and allow the resultant slurry to settle(dry paint, Glue.. etc).

Methanol Blank is prepared for NAPL sample by pipetting a 10 mL aliquot of purge grade methanol into the vial and immediately seal with a Teflon faced silicone/rubber septum and aluminum crimp top seal.

Prepare MS for the NAPL samples, by adding 8.0 mL of methanol, 1 mL of the matrix spike solution, and 1 mL of surrogate solution to each of the two aliquots of the sample chosen for spiking.

In some cases the final results of NAPL samples may be requested to be in "mg/L"instead of "mg/kg". Then we must convert the mg/kg values to

 $Density = \frac{Mass(g)}{Volume(mL)}$

mg/L by measuring the samples density by using the formula below: Pipet approximately 4 mL of the extract from either sec. 9.2 or 9.3 into a GC vial for storage, using a disposable pipet, and seal the vial. The remainder of the extract may be discarded. Add 4 mL of methanol to a separate GC vial for use as the method blank.

The extracts must be stored at $4^{\circ}C \pm 2^{\circ}C$ in the dark, prior to analysis.

If results are to be reported on a dry weight basis, determine the dry weight of a separate aliquot of the sample, using the procedure in sec. 9.2, after the sample extract has

been transferred to a GC vial and the vial sealed.

9.4 Extraction Log Book

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Extraction log book is for soil/sediment and NAPL Samples only. Entries must be made in the extraction log book for the samples and the quality control samples. The following information must be entered on the extraction log book:

sample date collection,

sample date extraction,

project/survey name,

project number,

• program type,

matrix type,

• EPA sample number/description,

• initial weight,

• final extract volume,

analyst initial, and

comments(if necessary).

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10. Instrument Operating Conditions

GC/MS operating conditions (temperatures, carrier gas flow rates, etc.) will depend on the instrument used for analysis. The conditions are set to allow for the detection of all desired analytes with "satisfactory" peak shapes and "resolution". Satisfactory means no excessive tailing, and good resolution means proper separation of adjacent analytes peaks.

10.1 Scan Parameters

The exact conditions of the GC/MS will depend on the condition of the MS source and GC column. Generally, the MS conditions are taken from the autotune results (or if necessary manual tune results) and will be shown by the PBFB mass calibration run. Scan parameters are as follows:

Mass range: 35 to 260 AMU Electron multiplier voltage: Variable* Number of A/D samples: 2 (variable)* GC peak threshold: 1000 counts (variable)* Threshold: 100 counts (variable)*

*Although these values are variable, they should not be changed without careful checking to see the effect on analytes detection and quantitation.

10.2 Tuning

The PBFB performance test requires the following instrumental parameters:

Electron energy:70 volts nominalMass Range:35 to 260 AMUScan time:to give at least 5 scan per peak but not to exceed 7 seconds per scan

The test is performed by acquiring data from an injection of 50 ng of PBFB in a suitable volume of solvent into the GC. After acquisition, a mass spectrum is obtained and compared with the following criteria in Table 2.

10.3 GC Conditions

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The GC conditions will be varied somewhat for different columns. The following are the recommended conditions:

Run time:	30.19 minutes
Scan start time:	3.80 minute
Injection port temperature:	200°C
Detector temperature:	280°C
Starting temperature:	40°C
Holding time at initial temperature:	4.0 minutes
Temperature program rate:	9°C/min
Final Temperature:	220°C
Holding time at final temperature:	2 minute

10.4 Purge and Trap Device

The recommended (CFR method 624)purge and trap sampling cycle is as follows:

Carrier Gas:	Helium	
Purge time:	11.0 minutes	
Purge gas flow rate:	40 mL/min	
Trap temperature:	30°C	
Trap preheat temperature:	245°C	
Desorb time:	2 minutes	
Desorb temperature:	250°C	
Trap bake out time:	10 minutes	
Trap bake out temperature:	260°C	

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10.5 Maintenance Log Book

Maintenance log book is for recording all service done On the instrument. Entries must be made in the maintenance log book for preventive maintenance, service calls, and regular maintenance (i.e., cleaning source or replacing column). The following information must be entered on the maintenance log book:

- date,
- service done or trouble observed,
- chemist or tech initials,
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11. Sample Analysis

11.1 Analytical Sequence

At the beginning of each 12 hour period during which GC/MS analyses are to be performed, the system is tested to ensure that acceptable performance criteria are achieved for PBFB (see sec 14 for criteria).

11.2 Method Blank

A volatile method blank must be analyzed at the beginning of every 12-hr time period. A method blank consist of 5mL volume of reagent water, spike with is/ss. An acceptable method blank must contain <5 ppb for common contaminant(methylene chloride, ketones, toluene) and <3.0ppb for non common (see section 14 for criteria).

- 11.3 Calibration of GC/MS equipment
 - 11.3.1 Initial Calibration The calibration solutions as prepared in section 7.2.3 contain the analytes routinely used to calibrate the instrument before analysis of samples (see section 14 for criteria). A calibration curve is usually run only when a daily check standard verifies the previous calibration curve fails.

Analysis and quantitation of the calibration standard runs provides area counts for the quantitation mass of each analytes. These area counts are used to calculate the relative response factors (RRF)

 $RRF = \frac{(A_s)(C_{is})}{(A_{is})(C_s)}$

according to the following equation: where,

- As = Area of the primary ion for the parameter to be measured
- Ais= Area of the primary ion for the internal standard
- Cis= Concentration of the internal standard
- Cs = Concentration of the parameter to be measured

11.3.2 The occurrence of an unacceptable instrument response(s) from the

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analysis of calibration standards, e.g., unacceptable correlation coefficient or RSD of response factor(s), etc., is an indication of an analytical problem(s) with the selected calibration range for the analysis and must be corrected before sample analyses are conducted. Sample analysis may not proceed until the resulting calibration curve is fully acceptable according to the established criteria identified in this SOP.

Elimination of calibration point(s) from the calibration curve is an acceptable practice under the following special conditions:

11.3.2.1 In multi-analyte tests in which calibration solutions are prepared from mixtures, analyte concentrations analyzed which are outside of the established calibration range for a given analyte, should not be included in the calibration for that analyte. This is an unavoidable situation because the stock solutions are mixtures.

11.3.2.2 A six point calibration curve with a concentration range of 5 to 200 ug/L is usually run. The calibration curve has to have a minimum of three points.

11.3.2.3 The lowest calibration point may be eliminated from the calibration curve. If this occurs, the Reporting Limit, which is based on the lowest calibration standard, must be raised accordingly and reflected in the final report.

- 11.3.2.4 The highest calibration point may be eliminated from the calibration curve if all sample concentrations and all associated quality control data (or their dilutions) are bracketed by the remaining calibration standards.
- 11.3.2.5

An outlier calibration point (other than a high point or a low point) may be eliminated only after an investigation has been performed and the reasons for the problem have been documented.

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- 11.3.3 All analytical runs for the initial calibration must be made within a continuous 12 hour period.
- 11.3.4 A Continuing Calibration Check Standard as prepared in 7.2.3(CCCS) is analyzed at the start of each 12 hour period(except when a curve is run) samples are to be analyzed to verify the concentration of a calibration curve. A calibration curve generated from a newly prepared set of working standards must be verified by a second source(Sec. 7.2.4). No verifications are necessary for any subsequent generation of calibration curves from the same set of working standards. After the different source check standard verifies the curve it may also serve as the CCCS for that same 12-hr. Period. If a different source check standard fails to verify then a 3rd source must be used. When a calibration curve is verified then one of its midpoints may be used to continously calibrate the curve and become the CCCS. The check standard or CCCS is quantitated and the analyte responses compared with the average RRF of the calibration curve. Refer to Sec 14.3 for acceptance criteria.
- 11.3.5 Internal standard (IS) Response & Retention Time (RT)- The IS responses and RT standards must be evaluated during or immediately after data acquisition (see section 14 for criteria).
- 11.4 Analytical Quality Control(AQC)

The AQC is analyzed in duplicate within 12 hour period samples are analyzed.

- 11.5 5 uL of IS/SS(7.2.3) must be added to all calibration standards, CCCS, and AQCs.
- 11.6 Analysis of Water Samples

All water samples must be allowed to warm to ambient temperature before analysis.

Place the 40ml samples vial in the vial tray of the Solatek 72 in an upright position with the caps on top and proceed with the analysis.

If the samples are analyzed after seven days, the pH of the sample must be determined. Once the sample aliquots have been taken from the VOA vial, test the pH by placing one or two drops of sample on the pH paper (do not add pH paper to the vial). Record the pH of the sample in the run

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log book.

b.

c.

In some cases, it is requested samples to be composited for analysis, in this case the following procedure is used:

a. A 50 ml volumetric flask and a 40 ml teflon screw-top vial are used. The portion of each individual grab sample (in mL) to be included in the composite should be calculated by dividing the 50 mL by the number of individual grab samples to be included in the composite.

Starting with the first grab sample vial, insert the needle of a 5 mL syringe through the vial's Teflon lined septum and draw the appropriate volume of sample (in mL) into the syringe. Transfer the sample from the syringe into the 50 mL volumetric flask.
Repeat this procedure until all individual grab samples have been aliquoted. Mix the contents of the volumetric flask and pour the content into the 40 mL vial and placed on the Solatek.

The Matrix Spike(MS) is prepared by filling a 50 mL volumetric flask with sample and then spiking with the appropriate MS solution. The content of the volumetric is then transferred to the 40 mL vial and placed on the Solatek.

d. The Solatek will add 5 uL of the IS/SS solution(sec. 7.2.2) into all aliquots transferred to the purge and trap concentrator.

11.7 Analysis of Medium Level Soil/Sediment

The medium level method is based on extracting the soil/sediment with methanol. A liquid organic waste is either extracted or diluted, depending on its solubility in methanol. An aliquot of the extract is added to reagent water spike with is/ss solution. This is purged at ambient temperature.

The GC/MS system is then set up as for a water sample analysis. Because the methanol extract and reagent water mixture is purged at ambient temperature, the instrument performance check, initial calibration, and continuing calibration for water sample is used.

Sample preparation see section 9.2

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Pipette 1.0 ml of sample extract into a 50 ml volumetric flask and fill to mark with reagent grade water. Mix and fill a teflon 40-ml screw-top vial with the content. Place on the Solatek and analyze as with a water sample but without addition surrogates by the Solatek.

Add an aliquot of MS extract to 50 mL of water for purging and analyze as described above(See sample preparation section).

A volatile method blank must be analyzed at the beginning of every 12-hr time period. See section 9.3 for method blank preparation. An acceptable method blank must contain <5 ppb of methylene chloride, ketones, and toluene (See section 14 for method blank criteria).

11.8 Analysis of NAPL Samples

See section 9.2 for NAPL preparation

See section 9.3.1 for methanol blank preparation.

An aliquot of the diluted NAPL sample will be added into a 50 mL volumetric flask and fill with reagent grade water. The judgement of the analyst will determined the dilution factor. If the NAPL sample is considered a solid (e.g dry paint) sample, then section 11.7 will be followed for analysis.

Proceed with the analysis as outlined in section 11.3.

11.9 Analysis of TCLP Sample

Due to high regulatory levels a initial dilution of 5X can be used for analysis. Further dilution may be required base in the judgement of the analyst. If the TCLP sample is considered a water or NAPL sample, then section 11.6 or 11.7 should be followed for analysis.

The initial analysis of extracted NAPL TCLP samples will be performed using a dilution factor determined by the analyst. If in the judgement of the analyst that analyzing a less-diluted sample would cause system contamination, the results of the diluted analysis will be reported. Regulatory levels for TCLP are summarized in Table 7.

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11.10 Run Log Book

Entries must be made in the run log book as the sample runs are made. These entries must include the following:

- date,
- survey name,
- laboratory sample number,
- computer file name,
- archived datafile path to server,
- operator's initials, and
- the method file name.

In the event of an erroneous entry, the entry line must be crossed out using a single line, initialed and dated by the analyst.

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12. **Oualitative Identification**

Analytes are detected in the GC/MS run by the computer software by using criteria based on the expected retention time window and the characteristic mass ions for the individual analytes. Manual searches for required analytes and for other compounds can be performed by other procedures contained in the software programs.

Target Compounds 12.1

Oualitatively identify a sample component by comparing its mass spectrum (after background subtraction) to a reference spectrum. Use the following criteria to confirm a qualitative identification:

The GC retention time of the sample component must be within 30 seconds of the time observed for the same compound found in the CCCS.

All ions that are present above 10% relative abundance in the mass spectrum of the standard should be present in the mass spectrum of the sample component that are located on Table 1 and should agree within absolute 20%. For example, if an ion has relative abundance of 30% in the standard spectrum, its abundance in the sample spectrum should be in the range of 10-50%. Some ions, particularly the molecular ion, are of special importance, and should evaluated even if the are below 10% relative abundance.

Identification is hampered when sample components are not resolved chromatographically and produce mass spectra containing ions contributed by more than one analytes. When GC peaks obviously represent more than one sample component (i.e., broadened peak with shoulders(s) or valley between two or more maxima), appropriate analytes spectra and background spectra can be selected by examining EICPs of characteristic ions for tentatively identified components. When analytes coelute (i.e., only one GC peak is apparent), the identification criteria described in above paragraph can be met but each analytes spectrum will contain extraneous ions contributed by the coeluting compound.

Structural isomers that produce very similar mass spectra can be explicitly identified only if they have sufficiently different GC retention times. Acceptable resolution is achieved if the height of the valley between two isomer peaks is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

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12.2 Non-Target Compounds (performed only upon request)

A library search must be executed for non-target sample components for the purpose of tentative identification. For this purpose, the most recent release of the NBS or Willey mass spectra library shall be used. Guidelines for making tentative identification are:

Up to 10 organic compounds of greatest concentration not listed in component list for the purge able organic compounds, excluding the system monitoring compound shall be tentative identified via a forward search of the NBS or Wiley Library. Substances with responses less than 10% of the internal standard are not required to be searched.

The relative intensities of major ions in the sample spectrum should agree within $\pm 20\%$ of the relative intensities of major ions in the reference spectrum. Molecular ions present in the reference must be present in the sample spectrum.

Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or coelution.

Only after visual comparison of sample spectra with the nearest library spectrum will the analyst assign a tentative identification.

If a compound can not be verified by the above criteria, then the analyst will report that identification as unknown and proceed with quantitation.

Computer generated library search routines should not use a normalization routines that would misrepresent the library or unknown spectra when compare to each other. Only after visual comparison of sample with the nearest library searches will the mass spectral interpretation specialist assign a tentative identification. Analyst should use professional judgement to ensure spectra provided by library truly identify the TIC.

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13. Quantitative Analysis

The analytes identified in the sample must be quantified by the internal standard method. The EICP area of the characteristic ion designated as quantitative ion must be used. The average response factor from the multi-point initial calibration is used to calculate the amount of the compound in the sample.

It is expected that situations will arise where the automated quantitation procedures in the GC/MS software provide inappropriate quantitation. This normally occurs when there is compound co-elution, baseline noise, or matrix interferences. In these circumstances, the chemist must perform a manual quantitation.

When an analyte is detected and identified, it is quantitated by the software program by first calculating the integrated ion abundance of the quantitation mass as given in the identification file.

13.1 Target Compounds

The quantitation report generated by the software is examined to confirm that analytes present have been detected (i.e., no visible peaks missed), that identification has been made correctly (i.e., spectra are compared with knowns), that integration has been performed correctly (e.g., the ion profile used for quantitation is satisfactory), and that baselines have been properly assigned.

Equation for aqueous samples. The concentration, in μ g/L, is then calculated for

 $Conc (\mu g/L) = \frac{(A_x)(C_{i_k})(DF)}{(A_{i_k})(RRF)}$

water sample using equation below,

Ax = Area of the Characteristic ion for the compound to be measured

Cis= Amount of internal standard injected in ng

DF = Dilution Factor

Ais= Area of the characteristic ion for the internal standard

RRF= The average RRF value obtained from the initial five point calibration

Equation For medium level soil samples, the concentration (as dry weight basis) is calculated as:

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$$Y = \frac{(W_{x})(ImL)(V_{x})(\%S)}{(V_{x})(1000\,\mu L)}$$

$$Z = \frac{(5mL)(dilution)}{(Y)}$$

$$Conc(\mu g/kg) = \frac{(A_x)(I_x)(Z)}{(A_{ix})(RRF)}$$

- Ws Weight of sample extracted in grams (g)
- Vx Volume of the extract inject in Microliters (uL)
- %S percent solid
- Vt Volume of the Methanol used in milliliters (10mL)

 $Y = \frac{(W_s)(1mL)(V_x)}{(V_i)(1000\,\mu L)}$

$$Z = \frac{(5mL)(dilution)}{(Y)}$$

 $Conc(\mu g/kg) = \frac{(A_*)(I_*)(Z)}{(A_{i*})(RRF)}$

• Equation for NAPL samples are calculated by using this equation below, 13.2 Non-Target Compounds (performed only upon request)

Tentative Identified Compounds(T.I.C.'s) are defined as those compounds not contained in the initial calibration standard solutions, which therefore must be identified by the computer software, using the main spectra library. The computer software also quantitates the T.I.C. against the internal standard having the closest retention time to the retention time of the T.I.C. of interest. Total area counts from the total ion chromatograms are to be used for both the compound to be measured and the internal standard. A relative response factor (RRF) of one (1) is to be assumed., using the equation shown in 13.1

Since T.I.C.'s are not calibrated all values are reported as estimated and flagged

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with the QA/QC remark code NJ. Only the 10 T.I.C.'s with the highest area counts are reported unless otherwise requested.

TICs are done for all Superfund projects.

13.3 Manual Integration

13.3.1 The compound identification and integration results generated by the EnviroQuant software may not always be accurate because of the reasons listed below:

- The automated integration routine may not find the target analyte as a result of retention time shift, coeluting interference, or peak inappropriate (too high or too low)intensity.
- The target analyte peak area may be incorrectly integrated by the automated integration routine as a result of poor peak shape, coelution with other peaks, or a significant baseline drift. Poor peak shapes can also be due to overloading of the GC column by the higher concentrations of calibration curve of certain analytes. The overloading can cause multiple peaks, shoulders, or humps which have the same spectra proving that they come from the same analyte. The lower concentrations of these analytes, however, do not exhibit the poor peak shape characteristics.
 - If one or peaks elute within the retention time window for a target analyte, the automated integrated routine may not pick the peak with a retention time that best matches the retention time established by the calibration.
- 13.3.2 It is the analyst's responsibility to validate the integration report generated by the computer software for every sample and calibration analysis. When errors are detected in the compound identification and peak integration, the analyst must conduct manual integration to correct the errors.
- 13.3.3 The manual integration must be reasonable, scientifically valid, and logically sound. The entire area of the subject peak and only the area of the subject should be integrated for that peak. Conducting peak-shaving to eliminate part of the subject peak or including peaks not belonging to the subject peak is prohibited. Manual integration performed solely to meet the calibration and surrogate QC criteria is unacceptable.

13.3.4 Manual integrations must be documented in the following manner.

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- A printout of summary quantitation report prior to manual integration, is submitted with the report.
 - A printout of detailed quantitation report showing manually integrated target analytes, surrogates and/or internal standards.

If manual integrations are done for reasons other than those listed in Sec. 13.3.1 then they must be initialed and dated by the analyst performing the integration on the quantitation report along with a brief narrative explaining why the manual integrations were required.

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14. Quality Control

14.1 Tuning (Sec 10.2)

Acceptance Criteria - Ion abundances must be within the EPA acceptance criteria published in the 40 CFR Method 624. Refer to Table 2 for the BFB key ions and ion abundance criteria.

Corrective Action - If the criteria are not met, the instrument is retuned and BFB is reanalyzed.

14.2 Initial Calibration (Sec 11.3)

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Acceptance Criteria - Table 3 lists the minimum RRF criteria that must be met and the maximum % RSD criteria for each individual VOA compound. In general, all RRF criteria must be greater than or equal to value listed in Table3 at each concentration level with a maximum %RSD \pm 35%. The number of analytes not meeting the criteria in Table 3 must be 10% or less of the total analytes, the maximum %RSD should be not more than 60%. For NPDES analyses the number of NPDES analytes not meeting the criteria in Table 3 must be zero. As stated in Sec. 11.3.2.2 the calibration curve is usually 6 points(5-200 ug/L) but has a minimum of 3 points.

Corrective Action - If more than 10% of the %RSD and RRF for the total analytes list fails(In the case of NPDES analyses if <u>any</u> NPDES analytes fails), or any analyte whose %RSD is >60, recalibration is required. If circumstances occur that prevent recalibration, (e.g. matrix interferences, holding time restrictions), consult with the Team Leader and/or Section Chief on appropriate action. Data may need to be flagged with the appropriate QA/QC remark codes listed in Table 5.

14.3 Continuing Calibration Check Standard (Sec 11.3)

Acceptance Criteria - All the compounds must be present in the quantitation report. The peak shape of the internal standard must be well defined and with a minimum degree of tailing. In general, all compounds must have a minimum RRF of what is listed in the Table 3. The maximum %D for each analytes RRF must be $\pm 30\%$ of the average initial calibration RRF. Table 3 lists both the minimum RRF & maximum %D. The number of analytes not meeting the criteria in Table 3 must be less than 10% of the total analytes. The maximum %D must be less than 60. For NPDES analyses, all NPDES analytes must meet the criteria in

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Table 3.

Corrective Action - If %D of any analytes is more than 60, or if 10% of the total analytes or any NPDES analytes fails, then the CCCS must be rerun. If it is still outside the acceptable range the curve for that analyte should be reanalyzed. If there is a case where the CCCS for a NPDES analyte(>30% but less than 60%) then the sample need not to be reanalyzed if that analyte was not identified in the affected samples. However if it is shown to be present then the CCCS and the affected samples must be reanalyzed for that analyte until the %D criteria is met. Also if a NPDES analyte fails the %D criteria biased low, the CCCS must be reanalyze for that analyte until the %D criteria is met. Check with the section chief/team leader to determine wether further action is necessary to insure data quality. If reporting any analyte that failed the %D criteria(as long as it's less than 10% of the total analytes and value is less than 60) any associated data including nondetect(except where % D is high) should be qualified . Use the appropriate QA/QC remark codes in Table 6 when necessary.

14.4 Alternate Source_Concentration Check(ASCC) - The AQC (Sec. 7.2.4) may serve as an ASCC because it's made from a different source at a concentration close to the midpoint of the curve. It is processed through the analytical procedure the same way as a CCCS. If a separate source is not available then a second lot from the 1st source is acceptable. When a calibration curve is verified then one of its midpoints may serve as the CCCS.

Acceptance Criteria and Corrective Action are same as 14.3.

14.5 Method Blank (and 11.2)

Acceptance Criteria - A method blank is run every 12 hours that samples are run. The method blank should be processed in exactly the same manner as the samples. It should be clean without any contaminants, but if present the concentration should be less than the reporting limit.

Corrective Action - Clean the instrument until analyses of method blanks show contaminants are under control. Common contaminants include methylene chloride, ketone, and toluene. Do not report as present any of the common contaminants if less than 10 times the amount reported in the blank. For all other analytes, do not report as present if less than five times the amount reported in the blank. If the amount is less than 10 or five times the amount found in the blank report the amount found in the sample as a U value. If the contaminants found in

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the method blank are not in the sample then report the analytes(contaminants) as nondetect with the reporting limit as their values.

14.6 Surrogate Standards (Sec 7.4)

Acceptance Criteria - Surrogate recoveries for each run are examined to confirm that they are within the acceptable range of 70-130%.(Ref. CERCLA CLP SOW for OLM04.3).

Corrective Action - If two surrogate standard recoveries are outside the QC limits in the blank or sample, corrective action is required. Begin by checking the GC/MS instrument for operation problems, correcting apparent instrument problems, and reinjecting the sample. The cause of problem must be determined and shall be corrected if feasible. If no correction is possible, the associated data, including the non-detect (except where the recovery is high the sample should not qualified) should be qualified. Use the appropriate QA/QC remark codes in Table 5, when necessary. If no instrument problems can be determined, consult with the Section Chief for course of action.

The associated data should be qualified as follows: If a surrogate does not meet the acceptance limits then all analytes quantitated on the same internal standard should be qualified. The exception to this rule is when dealing with data for a project of a non-regulatory program. The procedure then is to qualify the data according to similarities in chemistry. The analytes qualified will be those that have similar chemical properties as the affected surrogates. Use the appropriate OA/OC remark codes in Table 6, when necessary.

14.7 Internal Standards (Sec 7.4)

Acceptance Criteria - Internal standards (IS) areas examined to confirm reproducibility.

Corrective Action - If the area for any IS changes by more than a factor of two (-50% to +100%) the mass spectrometric system must be inspected for malfunction, and corrections made as appropriate and samples reanalyzed. If the results are the same, the sample should be qualified accordingly,

14.8 Matrix Spikes (Sec 11.3.3,11.4.5)

Acceptance Criteria - For every batch (a batch is defined as a group of samples which behaves similarly with respect to the sampling or the testing procedures

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being employed and which are processed as a unit. For QC purposes, if the number of samples in a group is greater than 20, then each group of 20 samples or less will all be handled as a separate batch) of 20 samples per site analyzed, one spiked field sample is analyzed. Calculate percent recovery for all group of compounds. For NPDES (National Pollution Discharge & Elimination System) samples, spike all analytes. Please refer to Table 6 of 40 CFR Method 624 for QC Acceptance Criteria. The spiking solution contains all target analytes and the spike level should be at the mid-level of the calibration curve or at the level of continuing calibration check.. For oil samples duplicates are done instead of a MS.

Corrective Action - Use the appropriate QA/QC remark codes for MS results which are outside the QA/QC acceptance limits.

The recovery of an analyte in the LFM/MS is not evaluated if the value of that analyte in the unfortified sample is greater than the level used to fortify the sample. No dilution for the analyte is necessary in the LFM/MS.

14.9 Analytical Quality Control Samples - (Sec 7.7)

Acceptance Criteria - For each batch of sample analyzed, an AQC is analyzed in duplicate. For soil/sediment samples sand spiked at or near the mid-point of the calibration curve are used as AQCs. Calculate percent recoveries and RPD. The average of the percent recoveries of the duplicates will be used. Percent recoveries are 70 to 130% and the RPD is 20.

Corrective Action -The AQC has the same corrective action as the Check Standard (see Sec. 14.3) except not all M624 analytes has to pass. However, the first AQC analyzed after the generation of a new curve must have all its NPDES analytes passing %D and RRF criteria since it is serving as an intial calibration check. If an analyte is present in the sample and that analyte fails to meet the acceptance criteria in the one or both of the AQC duplicates, the associated data, including the non-detect (except where the recovery is high) should be qualified. The sample data should be flagged with the appropriate QA/QC remark codes listed in Table 5.

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15. METHOD PERFORMANCE

An initial demonstration of capability (DOC) should be performed each time there is a significant change in the chemistry of the method, a major modification to an existing instrument, or a new instrument is installed. A DOC is performed by each analyst designated to analyze samples using this method. An annual check must subsequently be performed and documented for each analyst using this method.

15.1 Accuracy and Precision

15.1.1 Initial Demonstration of Capability

An initial demonstration of capability study was conducted for this method for each analyst using this method. The study consisted of the analysis of four standards which are from a source independent of the standard curve. The results of the standards must be within the acceptance criteria supplied by the manufacturer or within 30% if none are specified. The % RSD should be within 30%. The results of the accuracy and precision study (true value, % recovery, standard deviation and % RSD) are maintained by the Quality Assurance Officer for each analyst and are located in the Central Branch File.

15.1.2 Continuing Demonstration of Capability

An annual continuing demonstration of capability study must be performed and documented. It may consist of either successfully analyzing a PT sample or analyzing 2 sets of AQC standards to within control limits as stated in section 15.1.1. The results of the continuing accuracy and precision study (true value, % recovery, standard deviation and % RSD or final report from the PT provider) are maintained by the Quality Assurance Officer for each analyst and are located in the Central Branch File.

15.2 Method Detection Limit (MDL)

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An MDL Study was conducted for this method. The study is based on the requirements listed in 40 CFR Part 136 Appendix B. Specific procedures for the analysis of seven replicate samples of the method fortified at a level between 2-3x the detection limit or the lowest point of the calibration curve. The results of the MDL determination (true value, average concentration, standard deviation and calculated MDL) are maintained by the Quality Assurance Officer for each method and are located in the Central Branch File.

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15.3 Limit of Quantitation (LOQ)

The Laboratory performs a Limit of Quantitation (LOQ) study on an annual basis for analytes associated with chemistry methods. The validity of LOQ is confirmed by successful analysis of a Laboratory Fortified Blank (LFB) at approximately 2X the reporting limit. The recovery of each analyte is within the acceptance criteria established for the LFB. After this study is completed, it is reviewed and approved by the Laboratory Management. A summary of all LOQ study performance is maintained in the Laboratory's Central File.

.16. Reporting and Validation

16.1 Reporting Limits

The reporting limits are calculated based on the concentration of the lowest calibration standard analyzed. The reporting limits are matrix and dilution dependent. All reporting values should be rounded to 2 significant figures. The reporting limit is calculated by taking the lowest standard of the calibration curve using the appropriate equation from Section 13.1. Results for the sample that has the lowest dilution should be reported. All non-detects are reported as a reporting limit as described in Table 5.

16.2 Sample Data Package

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The sample data package should include but not limited to the following:

- a. GC/MS VOA QA/QC Checklist with all relevant information entered. See attached sample.
 - Copies of log book entries of analysis run log, sample extraction log and sample percent solids log, if necessary.
- c. Tune/BFB report GC/MS instrument performance check which include chromatographic run and BFB spectra.
- d. Method Blanks
- e. Initial calibration report
- f. Continuing calibration report
- g. AQC
- h. MS/MSD with each QC batch
 - Sample data raw data and quantitative reports for items d thru f, including dilution information, analytes found by the computer quantitation program, the reference spectrum, background subtracted sample spectrum and mass peak profiles for the characteristic ions.

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- j. QC Summary Form
- k. Tentative Identified Compounds (for CERCLA and special requested projects only)
- 16.3 Laboratory Information Management System (LIMS)

All sample data/results should be entered to the Labworks/LIMS for data management. Enter the following data on the LIMS:

- a. percent solids,
- b. dilution factor, and
- c. raw data, either manually entered or instrument upload to the Labworks Desktop

16.4 Data Validation

The analyst enters the results on the LIMS and the data packackage is given a reviewer. The review is done by a peer who was not involved in the analysis. Upon completion of the review, including validation of all the appropriate codes in the LIMS for the particular project(s), the data reviewer will sign and date the QA/QC Checklist.

17. Pollution prevention

Pollution prevention encompasses any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operation. The USEPA has established a preferred hierarchy of environmental management techniques that places pollution prevention as the management option of first choice. Whenever feasible, laboratory personnel should use pollution prevention prevention techniques to address their waste generation. When wastes cannot be feasibly reduced at the source, the USEPA recommends recycling as the next best option.

The quantity of chemicals purchased should be based on expected usage during its shelf life and disposal cost of unused material. Actual reagent preparation volumes should reflect anticipated usage and reagent stability.

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For information about pollution prevention consult the EPA Edison Facility Pollution Prevention Plan in Compliance with Executive Order 12856.

No solvent are utilized in this method except the extremely small volumes of methanol needed to make calibration standards and soil/NAPL extractions. The only other chemicals used in this method are the neat materials in preparing standards and sample preservatives. All are used in extremely small amounts and pose no treat to the environment.

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Waste Managment

18.

The USEPA requires that laboratory waste management practice be conducted consistent with all applicable rules and regulations. Excess reagents, samples and method process wastes should be characterized and disposed of in an acceptable manner. The agency urges laboratories to protect the air, water and land by minimizing and controlling all releases from hoods and bench operations, complying with the letter and spirit of any water discharge permit and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions. For further information on waste management consult the Region 2 SOP G-6, "Disposal of Samples and Hazardous Wastes in Regional Laboratory".

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19. REFERENCES

- U.S. EPA 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of pollutants Under the Clean Water Act, Method 624," July 1, 1999.
- EPA Contract Laboratory Statement of Work SOM 1.1, May 2005.
- SW-846 Method 8260B- Volatile organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS) December 1996, Revision 2
 - SW-846 Method 5035- Closed System Purge and Trap Extraction of Volatile Organics in Soil and Waste Samples.

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APPENDIX I

DEFINITION OF TERMS

Aliquot - a measured portion of a sample taken for analysis.

Analysis date/time - the date and military time of the injection of the sample, standard, or blank into the GC/MS or GC system.

Blank - see method blank

4-Bromofluorobenzene (BFB) - compound chosen to establish mass spectral instrument performance for volatile analyses.

Continuing Calibration - analytical standard run every 12 hours to verify the calibration of the GC/MS system.

Day - unless otherwise specified, day shall mean calendar day.

- Extracted Ion Current Profile (EICP)- a plot of ion abundance versus time (or scan number) for ion(s) of specified mass(es).
- *Initial Calibration* analysis of the analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the mass spectrometer to the target compounds.
- *Internal Standards* compounds added to every standard, blank, matrix spike, matrix spike duplicate, sample at a known concentration, prior to analysis. Internal standards are used as the basis for quantitation of the target compounds.
- *Matrix Spike* aliquot of a matrix (water or soil) fortified (spiked) with known quantities of specific compounds and subjected to the entire analytical procedure in order to indicate the appropriateness of the method for the matrix by measuring recovery.

Matrix Spike Duplicate - a second aliquot of the same matrix as the matrix spike (above) that is spiked in order to determine the precision of the method.

Method Blank - an analytical control consisting of all reagents, internal standards and surrogate

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standards, that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background contamination.

Narrative - a descriptive documentation of any problems encountered in processing the samples, along with corrective action taken and problem resolution.

- Percent Difference (%D) is used to compare two values, the percent difference indicates both the direction and the magnitude of the comparison.
- Percent Moisture an approximation of the amount of water in a soil/sediment sample made by drying an aliquot of the sample at 105 °C. The percent moisture determined in this manner also includes contributions from all compounds that may volatilize at 105 °C, including water. Percent moisture may be determined from decanted samples and from samples that are not decanted.

Protocol - describes the exact procedures to be followed respect to sample receipt and handling, analytical methods, data reporting and deliverables, and document control.

- Purge and Trap (Device) analytical technique (device) used to isolate volatile (purgeable) organic by stripping the compounds from water or soil by a stream of inert gas, trapping the compounds on a porous polymer trap, and thermally desorbing the trapped compounds onto the gas chromatographic column.
- *Reagent Water* water in which target analytes are not observed at or above the minimum quantitation limits.
- Reconstructed Ion Chromatogram (RIC) a mass spectral graphical representation of the separation achieved by a gas chromatography; a plot of total ion current versus retention time.
- *Recovery* a determination of the accuracy of the analytical procedure made by comparing measured values for a fortified (spiked) sample against the known spike values. Recovery is determined by the following equation:

% Recovery = $\frac{Measured \ value}{Spiked \ value} X \ 100$

Relative Percent Difference (RPD) - is used to compare two values, the relative percent difference is based on the mean of the two values, and is reported as an absolute value,

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i.e., always expressed as a positive number or zero.

Relative Response Factor (RRF) - a measure of the relative mass spectral response of an analytes compared to its internal standard. Relative response factor are determined by analysis of standards and are used in the calculation of concentration of analytes in

 $RRF = \frac{(A_x)(C_{is})}{(A_{is})(C_x)}$

samples. RRF is determined by the following equation:

Where,

A = area of the characteristic ion measured

C = concentration

Is= internal standard

X = analytes of interest

Resolution - also termed separation, the separation between peaks on a chromatogram, calculated by dividing the depth of the valley between the peaks by the peak height of the smaller peak being resolved, multiplied by 100.

- Sample Number (EPA Sample Number) a unique identification number designated by EPA for each sample. The EPA sample number appears on the sample traffic report which documents information on the sample.
- System Monitoring Compounds compounds added to every blank, sample, matrix spike, matrix spike duplicate, and standard for volatile analysis, and used to evaluate the performance of the entire purge and trap-GC/MS system. These compounds are deuterated compounds not expected to be detected in the environmental media.

Target Compound List (TCL) - a list of compounds designated by SOP for analysis.

Tentatively Identified Compounds (TIC) - compounds detected in samples that are not target compounds, internal standards, system monitoring compounds. Up to 10 peaks (those greater than 10% of peak areas or heights of nearest internal standards) are subjected to mass spectral library searches for tentative identification.

Time - when required to record time on any deliverable item, time shall be expressed as military time, i.e., a 24-hour clock.

Sample - a portion of the material to be analyzed that is contained in single or multiple containers and identified by a unique sample number.

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Twelve-hour Time Period - The twelve (12) hour time period for GC/MS system instrument performance check, standards calibration (initial or continuing calibration), and method blank analysis begins at the moment of injection of instrument performance. The time period ends after 12 hours has elapsed according to the system clock.

Volatile Compounds - compounds amenable to analysis by the purge and trap technique. Used synonymously with purgeable compounds.

Wide Bore Capillary Column - a GC column with an internal diameter (ID) that is greater than 0.32 mm. Columns with lesser diameters are classified as narrow bore capillaries.

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CHARACTERISTIC IONS FOR LISTED ANALYTES TABLE 1 -

		Pgm of	Primary	Secondary	Internal Std.
Analyte		Analyte	Ion	Ions	Used
1 2-Dichloroethane d4 (ISTD #1)			65	67	
Chloromethane		N, S	50	52	1
Bromomethane		N, S	94 .	96 ⁻	1
Vinvl Chloride		N, S	62	64	1
Chloroethane		N, S	64	66	1
Methylene Chloride		N, S	49	84	I
Acetone		S	-43	58	1
Carbon disulfide		S	76	78	· 1
1,1-Dichloroethene		N, S	96	.63	Ţ
1.4 Difluorobenzene(SSTD1)			114	63	2
1.1-Dichloroethane		N, S	63	65	1
Trans-1.2-Dichloroethene		N, S	96	61,98	. 1
Chloroform		N, S	83	85	1
2-Butanone		Ś	43	57	1 .
1.2-Dichloroethane		N, S	62	64	I
1.1.1-Trichloroethane		N, S	97	99	1
Carbon Tetrachloride		N, S	117	119,121	1
Bromodichloromethane		N, S	83	85	1
1.2-Dichloropropane		N, S	63	65	2
1.3-Z-Dichloropropene (cis)	-	N, S	75	77	. 2
Trichloroethene		N, S	95	97,130	2
Fluorobenzene (ISTD #2)			96	. .	
Benzene		N, S	78	77	2
1,3-E-Dichloropropene (trans)		N, S	75	77	· 2
1,1,2-Trichloroethane		N, S	97	83, 85	2
Dibromochloromethane		N, S	129	127, 131	3
2-Bromo-1-chloropropane (SSTD2)			77	79	2
2-Hexanone		S	43	58	3 ´
4-Methyl-2-Pentanone		S	43	58	2
Bromoform		N, S	173	171, 175	3
Tetrachloroethene		N, S	166	129, 131	3 -
1,1,2,2-Tetrachloroethane		N, S	83	85	3
1,4-Dichlorobutane (SSTD3)			55	90	3
Chlorobenzene-d5 (ISTD 3#)			117		
Toluene		N, S	91	92 ⁻	. 2
	-				

			SOP#: C-89 Effective Date: 3/1/07 Revision # 2.0 Page 47 of 56	
Chlorobenzene	N, S	112	114	3
Ethylbenzene	N, S	106	91	3
Styrene	S	104	78	3
Meta + Para-Xylene	S	91	106	3
Ortho-Xylene	S	91	106	3
Dichlorodifluoromethane	S	85	87	1
Trichlorofluoromethane	S,N	101	103	. 1
Methyl Acetate	S S	43	.74	1
Cis-1,2-Dichloroethene	S	96	61,98	1
Cyclohexane	S	56	84, 41	1
Methylcyclohexane	S	83		2
1,2-Dibromoethane	S	107		3
Isopropylbenzene	S	105	120	3
1,3-Dichlorobenzene	N, S	146	148,113	. 3
1,4-Dichlorobenzene	N, S	146	148,113	. 3
1,2-Dichlorobenzene	N, S	146	148,113	3
1,2-Dibromo-3-Chloropropane	S .	75	155,157	3
1,2,4-Trichlorobenzene	S	180	182	3
Ethyl Acetate	Р	43	45,70	1
Isopropyl Acetate	Р	43	61,87	1
n-Amyl Acetate	. P	43	70	3
Acrylonitrile	N	53	52,51	1
1,1,2-Trichloro-1,2,2-trifluoroethane	S	101	85,151	1
Methyl tert-butyl ether	S	73	: 74, 57	1
Bromochloromethane	, S	128	130, 49	1
1,2,3-Trichlorobenzene	S	180	182	3

N=NPDES(M625, Total Toxic Organics), S= Superfund(SOM01.1), P=Pharmaceuticals

Table 2 -

- BFB KEY IONS AND ION ABUNDANCE CRITERIA

Mass	Ion Abundance Criteria
50	 15-40% of base peak
75	30-60% of base peak

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95	base peak, 100% relative abundance
96	5-9% of base peak
173	less than 2% of mass 174
174	greater than 50% of base peak
175	5-9% of mass 174
.176	greater than 95% & less than 101% of mass 174
177	5-9% of mass 176

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Table 3 -

INITIAL AND CONTINUING CALIBRATION CRITERIA FOR TARGET ANALYTES

	Pgm of			Maximu
	Analyte		Maximu	m % D
		Minimu	m % RSD	
Analyte		m RF		
1,2-Dichloroethane d4 (ISTD)		0.100	35	30
Chloromethane	N, S	0.100	35	- 30
Bromomethane	N, S	0.100	35	30
Vinyl Chloride	N, S	0.100	· 35·	30
Chloroethane	N, S	0.300	35	30
Methylene Chloride	N, S, P	0.100	35	30
Acetone	S, P	0.100	35	30
Carbon disulfide	S	0.300	35	30
1,1-Dichloroethene	N, S	0.300	35	30
1,1-Dichloroethane	N, S	0.300	35	30
Trans-1,2-Dichloroethene	N, S	0.300	35	30
Chloroform	N, S	0.300	35	30
2-Butanone	S	0.100	35	30
1,2-Dichloroethane	N, S	0.300	35	30
1,1,1-Trichloroethane	N, S	0.300	35	30
Carbon Tetrachloride	N, S	0.300	35	30
Bromodichloromethane	N, S	0.100	35 -	, 30
1,2-Dichloropropane	N, S	0.100	35	30
1,3-Z-Dichloropropene (cis)	N, S	0,200	35	30
Trichloroethene	N, S	0.200	35	30
Benzene	N, S	0.300	35	30
1,3-E-Dichloropropene (trans)	N, S	0.300	35	30
1,1,2-Trichloroethane	N, S	0.100	35	30
Dibromochloromethane	N, S·	0.200	35	. 30
2-Hexanone	S	0.100	35	30
4-Methyl-2-Pentanone	S	0.100	35	30
Bromoform	N, S	0.100	35	30
Tetrachloroethene	N, S	0.300	: 35	30
1,1,2,2-Tetrachloroethane	N, S	0.200	35	30
Toluene	N, S	0.300	. 35	30
Chlorobenzene	N, S	0.300	35	30
Ethylbenzene	N, S	0.300	35	30
Styrene	S	0.300	35	30

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		·	SOP#: C-89 Effective Date Revision # 2.0 Page 50 of 56	e: 3/1/07)
Meta + Para-Xylene	S	0.300	35	· 30.
Ortho-Xylene	S	0.300	35	30
Dichlorodifluoromethane	S	0.300	35	30
Trichlorofluoromethane	S,N	0.300	35	´ 30
Methyl Acetate	S	0.300	35	30 -
Cis-1,2-Dichloroethene	S	0.300	35	30
Cyclohexane	S	0.300	35	30
Methylcyclohexane	S	0.200	35	30
1.2-Dibromoethane	S	0.200	35	30
Isopropylbenzene	S	0.300	35	30
1.3-Dichlorobenzene	N, S	0.300	35	30
1.4-Dichlorobenzene	N, S	0.300	35	30
1.2-Dichlorobenzene	N, S	0.300	35	30
1.2-Dibromo-3-Chloropropane	S .	0.020	3`5	30
1.2.4-Trichlorobenzene	S	0,200	35	- 30
Ethyl Acetate	Р	0.100	35	30
Isopropyl Acetate	Р	0.100	35	30
n-Amyl Acetate	Р	0.100	35	30
Acrylonitrile	N	0.100	35	· 30
1.1.2-Trichloro-1,2,2-trifluoroethane	S	0.100	35	30
Methyl tert-butyl ether	S	0.100	35	30
Bromochloromethane	S	0.100	35	<u>3</u> 0
1.2.3-Trichlorobenzene	S	0.100	- 35	30
1.4 Difluorobenzene(SSTD1)		0.300	35	:30
2-Bromo-1-chloropropane (SSTD2)		0.300	35	30
2-Bromo-1-chloropropane (SSTD2)		0.300	35	- 30 -

N=NPDES(M625, Total Toxic Organics), S= Superfund(SOM01.1), P=Pharmaceuticals

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Table 4 -PERCENT RECOVERIES FOR MATRIX SPIKE

Analyte	% Recovery Water/soil
Benzene	44-150
Bromodichlomethane	46-154
Bromoform	60-167
Bromomethane	26-242
Carbon Tetrachloride	76-137
Chlorobenzene	47-158
Chloroethane	26-213
Chloroform	52-136
Chloromethane	26-242
Dibromochloromethane	57-145
1,1-Dichloroethane	62-149
1,2-Dichloroethane	52-154
1,1-Dichloroethene	· 26-231
trans-1,2-Dichloroethene	56-155
1,2-Dichloropropane	26-210
cis-1,3-Dichloropropene	26-227
trans-1,3-Dichloropropene	17-183
Ethylbenzene	46-160
Methylene Chloride	26-181
1,1,2,2-Tetrachloroethane	47-146
Tetrachloroethene	68-147

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Continuation of Table 4 -

Continuation of Table (1
Analyte	% Recovery Water/soil
Toluene	56-149
1,1,1-Trichloroethane	54-161
1,1,2-Trichloethane	55-142
Trichloroethene	74-143
Vinyl Chloride	26-259
m& p-Xylene	46-160
o-Xylene	46-160
Styrene	46-160

All other compounds must meet a % recovery 50-150.

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Table 5 -

REPORTING LIMITS

·	Pgm of	Water	Soil	
Analyte	Analyte	<u>Ug/L</u>	<u>Ug/kg</u>	
1.2-Dichloroethane d4 (ISTD)		5	500	4
Chloromethane	N, S	5	500 .	
Bromomethane	N, S	5	500	
Vinyl Chloride	N, S	5	500	
Chloroethane	N, S	5	500	
Methylene Chloride	N, S	5	500	
A cetone	S	5	500	
Carbon disulfide	S	5	500	
1.1. Dichloroethene	N.S	5	500	
1,1-Dichloroethane	N.S	5	500	•
Trang 1.2 Dichloroethene	N.S	5	. 500	
Chlore form	NS	5	500	
	S	5	.500	
2-Butanone	NS	5	500	
1,2-Dichloroethane	NS	5	500	
I,I,I-Irichloroelliane	NS	5	500	
Carbon l'etrachionde	N S	5	500	
Bromodichloromethalle	N S	5	500	
1,2-Dichloropropane	- N S	5	500	
1,3-Z-Dichloropropene (cis)	N, S N S	5	500	
Trichloroethene	N, S N S	5	500	
Benzene	N S	- 5	500	
1,3-E-Dichloropropene (trans)	N, S N S	- 5	500	
1,1,2-Trichloroethane	ם, או סידע	5	500	•
Dibromochloromethane	а, ri	·	500	
2-Hexanone	· 3	5	500	
4-Methyl-2-pentanone	د ۲ ۲ ۲	ן ד	500	
Bromoform	N, 5	ر ح	500	
Tetrachloroethene	N, S		500	
1,1,2,2-Tetrachloroethane	N, S	י <u>כ</u>	500	
Toluene	N, 5) 5	500	
Chlorobenzene	N, S	5	500	
Ethylbenzene	И, Б	_ ر_ ۲	500	
Styrene	2	ມ . 5	500	
Meta + Para-Xylene	2	·) 5	500 °	
Ortho-Xylene	5	5 5	500	
Dichlorodifluoromethane	S 0 NT	·) _	500	
Trichlorofluoromethane	5,N		200	

			SOP#: C-89 Effective Date: 3/1/07 Revision # 2.0 Page 54 of 56	
	S	5	500	•
Methyl Acetate	· S	5	500	
Cis-1,2-Dichloroetnene	S	5	500	
Cyclohexane	S	5	500	
Methylcyclohexane	S	5	500	
1,2-Dibromoethane	С	5	500	
Isopropylbenzene	ŃS	5	500.	
1,3-Dichlorobenzene	N S	5'	500	
1,4-Dichlorobenzene	IN, D NI S	5	500	
1,2-Dichlorobenzene	۵.×۱	. J	500	
1,2-Dibromo-3-Chloropropane	S.	5	500	
1,2,4-Trichlorobenzene	3	2	500	
Ethyl Acetate	Ý	2	500	
Isopropyl Acetate	י א		500	
n-Amyl Acetate	Р	5	500	
Acrylonitrile	N	5	500	
1.1.2-Trichloro-1,2,2-trifluoroethane	S	5	500	
Methyl tert-butyl ether	_ S	5	500	
Bromochloromethane	- S	5	500	
1 2 3-Trichlorobenzene	S	5	500	
1 4 Diffuorobenzene(SSTD1)		5	500	
2-Bromo-1-chloropropane (SSTD2)		- 5	500	
2-Bromo-1-chloropropane (SSTD2)	•	, 5	500	•

N=NPDES(M625, Total Toxic Organics), S= Superfund(SOM01.1), P=Pharmaceuticals

Notes: Reporting limits are based on the lowest calibration standard for water sample, and soil sample a 100 μ L aliquot of extract, a sample weight of 5.0 grams in 10 mLs of methanol, and 100% solids (See section 15.0).

The reporting limits for waste oil/organic solvents are dilution dependent therefore are not listed here.

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Table 6 -QA/QC REMARK CODES

Qualifier Code	Definitions
U	The analyte was not detected at or above the reporting limit
J	The identification of the analyte is acceptable; the reported value is an estimate
UJ	The analyte was not detected at or above the reporting limit. The reporting limit is an estimate.
N	There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification.
NJ	There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification. The reported value is an estimate.
К	The identification of the analyte is acceptable; the reported value may be biased high. The actual value is expected to be less than the reported value.
L	The identification of the analyte is acceptable; the reported value may be biased low. The actual value is expected to be greater than the reported value.
R	The presence or absence of the analyte can not be determined from the data due to severe quality control problems. The data are rejected and considered unusable.
NV	The analysis has not been validated in LIMS.
INC	The project is incomplete. There are analyses which need to be validated in LIMS.
SOP#: C-89 Effective Date: 3/1/07 Revision # 2.0 Page 56 of 56

Analyte	Regulatory Level(mg/L)
Benzene	0.50
Carbon tetrachloride	0.50
Chlorobenzene	100
Chloroform	6.0
1,2-Dichloroethane	0.50
1,1-Dichloroethylene	0.7
Methylethylketone	200
Tetrachloroethylene	0.70
Trichloroehtylene	0.50
Vinyl Chloride	0.20

Table 7 TCLP REGULATORY LEVELS

Sample#: MW-1 (MS/MSD)	Sample#: MW-1 (MS/MSD)	Sample#: MW-1 (MS/MSD)
Site: Olean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCI	Anal: VOC, pres w/ HCl
Sampler: MMercado	Sampler: MMercado	Sampler: MMercado
Sample#: MW-1 (MS/MSD)	Sample#: MW-1 (MS/MSD)	Sample#: MW-1 (MS/MSD)
Site: Olean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl
Sampler: MMercado	Sampler: MMercado	Sampler: MMercado
Sample#: MW-1 (MS/MSD)	Sample#: MW-1 (MS/MSD)	Sample#: MW-1 (MS/MSD)
Site: Olean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl
Sampler: MMercado	Sampler: MMercado	Sampler: MMercado
Sample#: MW-2	Sample#: MW-2	Sample#: MW-2
Site: Olean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl
Sampler: MMercado	Sampler: MMercado	Sampler: MMercado
Sample#: MW-3	Sample#: MW-3	Sample#: MW-3
Site: Olean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl
Sampler: MMercado	Sampler: MMercado	Sampler: MMercado
Sample#: MW-4	Sample#: MW-4	Sample#: MW-4
Site: Olean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl
Sampler: MMercado	Sampler: MMercado	Sampler: MMercado
Sample#: MW-5	Sample#: MW-5	Sample#: MW-5
Site: Olean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl
Sampler: MMercado	Sampler: MMercado	Sampler: MMercado
Sample#: MW-6	Sample#: MW-6	Sample#: MW-6
Site: Olean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl
Sampler: MMercado	Sampler: MMercado	Sampler: MMercado
Sample#: MW-	Sample#: MW-	Sample#: MW-
Site: Olean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl	Anal: VOC, pres w/ HCl
Sampler: Ivitviercado	Sampler: Miviercado	Sampler: MMercado
Sample#: MW-	Sample#: MW-	Sample#: MW-
Site: Ulean Well Fields	Site: Olean Well Fields	Site: Olean Well Fields
Date:	Date:	Date:
Anar: VOC, pres W/ HCl	Anal: VUC, pres w/ HCl	Anal: VOC, pres w/ HCl
Sampier, Wiwiercado	Sampler: MIMercado	Sampler: MMercado
	•	

		ŕ.	WELL DATA	SHEET				
SITE: <u>Lo</u>	ohn's Cleaner Site		Date:			WELL#: <u>N</u>	1W-1	
SAMPLING PERSONNEL: <u>MERCADO / WALL</u>								
			EVACUATION IN	FORMATION		· · · ·		
DATE/TH	ME:	METH	IOD: <u></u>	<u>OW FLOW)</u>	TOTAL DI	EPTH (FT):27.62	·	
WELL CS	G. TYPE/DIA: <u>PV</u>	<u>C 2"</u> T	op of Casting to Water I	Level (FT):	Pump Loca	tion: 23'		
6			METER CALI	BRATION	•			
Date/Time	:		Meter Type Turbidit	v Kit #:		VSI Meter #•		
		•	SAMPLING INFO	DRMATION				
DATE/TIN	ME OF SAMPLING	ì:	YSI Mete	r:	SAMPLE #			
			FIELD MEASURE	MENT DATA			· <u>···</u> ····	
TIME (2400HRS)	VOLUME EVACUATED (GAL)	TEMP (C)	*SPECIFIC CONDUCTANCE (UMHOS/CM)	pH (SU)	D.O.	TURBIDITY (NTU)	ORP	
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(*W/O TEMPERATURE COMPENSATION - CONVERSIONS: 1 m=3.28'/1'=.305m)

GENERAL INFORMATION

WEATHER/Comments/Observations/Sample Charac-

ANALYSIS/PRESERVATION: (SEE FIELD DATA SHEET)

CERTIFICATION:

Date Shipped			Chain of Custody Record	rd		Sampler Signatu	re:	
Carrier Name	e: Hand-Carried OS	Ì	Relinguished by: (Date/Time)		Received by: (Deta /T)			
Snipped to:	EPA Fixed Lab in E	dison	1					(Date/Time)
	2890 Woodbridge A	Ave F	2					
	Edison, NJ 08837	. -	3			<u> </u>		
		-	4					
Sample No.	Matrix/Sampler	Conc/Type	Analysis/Turnaround	Preservative	#Bottles	Date/Time	For Lab Use Only	, .
MW-1	M. Mercado	L/G	VOA (45)	HCI	3		TOT Lab USE Only	·
MW-2*	M. Mercado	L/G	VOA (45)	HC1	9			
MW-3	M. Mercado	L/G	VOA (45)	HC1	3			
MW-4	M. Mercado	L/G	VOA (45)	HCI	3	· · · · · · · · · · · · · · · · · · ·		
<u>MW-5</u>	M. Mercado	L/G	VOA (45)	HC1	3			
<u>MW-6</u>	M. Mercado	L/G	VOA (45)	HCl	3			
RB-01	M. Mercado	L/G	VOA (45)	HC1	3		· · · · · · · · · · · · · · · · · · ·	·
TB-01	M. Mercado	L/G	VOA (45)	HCl	3			
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							<u> </u>	
MW-2 is the	MS/MSD for this							

* MW-2 is the MS/MSD for this sampling event. Sampling event is completed

APPENDIX C U.S. EPA, Region 2 DESA Laboratory Data Package



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 2 Laboratory 2890 Woodbridge Avenue Edison , New Jersey 08837 732-906-6886 Phone 732-906-6165 Fax

October 31, 2018

Amelia Jackson Hazardous Waste Support Branch DESA/HWSB Edison, NJ 08837

RE: Olean Well Field - 1809024

Enclosed are the results of analyses for samples received by the laboratory on 09/27/2018. The signature below reflects the laboratory's approval of the reported results. If you have any questions concerning this report, please refer to Project Number 1809024 and contact the laboratory.

Sincerely,

Joe R. Amlon

John R. Bourbon Chief, DESA/LB



Final Report Project: Olean Well Field - 1809024 Project Number: 1809024

Project Narrative:

The National Environmental Laboratory Accreditation Conference Institute (TNI) is a voluntary environmental laboratory accreditation association of State and Federal agencies. TNI established and promoted a National Environmental Laboratory Accreditation Program (NELAP) that provides a uniform set of standards for the generation of environmental data that are of known and defensible quality. The EPA Region 2 Laboratory is NELAP accredited. The Laboratory tests that are accredited have met all the requirements established under the TNI Standards.

Condition Comments

None

Comment(s):

The "Sample Analysis Date and Time" is included in the results section for any analyte with a prescribed holding time of 72 hours or less.

Data Qualifier(s):

- U- The analyte was not detected at or above the Reporting Limit.
- J- The identification of the analyte is acceptable; the reported value is an estimate.
- K- The identification of the analyte is acceptable; the reported value may be biased high.
- L- The identification of the analyte is acceptable; the reported value may be biased low.

NJ- There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification. The reported value is an estimate.

Reporting Limit(s):

The Laboratory was able to achieve the appropriate limits for each analyte requested, except for the following:

Trace Volatile Organic Compounds: The CRQL for Bromomethane, Chloroethane, and Chloromethane in water is 0.50 ug/L. The Laboratory Reporting Limit (RL) was raised due to problems associated with the initial calibration curve for these analytes in all samples.

U.S.E.P.A Region 2 Laboratory



Final Report Project: Olean Well Field - 1809024

Project Number: 1809024

SUMMARY REPORT FOR SAMPLES

Field ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-01-SEP18	1809024-01	Aqueous	09/24/2018 17:30	09/27/2018 11:25
MW-02-SEP18	1809024-02	Aqueous	09/25/2018 10:20	09/27/2018 11:25
MW-03-SEP18	1809024-03	Aqueous	09/25/2018 11:20	09/27/2018 11:25
MW-04-SEP18	1809024-04	Aqueous	09/25/2018 12:15	09/27/2018 11:25
MW-05-SEP18	1809024-05	Aqueous	09/25/2018 12:30	09/27/2018 11:25
MW-06-SEP18	1809024-06	Aqueous	09/25/2018 12:30	09/27/2018 11:25
RB-01-SEP18	1809024-07	Aqueous	09/24/2018 07:40	09/27/2018 11:25
TB-01-SEP18	1809024-08	Aqueous	09/24/2018 07:40	09/27/2018 11:25

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Project: Olean Well Field - 1809024

Project Number: 1809024

SUMMARY REPORT FOR METHODS

Analysis	Method	Certification	Matrix
E-VOA TRACE/SF	EPA DW-1 Rev 2.6	NELAP	Aqueous

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Project: Olean Well Field - 1809024

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Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: MW-01-SEP18			San	nple ID: 1809024	-01
VOA-TRACE GCMS		T T T	0.50	/T	
			0.50	ug/L	
		UJ	1.0	ug/L	
Vinyl Chloride		UJ	0.50	ug/L	
Bromomethane		UJ	1.0	ug/L	
Chloroethane		U	1.0	ug/L	
Trichlorofluoromethane		U	0.50	ug/L	
1,1-Dichloroethene		U	0.50	ug/L	
1,1,2-Trichloro-1,2,2-Trifluoroethane		U	0.50	ug/L	
Carbon Disulfide		U	0.50	ug/L	
Acetone		U	5.0	ug/L	
Methyl Acetate		U	0.50	ug/L	
Methylene Chloride		U	0.50	ug/L	
trans-1,2-Dichloroethene		U	0.50	ug/L	
Methyl tert-Butyl Ether		U	0.50	ug/L	
1,1-Dichloroethane		U	0.50	ug/L	
cis-1,2-Dichloroethene	0.63		0.50	ug/L	
2-Butanone		U	5.0	ug/L	
Bromochloromethane		U	0.50	ug/L	
Chloroform		U	0.50	ug/L	
1,1,1-Trichloroethane		U	0.50	ug/L	
Cyclohexane		U	0.50	ug/L	
Carbon Tetrachloride		U	0.50	ug/L	
Benzene		U	0.50	ug/L	
1,2-Dichloroethane		U	0.50	ug/L	
Trichloroethene		U	0.50	ug/L	
1,2-Dichloropropane		U	0.50	ug/L	
Bromodichloromethane		U	0.50	ug/L	
cis-1,3-Dichloropropene		U	0.50	ug/L	
				0	

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Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: MW-01-SEP18			Sar	mple ID: 1809024-0	01
VOA-TRACE GCMS		TT	5.0	/T	
4-Methyl-2-Pentanone		U	5.0	ug/L	
		U	0.50	ug/L	
trans-1,3-Dichloropropene		U	0.50	ug/L	
1,1,2-1richloroethane		U	0.50	ug/L	
Tetrachloroethene		U	0.50	ug/L	
Methylcyclohexane		U	0.50	ug/L	
Dibromochloromethane		U	0.50	ug/L	
1,2-Dibromoethane		U	0.50	ug/L	
2-Hexanone		U	5.0	ug/L	
Chlorobenzene		U	0.50	ug/L	
Ethylbenzene		U	0.50	ug/L	
m,p-Xylene		U	0.50	ug/L	
o-Xylene		U	0.50	ug/L	
Styrene		U	0.50	ug/L	
Bromoform		U	0.50	ug/L	
Isopropylbenzene		U	0.50	ug/L	
1,1,2,2-Tetrachloroethane		U	0.50	ug/L	
1,3-Dichlorobenzene		U	0.50	ug/L	
1,4-Dichlorobenzene		U	0.50	ug/L	
1,2-Dichlorobenzene		U	0.50	ug/L	
1,2-Dibromo-3-Chloropropane		U	1.0	ug/L	
1,2,4-Trichlorobenzene		U	0.50	ug/L	
1,2,3-Trichlorobenzene		U	0.50	ug/L	
Field ID: MW-02-SEP18			Sar	mple ID: 1809024-0	02
VOA-TRACE GCMS					
Dichlorodifluoromethane		UL	0.50	ug/L	
Chloromethane		U J	1.0	ug/L	
Vinyl Chloride	42	J	0.50	ug/L	

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Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: MW-02-SEP18			Sar	nple ID: 1809024-02	
VOA-TRACE GCMS			1.0	/T	
Bromomethane		UJ	1.0	ug/L	
		U	1.0	ug/L	
Inchlorofluoromethane		U	0.50	ug/L	
1,1-Dichloroethene	1.9		0.50	ug/L	
1,1,2-Trichloro-1,2,2-Trifluoroethane		U	0.50	ug/L	
Carbon Disulfide		U	0.50	ug/L	
Acetone	10		5.0	ug/L	
Methyl Acetate		U	0.50	ug/L	
Methylene Chloride		U	0.50	ug/L	
trans-1,2-Dichloroethene		U	0.50	ug/L	
Methyl tert-Butyl Ether		U	0.50	ug/L	
1,1-Dichloroethane		U	0.50	ug/L	
cis-1,2-Dichloroethene	190		25	ug/L	
2-Butanone		U	5.0	ug/L	
Bromochloromethane		U	0.50	ug/L	
Chloroform		U	0.50	ug/L	
1,1,1-Trichloroethane		U	0.50	ug/L	
Cyclohexane		U	0.50	ug/L	
Carbon Tetrachloride		U	0.50	ug/L	
Benzene		U	0.50	ug/L	
1,2-Dichloroethane		U	0.50	ug/L	
Trichloroethene	140		25	ug/L	
1,2-Dichloropropane		U	0.50	ug/L	
Bromodichloromethane		U	0.50	ug/L	
cis-1,3-Dichloropropene		U	0.50	ug/L	
4-Methyl-2-Pentanone		U	5.0	ug/L	
Toluene		U	0.50	ug/L	
trans-1,3-Dichloropropene		U	0.50	ug/L	
				-	

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Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: MW-02-SEP18			San	nple ID: 180902	24-02
VOA-TRACE GCMS			0.50	/T	
1,1,2-Trichloroethane		U	0.50	ug/L	
Tetrachloroethene	1400		25	ug/L	
Methylcyclohexane		U	0.50	ug/L	
Dibromochloromethane		U	0.50	ug/L	
1,2-Dibromoethane		U	0.50	ug/L	
2-Hexanone		U	5.0	ug/L	
Chlorobenzene		U	0.50	ug/L	
Ethylbenzene		U	0.50	ug/L	
m,p-Xylene		U	0.50	ug/L	
o-Xylene		U	0.50	ug/L	
Styrene		U	0.50	ug/L	
Bromoform		U	0.50	ug/L	
Isopropylbenzene		U	0.50	ug/L	
1,1,2,2-Tetrachloroethane		U	0.50	ug/L	
1,3-Dichlorobenzene		U	0.50	ug/L	
1,4-Dichlorobenzene		U	0.50	ug/L	
1,2-Dichlorobenzene		U	0.50	ug/L	
1,2-Dibromo-3-Chloropropane		U	1.0	ug/L	
1,2,4-Trichlorobenzene		U	0.50	ug/L	
1,2,3-Trichlorobenzene		U	0.50	ug/L	
Field ID: MW-03-SEP18			San	nple ID: 180902	24-03
VOA-TRACE GCMS					
Dichlorodifluoromethane		UL	0.50	ug/L	
Chloromethane		UJ	1.0	ug/L	
Vinyl Chloride	3.1	J	0.50	ug/L	
Bromomethane		UJ	1.0	ug/L	
Chloroethane		U	1.0	ug/L	
Trichlorofluoromethane		U	0.50	ug/L	

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Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: MW-03-SEP18			Sa	mple ID: 1809024-03	5
VOA-TRACE GCMS					
1,1-Dichloroethene	0.61		0.50	ug/L	
1,1,2-Trichloro-1,2,2-Trifluoroethane		U	0.50	ug/L	
Carbon Disulfide		U	0.50	ug/L	
Acetone		U	5.0	ug/L	
Methyl Acetate		U	0.50	ug/L	
Methylene Chloride		U	0.50	ug/L	
trans-1,2-Dichloroethene		U	0.50	ug/L	
Methyl tert-Butyl Ether		U	0.50	ug/L	
1,1-Dichloroethane	0.53		0.50	ug/L	
cis-1,2-Dichloroethene	49		0.50	ug/L	
2-Butanone		U	5.0	ug/L	
Bromochloromethane		U	0.50	ug/L	
Chloroform		U	0.50	ug/L	
1,1,1-Trichloroethane		U	0.50	ug/L	
Cyclohexane		U	0.50	ug/L	
Carbon Tetrachloride		U	0.50	ug/L	
Benzene		U	0.50	ug/L	
1,2-Dichloroethane		U	0.50	ug/L	
Trichloroethene	32		0.50	ug/L	
1,2-Dichloropropane		U	0.50	ug/L	
Bromodichloromethane		U	0.50	ug/L	
cis-1,3-Dichloropropene		U	0.50	ug/L	
4-Methyl-2-Pentanone		U	5.0	ug/L	
Toluene		U	0.50	ug/L	
trans-1,3-Dichloropropene		U	0.50	ug/L	
1,1,2-Trichloroethane		U	0.50	ug/L	
Tetrachloroethene	47		0.50	ug/L	
Methylcyclohexane		U	0.50	ug/L	
				-	

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	Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID:	MW-03-SEP18			Sam	ple ID: 180902	24-03
VOA	-TRACE GCMS					
	Dibromochloromethane		U	0.50	ug/L	
	1,2-Dibromoethane		U	0.50	ug/L	
	2-Hexanone		U	5.0	ug/L	
	Chlorobenzene		U	0.50	ug/L	
	Ethylbenzene		U	0.50	ug/L	
	m,p-Xylene		U	0.50	ug/L	
	o-Xylene		U	0.50	ug/L	
	Styrene		U	0.50	ug/L	
	Bromoform		U	0.50	ug/L	
	Isopropylbenzene		U	0.50	ug/L	
	1,1,2,2-Tetrachloroethane		U	0.50	ug/L	
	1,3-Dichlorobenzene		U	0.50	ug/L	
	1,4-Dichlorobenzene		U	0.50	ug/L	
	1,2-Dichlorobenzene		U	0.50	ug/L	
	1,2-Dibromo-3-Chloropropane		U	1.0	ug/L	
	1,2,4-Trichlorobenzene		U	0.50	ug/L	
	1,2,3-Trichlorobenzene		U	0.50	ug/L	
Field ID:	MW-04-SEP18			Sam	ple ID: 180902	24-04
VOA	-TRACE GCMS					
	Dichlorodifluoromethane		UL	0.50	ug/L	
	Chloromethane		UJ	1.0	ug/L	
	Vinyl Chloride	1.4	J	0.50	ug/L	
	Bromomethane		UJ	1.0	ug/L	
	Chloroethane		U	1.0	ug/L	
	Trichlorofluoromethane		U	0.50	ug/L	
	1,1-Dichloroethene		U	0.50	ug/L	
	1,1,2-Trichloro-1,2,2-Trifluoroethane		U	0.50	ug/L	
	Carbon Disulfide		U	0.50	ug/L	

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Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: MW-04-SEP18			Sar	nple ID: 1809024-04	4
VOA-TRACE GCMS					
Acetone		U	5.0	ug/L	
Methyl Acetate		U	0.50	ug/L	
Methylene Chloride		U	0.50	ug/L	
trans-1,2-Dichloroethene		U	0.50	ug/L	
Methyl tert-Butyl Ether		U	0.50	ug/L	
1,1-Dichloroethane		U	0.50	ug/L	
cis-1,2-Dichloroethene	15		0.50	ug/L	
2-Butanone		U	5.0	ug/L	
Bromochloromethane		U	0.50	ug/L	
Chloroform		U	0.50	ug/L	
1,1,1-Trichloroethane		U	0.50	ug/L	
Cyclohexane		U	0.50	ug/L	
Carbon Tetrachloride		U	0.50	ug/L	
Benzene		U	0.50	ug/L	
1,2-Dichloroethane		U	0.50	ug/L	
Trichloroethene	25		0.50	ug/L	
1,2-Dichloropropane		U	0.50	ug/L	
Bromodichloromethane		U	0.50	ug/L	
cis-1,3-Dichloropropene		U	0.50	ug/L	
4-Methyl-2-Pentanone		U	5.0	ug/L	
Toluene		U	0.50	ug/L	
trans-1,3-Dichloropropene		U	0.50	ug/L	
1,1,2-Trichloroethane		U	0.50	ug/L	
Tetrachloroethene	130		5.0	ug/L	
Methylcyclohexane		UL	0.50	ug/L	
Dibromochloromethane		U	0.50	- ug/L	
1,2-Dibromoethane		U	0.50	ug/L	
2-Hexanone		U	5.0	ug/L	
				0	

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Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: MW-04-SEP18			Sar	nple ID: 1809024-0	4
VOA-TRACE GCMS					
Chlorobenzene		U	0.50	ug/L	
Ethylbenzene		U	0.50	ug/L	
m,p-Xylene		U	0.50	ug/L	
o-Xylene		U	0.50	ug/L	
Styrene		U	0.50	ug/L	
Bromoform		U	0.50	ug/L	
Isopropylbenzene		U	0.50	ug/L	
1,1,2,2-Tetrachloroethane		U	0.50	ug/L	
1,3-Dichlorobenzene		U	0.50	ug/L	
1,4-Dichlorobenzene		U	0.50	ug/L	
1,2-Dichlorobenzene		U	0.50	ug/L	
1,2-Dibromo-3-Chloropropane		U	1.0	ug/L	
1,2,4-Trichlorobenzene		U	0.50	ug/L	
1,2,3-Trichlorobenzene		U	0.50	ug/L	
Field ID: MW-05-SEP18			Sar	nple ID: 1809024-0	5
VOA-TRACE GCMS					
Dichlorodifluoromethane		UL	0.50	ug/L	
Chloromethane		U J	1.0	ug/L	
Vinyl Chloride		U J	0.50	ug/L	
Bromomethane		U J	1.0	ug/L	
Chloroethane		U	1.0	ug/L	
Trichlorofluoromethane		U	0.50	ug/L	
1,1-Dichloroethene		U	0.50	ug/L	
1,1,2-Trichloro-1,2,2-Trifluoroethane		U	0.50	ug/L	
Carbon Disulfide		U	0.50	ug/L	
Acetone		U	5.0	ug/L	
Methyl Acetate		U	0.50	ug/L	
Methylene Chloride		U	0.50	ug/L	

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Analyte	Result	Qualifier	Reporting Limit	g Units	Date and Time of Analysis*
Field ID: MW-05-SEP18			S	Sample ID: 1809024-05	
VOA-TRACE GCMS					
trans-1,2-Dichloroethene		U	0.50	ug/L	
Methyl tert-Butyl Ether		U	0.50	ug/L	
1,1-Dichloroethane		U	0.50	ug/L	
cis-1,2-Dichloroethene	0.71		0.50	ug/L	
2-Butanone		U	5.0	ug/L	
Bromochloromethane		U	0.50	ug/L	
Chloroform		U	0.50	ug/L	
1,1,1-Trichloroethane		U	0.50	ug/L	
Cyclohexane		U	0.50	ug/L	
Carbon Tetrachloride		U	0.50	ug/L	
Benzene		U	0.50	ug/L	
1,2-Dichloroethane		U	0.50	ug/L	
Trichloroethene	2.2		0.50	ug/L	
1,2-Dichloropropane		U	0.50	ug/L	
Bromodichloromethane		U	0.50	ug/L	
cis-1,3-Dichloropropene		U	0.50	ug/L	
4-Methyl-2-Pentanone		U	5.0	ug/L	
Toluene		U	0.50	ug/L	
trans-1,3-Dichloropropene		U	0.50	ug/L	
1,1,2-Trichloroethane		U	0.50	ug/L	
Tetrachloroethene	4.1		0.50	ug/L	
Methylcyclohexane		U	0.50	ug/L	
Dibromochloromethane		U	0.50	ug/L	
1,2-Dibromoethane		U	0.50	ug/L	
2-Hexanone		U	5.0	ug/L	
Chlorobenzene		U	0.50	ug/L	
Ethylbenzene		U	0.50	ug/L	
m,p-Xylene		U	0.50	ug/L	
				e	

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Sample ID: 1809024-05 Somple ID: 1809024-05 VOA-TRACE GCMS o-Xylene U 0.50 ug/L Styrene U 0.50 ug/L Bromoform U 0.50 ug/L Isopropylbenzene U 0.50 ug/L 1,1,2,2-Tetrachloroethane U 0.50 ug/L 1,3-Dichlorobenzene U 0.50 ug/L 1,4-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dibromo-3-Chloropropane U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L Sample ID: 1809024-06
VOA-TRACE GCMS U 0.50 ug/L Styrene U 0.50 ug/L Bromoform U 0.50 ug/L Isopropylbenzene U 0.50 ug/L 1,1,2,2-Tetrachloroethane U 0.50 ug/L 1,3-Dichlorobenzene U 0.50 ug/L 1,4-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L tug/L
o-Xylene U 0.50 ug/L Styrene U 0.50 ug/L Bromoform U 0.50 ug/L Isopropylbenzene U 0.50 ug/L 1,1,2,2-Tetrachloroethane U 0.50 ug/L 1,3-Dichlorobenzene U 0.50 ug/L 1,4-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dibromo-3-Chloropropane U 0.50 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L ug/L Sulfur Dioxide 5.7 ug/L sample ID: 1809024-06
Styrene U 0.50 ug/L Bromoform U 0.50 ug/L Isopropylbenzene U 0.50 ug/L 1,1,2,2-Tetrachloroethane U 0.50 ug/L 1,3-Dichlorobenzene U 0.50 ug/L 1,3-Dichlorobenzene U 0.50 ug/L 1,4-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dibromo-3-Chloropropane U 0.50 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Sulfur Dioxide 5.7 ug/L ug/L Field ID: MW-06-SEP18 Sample ID: 1809024-06 Sample ID: 1809024-06
Bromoform U 0.50 ug/L Isopropylbenzene U 0.50 ug/L 1,1,2,2-Tetrachloroethane U 0.50 ug/L 1,3-Dichlorobenzene U 0.50 ug/L 1,4-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L Field ID: MW-06-SEP18 Sample ID: 1809024-06
Isopropylbenzene U 0.50 ug/L 1,1,2,2-Tetrachloroethane U 0.50 ug/L 1,3-Dichlorobenzene U 0.50 ug/L 1,4-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Sulfur Dioxide 5.7 ug/L ug/L 5.7 ug/L 1809024-06 Sample ID: 1809024-06
1,1,2,2-Tetrachloroethane U 0.50 ug/L 1,3-Dichlorobenzene U 0.50 ug/L 1,4-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dibromo-3-Chloropropane U 1.0 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L
1,3-Dichlorobenzene U 0.50 ug/L 1,4-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dibromo-3-Chloropropane U 1.0 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L Sample ID: 1809024-06
1,4-Dichlorobenzene U 0.50 ug/L 1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dibromo-3-Chloropropane U 1.0 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L
1,2-Dichlorobenzene U 0.50 ug/L 1,2-Dibromo-3-Chloropropane U 1.0 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L ug/L Sulfur Dioxide 5.7 ug/L ug/L
1,2-Dibromo-3-Chloropropane U 1.0 ug/L 1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L Sample ID: 1809024-06
1,2,4-Trichlorobenzene U 0.50 ug/L 1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L Sample ID: 1809024-06
1,2,3-Trichlorobenzene U 0.50 ug/L Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L Field ID: MW-06-SEP18 Sample ID: 1809024-06
Ethyne, fluoro- 3.0 ug/L Sulfur Dioxide 5.7 ug/L Field ID: MW-06-SEP18 Sample ID: 1809024-06
Sulfur Dioxide 5.7 ug/L Field ID: MW-06-SEP18 Sample ID: 1809024-06
Field ID: MW-06-SEP18 Sample ID: 1809024-06
VOA-TRACE GCMS
Dichlorodifluoromethane UL 0.50 ug/L
Chloromethane U J 1.0 ug/L
Vinyl Chloride U J 0.50 ug/L
Bromomethane U J 1.0 ug/L
Chloroethane U 1.0 ug/L
Trichlorofluoromethane U 0.50 ug/L
1,1-Dichloroethene U 0.50 ug/L
1,1,2-Trichloro-1,2,2-Trifluoroethane U 0.50 ug/L
Carbon Disulfide U 0.50 ug/L
Acetone U 5.0 ug/L
Methyl Acetate U 0.50 ug/L
Methylene Chloride U 0.50 ug/L
trans-1,2-Dichloroethene U 0.50 ug/L

U.S.E.P.A Region 2 Laboratory



Final Report

Project: Olean Well Field - 1809024

Project Number: 1809024

Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: MW-06-SEP18			San	nple ID: 180902	24-06
VOA-TRACE GCMS			0.50	σ	
Metnyi teri-Bulyi Einer		U	0.50	ug/L	
1,1-Dichloroethane		U	0.50	ug/L	
cis-1,2-Dichloroethene	1.4		0.50	ug/L	
2-Butanone		U	5.0	ug/L	
Bromochloromethane		U	0.50	ug/L	
Chloroform		U	0.50	ug/L	
1,1,1-Trichloroethane		U	0.50	ug/L	
Cyclohexane		U	0.50	ug/L	
Carbon Tetrachloride		U	0.50	ug/L	
Benzene		U	0.50	ug/L	
1,2-Dichloroethane		U	0.50	ug/L	
Trichloroethene	3.0		0.50	ug/L	
1,2-Dichloropropane		U	0.50	ug/L	
Bromodichloromethane		U	0.50	ug/L	
cis-1,3-Dichloropropene		U	0.50	ug/L	
4-Methyl-2-Pentanone		U	5.0	ug/L	
Toluene		U	0.50	ug/L	
trans-1,3-Dichloropropene		U	0.50	ug/L	
1,1,2-Trichloroethane		U	0.50	ug/L	
Tetrachloroethene	7.7		0.50	ug/L	
Methylcyclohexane		U	0.50	ug/L	
Dibromochloromethane		U	0.50	ug/L	
1,2-Dibromoethane		U	0.50	ug/L	
2-Hexanone		U	5.0	ug/L	
Chlorobenzene		U	0.50	ug/L	
Ethylbenzene		U	0.50	ug/L	
m,p-Xylene		U	0.50	ug/L	
o-Xylene		U	0.50	ug/L	
				2	

U.S.E.P.A Region 2 Laboratory



Final Report

Project: Olean Well Field - 1809024

Project Number: 1809024

Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: MW-06-SEP18			San	nple ID: 18090	24-06
VOA-TRACE GCMS					
Styrene		U	0.50	ug/L	
Bromoform		U	0.50	ug/L	
Isopropylbenzene		U	0.50	ug/L	
1,1,2,2-Tetrachloroethane		U	0.50	ug/L	
1,3-Dichlorobenzene		U	0.50	ug/L	
1,4-Dichlorobenzene		U	0.50	ug/L	
1,2-Dichlorobenzene		U	0.50	ug/L	
1,2-Dibromo-3-Chloropropane		U	1.0	ug/L	
1,2,4-Trichlorobenzene		U	0.50	ug/L	
1,2,3-Trichlorobenzene		U	0.50	ug/L	
Carbon dioxide	3.0			ug/L	
Sulfur Dioxide	5.4			ug/L	
Field ID: RB-01-SEP18			San	nple ID: 18090	24-07
VOA-TRACE GCMS					
Dichlorodifluoromethane		UL	0.50	ug/L	
Chloromethane		U J	1.0	ug/L	
Vinyl Chloride		U J	0.50	ug/L	
Bromomethane		U J	1.0	ug/L	
Chloroethane		U	1.0	ug/L	
Trichlorofluoromethane		U	0.50	ug/L	
1,1-Dichloroethene		U	0.50	ug/L	
1,1,2-Trichloro-1,2,2-Trifluoroethane		U	0.50	ug/L	
Carbon Disulfide		U	0.50	ug/L	
Acetone	16		5.0	ug/L	
Methyl Acetate		U	0.50	ug/L	
Methylene Chloride		U	0.50	ug/L	
trans-1,2-Dichloroethene		U	0.50	ug/L	
Methyl tert-Butyl Ether		U	0.50	ug/L	

U.S.E.P.A Region 2 Laboratory



Final Report

Project: Olean Well Field - 1809024

Project Number: 1809024

Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: RB-01-SEP18			San	nple ID: 18090	24-07
VOA-TRACE GCMS				_	
1,1-Dichloroethane		U	0.50	ug/L	
cis-1,2-Dichloroethene		U	0.50	ug/L	
2-Butanone		U	5.0	ug/L	
Bromochloromethane		U	0.50	ug/L	
Chloroform		U	0.50	ug/L	
1,1,1-Trichloroethane		U	0.50	ug/L	
Cyclohexane		U	0.50	ug/L	
Carbon Tetrachloride		U	0.50	ug/L	
Benzene		U	0.50	ug/L	
1,2-Dichloroethane		U	0.50	ug/L	
Trichloroethene		U	0.50	ug/L	
1,2-Dichloropropane		U	0.50	ug/L	
Bromodichloromethane		U	0.50	ug/L	
cis-1,3-Dichloropropene		U	0.50	ug/L	
4-Methyl-2-Pentanone		U	5.0	ug/L	
Toluene		U	0.50	ug/L	
trans-1,3-Dichloropropene		U	0.50	ug/L	
1,1,2-Trichloroethane		U	0.50	ug/L	
Tetrachloroethene		U	0.50	ug/L	
Methylcyclohexane		U	0.50	ug/L	
Dibromochloromethane		U	0.50	ug/L	
1,2-Dibromoethane		U	0.50	ug/L	
2-Hexanone		U	5.0	ug/L	
Chlorobenzene		U	0.50	ug/L	
Ethylbenzene		U	0.50	ug/L	
m,p-Xylene		U	0.50	ug/L	
o-Xylene		U	0.50	ug/L	
Styrene		U	0.50	ug/L	
				0	

U.S.E.P.A Region 2 Laboratory



Final Report

Project: Olean Well Field - 1809024

Project Number: 1809024

Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: RB-01-SEP18			Sa	mple ID: 1809024-07	1
VOA-TRACE GCMS					
Bromotorm		U	0.50	ug/L	
Isopropylbenzene		U	0.50	ug/L	
1,1,2,2-Tetrachloroethane		U	0.50	ug/L	
1,3-Dichlorobenzene		U	0.50	ug/L	
1,4-Dichlorobenzene		U	0.50	ug/L	
1,2-Dichlorobenzene		U	0.50	ug/L	
1,2-Dibromo-3-Chloropropane		U	1.0	ug/L	
1,2,4-Trichlorobenzene		U	0.50	ug/L	
1,2,3-Trichlorobenzene		U	0.50	ug/L	
Field ID: TB-01-SEP18			Sa	mple ID: 1809024-08	}
VOA-TRACE GCMS					
Dichlorodifluoromethane		UL	0.50	ug/L	
Chloromethane		U J	1.0	ug/L	
Vinyl Chloride		U J	0.50	ug/L	
Bromomethane		UJ	1.0	ug/L	
Chloroethane		U	1.0	ug/L	
Trichlorofluoromethane		U	0.50	ug/L	
1,1-Dichloroethene		U	0.50	ug/L	
1,1,2-Trichloro-1,2,2-Trifluoroethane		U	0.50	ug/L	
Carbon Disulfide		U	0.50	ug/L	
Acetone		U	5.0	ug/L	
Methyl Acetate		U	0.50	ug/L	
Methylene Chloride		U	0.50	ug/L	
trans-1,2-Dichloroethene		U	0.50	ug/L	
Methyl tert-Butyl Ether		U	0.50	ug/L	
1,1-Dichloroethane		U	0.50	ug/L	
cis-1,2-Dichloroethene		U	0.50	ug/L	
2-Butanone		U	5.0	ug/L	

U.S.E.P.A Region 2 Laboratory



Final Report

Project: Olean Well Field - 1809024

Project Number: 1809024

Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID: TB-01-SEP18			San	nple ID: 18090	24-08
VOA-TRACE GCMS					
Bromochloromethane		U	0.50	ug/L	
Chloroform		U	0.50	ug/L	
1,1,1-Trichloroethane		U	0.50	ug/L	
Cyclohexane		U	0.50	ug/L	
Carbon Tetrachloride		U	0.50	ug/L	
Benzene		U	0.50	ug/L	
1,2-Dichloroethane		U	0.50	ug/L	
Trichloroethene		U	0.50	ug/L	
1,2-Dichloropropane		U	0.50	ug/L	
Bromodichloromethane		U	0.50	ug/L	
cis-1,3-Dichloropropene		U	0.50	ug/L	
4-Methyl-2-Pentanone		U	5.0	ug/L	
Toluene		U	0.50	ug/L	
trans-1,3-Dichloropropene		U	0.50	ug/L	
1,1,2-Trichloroethane		U	0.50	ug/L	
Tetrachloroethene		U	0.50	ug/L	
Methylcyclohexane		U	0.50	ug/L	
Dibromochloromethane		U	0.50	ug/L	
1,2-Dibromoethane		U	0.50	ug/L	
2-Hexanone		U	5.0	ug/L	
Chlorobenzene		U	0.50	ug/L	
Ethylbenzene		U	0.50	ug/L	
m,p-Xylene		U	0.50	ug/L	
o-Xylene		U	0.50	ug/L	
Styrene		U	0.50	ug/L	
Bromoform		U	0.50	ug/L	
Isopropylbenzene		U	0.50	ug/L	
1,1,2,2-Tetrachloroethane		U	0.50	ug/L	

U.S.E.P.A Region 2 Laboratory



Final Report

Project: Olean Well Field - 1809024

Project Number: 1809024

	Analyte	Result	Qualifier	Reporting Limit	Units	Date and Time of Analysis*
Field ID:	ГВ-01-SEP18			Sar	nple ID: 18090	024-08
VOA	-TRACE GCMS					
	1,3-Dichlorobenzene		U	0.50	ug/L	
	1,4-Dichlorobenzene		U	0.50	ug/L	
	1,2-Dichlorobenzene		U	0.50	ug/L	
	1,2-Dibromo-3-Chloropropane		U	1.0	ug/L	
	1,2,4-Trichlorobenzene		U	0.50	ug/L	
	1,2,3-Trichlorobenzene		U	0.50	ug/L	

U.S.E.P.A Region 2 Laboratory

APPENDIX D Trip Report

SAMPLING TRIP REPORT

Site Name:Loohn's Cleaners and Launderers Source Area (OU 2 - Olean Well Field)Sampling Date:September 24-25, 2018Op/216Op/216

1. Site Location:

Olean, Cattaraugus County, New York

2. Sample Descriptions:

Refer to Table 1

3. Laboratories Receiving Samples:

Sample Type	Laboratory	Name and Address of Laboratory
	Code	
Trace Level VOCs in Water	LABB	U.S. EPA Region 2
		DESA Lab Branch
		2890 Woodbridge Ave.
		Edison NJ 08854

4. Sample Dispatch Data:

Groundwater samples were collected from 5 separate monitoring wells at the Loohn's Cleaners and Launders Source Area, OU-2, Olean Well Field site, Olean, NY between September 24-25, 2018. The samples were denoted as follows: MW-01-SEP18, MW-02-SEP18, MW-03-SEP18, MW-04-SEP18, MW-05-SEP18, MW-06-SEP18 with MW-06-SEP18 being a field Duplicate of MW-05-SEP18. The trip blank was denoted as TB-01-SEP18 and the Rinse blank as RB-01-SEP18. All samples were submitted to the U.S. EPA Region 2 DESA Lab Branch for the analysis of trace level Volatile Organics. All monitoring wells wells were purged and the samples collected by the EPA Region 2 Low Flow procedure.

5. Sampling Personnel:

Name	Organization	Site Duties
Robert C. Finke	U.S. EPA Region 2 DESA/HWSB Superfund Support Team	Field Project Manager/Sample Management
Mark Denno	U.S. EPA Region 2 DESA/HWSB Superfund Support Team	Field Personnel

6. Additional Comments:

The number of samples includes:

- 5 groundwater samples
- 1 field duplicate samples (field quality control sample)
- 1 Matrix Spike sample
- 1 rinsate blank samples (field quality control sample)
- 1 Trip Blank (VOCs only)

The following Sample Numbers were used for laboratory and/or field quality control:

CLP	Laborat	ory Quality Control (QC) Samples		
Standard Operating Procedure (SOP)	Matrix Spike/ Matrix Spike Duplicate (MS/MSD)	Field Duplicate		
Trace Level VOCs CLP Inorganic SOW EPA Region 2 SOP DW-1	MW-04-SEP18	MW-05-SEP18/MW-06-SEP18		

Report Prepared By: Robert C. Finke

Date: September 27, 2018

TABLE 1 SAMPLE DESCRIPTIONS LOOHN'S CLEANERS AND LAUNDERERS SOURCE AREA OF THE OLEAN WELL FIELD (OU-2) OLEAN, CATTARAUGUS COUNTY, NEW YORK September 24-25, 2018												
Sample Less tien		Sam Collec	ple tion	Commu	Analysis Requested		Analysis Requested	Analysis Requested	Analysis Requested		Required	Comula
Location	Sample Type	Date	Time	Sample Number	Parameter	Fraction	Sample Container	Sample Volume	Sample Preservation			
(MW-01) Along East State St.	Groundwater	9/24/18	1730	MW-01-SEP18	VOCs	Trace	(3) 40 mL glass/Teflon lid	40 mL (3)	pH <2 with HCl; Cool to 4°C			
(MW-02) South- Central, Along River	Groundwater	9/25/18	1020	MW-02-SEP18	VOCs	Trace	(3) 40 mL glass/Teflon lid	40 mL (3)	pH <2 with HCl; Cool to 4℃			
(MW-03) East – Along River	Groundwater	9/25/18	1120	MW-03-SEP18	VOCs	Trace	(3) 40 mL glass/ Teflon lid	40 mL (3)	pH <2 with HCl; Cool to 4°C			
(MW-04) West – Along River (Spike Sample)	Groundwater	9/25/18	1215	MW-04-SEP18	VOCs	Trace	(6) 40 mL glass/Teflon lid	40 mL (6)	pH <2 with HCl; Cool to 4℃			
(MW-05) West – Along River	Groundwater	9/25/18	1230	MW-05-SEP18	VOCs	Trace	(3) 40 mL glass/Teflon lid	40 mL (3)	pH <2 with HCl; Cool to 4°C			
(MW-06) West – Along River (FIELD DUPLICATE of MW-05)	Groundwater	9/25/18	1230	MW-06-SEP18	VOCs	Trace	(3) 40 mL glass/Teflon lid	40 mL (3)	pH <2 with HCl; Cool to 4°C			
Trip Blank	DI Water	8/24/18	0750	TB-01-SEP18	VOCs	Trace	(3) 40 mL glass/Teflon lid	40 mL (3)	pH <2 with HCl; Cool to 4°C			
Rinse Blank	Deionized Water	8/24/18	0740	RB-01-SEP18	VOCs	Trace	(3) 40 mL glass/Teflon lid	40 mL (3)	pH <2 with HCl; Cool to 4°C			

ATTACHMENT I

Chain-of-Custody Form

USEPA

Hand Delivered Code: 2018 T 02P 303DD20216RA2A AirbillNo: N/A

CHAIN OF CUSTODY RECORD Site #: NYD980528657 Contact: Robert Finke 732-586-9987

No: 2-092618-090007-0003

DESA LB Project #: P-1809024 USEPA Region 2 DESALB Lab Phone: 732-321-6706

Lab #	Sample #	CLP Sample #	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	Lab QC
	M W-01-SEP18	BEG12	Trace Volatiles	Ground Water	9/24/2018	17:30	3	40 ml VOA	HCI	
	MW-02-SEP18	BEG13	Trace Volatiles	Ground Water	9/25/2018	10:20	3	40 ml VOA	HCI	
	MW-03-SEP18	BEG14	Trace Volatiles	Ground Water	9/25/2018	11:20	. 3	40 ml VOA	HCI	
	MW-04-SEP18	BEG15	Trace Volatiles	Ground Water	9/25/2018	12:15	6	40 ml VOA	HCI	Y
	MW-05-SEP18	BEG16	Trace Volatiles	Ground Water	9/25/2018	12:30	3	40 ml VOA	HCI	
	MW-06-SEP18	BEG17	Trace Volatiles	Ground Water	9/25/2018	12:30	3	40 ml VOA	HCI	
	RB-01-SEP18	BEG18	Trace Volatiles	Filtered Water	9/24/2018	07:40	3	40 ml VOA	HCI	
	TB-01-SEP18	BEG19	Trace Volatiles	Filtered Water	9/24/2018	07:50	3	40 ml VOA	HCI	
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Special Instructions:			C	HAIN OF CUSTODY	#	
		\bigcap			29.	
Items/Reason Relinquished by (Signature and Organization)	Date/Time	Received by Signature a	nd Ørganization)	Date/Time	Sample Conditio	n Upon Receipt
Halysis CAMK	9/27/18/130	Autom pour	will	9/27/18 11:	25	INTACT
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ATTACHMENT II

LOW FLOW WELL REPORTS

Low-Flow Test Report:

Test Date / Time: 9/24/2018 4:41:28 PM Project: Olean Well Field - Loohns Cleaners Source Area MW-1 Operator Name: M.Denno, R.Finke

Location Name: MW-1	Pump Type: Grundfos RediFLO2	Instrument Used: Aqua TROLL 600
Well Diameter: 2 in	S.S. Submersible Pump	Vented
Screen Length: 10 ft	Tubing Type: 5/8" O.D. LDPE with	Serial Number: 540432
Top of Screen: 18 ft	1/2" I.D. Teflon-Lined	
Total Depth: 27.37 ft	Tubing Inner Diameter: 0.5 in	
Initial Depth to Water: 17.7 ft	Tubing Length: 33 ft	
	Pump Intake From TOC: 26 ft	
	Estimated Total Volume Pumped:	
	8193.333 ml	
	Flow Cell Volume: 130 ml	
	Final Flow Rate: 200 ml/min	
	Final Draw Down: 0 ft	

Test Notes:

Weather Conditions:

Overcast, 64*F

Low-Flow Readings:

Date Time	Elapsed Time	рН	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth To Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.33	
9/24/2018 4:41 PM	00:00	7.00 pH	16.65 °C	1,305.0 µS/cm	0.30 mg/L	101.93 NTU	148.3 mV	17.70 ft	200.00 ml/min
9/24/2018 4:44 PM	03:00	6.98 pH	16.52 °C	1,313.3 μS/cm	0.29 mg/L	87.92 NTU	138.9 mV	17.70 ft	200.00 ml/min
9/24/2018 4:49 PM	07:58	7.03 pH	16.80 °C	1,314.9 μS/cm	0.29 mg/L	128.26 NTU	139.8 mV	17.70 ft	200.00 ml/min
9/24/2018 4:52 PM	10:58	7.05 pH	16.78 °C	1,313.1 μS/cm	0.29 mg/L	103.82 NTU	131.6 mV	17.70 ft	200.00 ml/min
9/24/2018 4:55 PM	13:58	7.06 pH	16.79 °C	1,296.2 μS/cm	0.26 mg/L	88.36 NTU	125.0 mV	17.70 ft	200.00 ml/min
9/24/2018 4:58 PM	16:58	7.07 pH	16.94 °C	1,275.9 μS/cm	0.25 mg/L	60.62 NTU	120.5 mV	17.70 ft	200.00 ml/min
9/24/2018 5:01 PM	19:58	7.09 pH	16.95 °C	1,260.0 μS/cm	0.24 mg/L	50.98 NTU	114.0 mV	17.70 ft	200.00 ml/min
9/24/2018 5:04 PM	22:58	7.11 pH	16.94 °C	1,240.4 μS/cm	0.22 mg/L	42.97 NTU	108.2 mV	17.70 ft	200.00 ml/min
9/24/2018 5:07 PM	25:58	7.11 pH	16.94 °C	1,229.6 μS/cm	0.22 mg/L	55.12 NTU	104.7 mV	17.70 ft	200.00 ml/min
9/24/2018 5:10 PM	28:58	7.12 pH	16.92 °C	1,229.1 μS/cm	0.21 mg/L	45.97 NTU	100.6 mV	17.70 ft	200.00 ml/min
9/24/2018 5:13 PM	31:58	7.12 pH	16.90 °C	1,230.7 μS/cm	0.21 mg/L	28.62 NTU	96.8 mV	17.70 ft	200.00 ml/min

9/24/2018	24.59	7 12 pH	16.00.00	1,227.4	0.22 mg/l		02.2 m\/	17 70 ft	200.00 ml/min
5:16 PM	54.56	7.12 pm	10.90 C	µS/cm	0.22 mg/L	00.02 1110	95.5 111	17.70 1	200.00 111/1111
9/24/2018	27.59	7 10 pH	16.04.90	1,227.5	0.22 mg/l	59.02 NTU	80.0 mV	17 70 ft	200.00 ml/min
5:19 PM	57.50	7.12 pm	10.94 C	µS/cm	0.22 mg/L	56.95 NTU	69.0 mv	17.701	200.00 111/1111
9/24/2018	10.59	7 12 nH	16.07.00	1,225.9	0.22 mg/l		94.2 mV	17 70 ft	200.00 ml/min
5:22 PM	40.56	7.13 pm	10.97 C	µS/cm	0.23 mg/L	03.25 NTU	04.3 1110	17.701	200.00 111/11111

Samples

Sample ID:	Description:
MW-01-SEP18	VOCs

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 9/25/2018 8:51:33 AM Project: Olean Well Field - Loohns Cleaners Source Area MW-2 Operator Name: M.Denno, R.Finke

Location Name: MW-2	Pump Type: Grundfos RediFLO2	Instrument Used: Aqua TROLL 600			
Well Diameter: 2 in	S.S. Submersible Pump	Vented			
Screen Length: 10 ft	Tubing Type: 5/8" O.D. LDPE with	Serial Number: 540503			
Top of Screen: 18 ft	1/2" I.D. Teflon-Lined				
Total Depth: 30.02 ft	Tubing Inner Diameter: 0.5 in				
Initial Depth to Water: 17.54 ft	Tubing Length: 33 ft				
	Pump Intake From TOC: 27 ft				
	Estimated Total Volume Pumped:				
	16710 ml				
	Flow Cell Volume: 130 ml				
	Final Flow Rate: 200 ml/min				
	Final Draw Down: 0 ft				

Test Notes:

Weather Conditions:

Rain, 54*F

Low-Flow Readings:

Date Time	Elapsed Time	рН	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth To Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.33	
9/25/2018 8:51 AM	00:00	7.37 pH	12.74 °C	560.81 µS/cm	0.25 mg/L	435.25 NTU	145.0 mV	17.54 ft	200.00 ml/min
9/25/2018 8:54 AM	03:00	7.48 pH	12.87 °C	569.51 µS/cm	0.28 mg/L	430.47 NTU	124.6 mV	17.54 ft	200.00 ml/min
9/25/2018 8:57 AM	06:00	7.53 pH	13.00 °C	564.49 µS/cm	0.23 mg/L	255.17 NTU	85.8 mV	17.54 ft	200.00 ml/min
9/25/2018 9:00 AM	09:00	7.54 pH	13.35 °C	555.95 µS/cm	0.22 mg/L	144.04 NTU	54.7 mV	17.54 ft	200.00 ml/min
9/25/2018 9:03 AM	12:00	7.56 pH	13.65 °C	554.03 µS/cm	0.22 mg/L	65.33 NTU	32.4 mV	17.54 ft	200.00 ml/min
9/25/2018 9:06 AM	15:00	7.57 pH	13.69 °C	551.16 µS/cm	0.18 mg/L	71.79 NTU	15.6 mV	17.54 ft	200.00 ml/min
9/25/2018 9:09 AM	18:00	7.58 pH	13.68 °C	554.89 µS/cm	0.16 mg/L	36.24 NTU	12.5 mV	17.54 ft	200.00 ml/min
9/25/2018 9:12 AM	21:00	7.58 pH	13.55 °C	555.49 µS/cm	0.15 mg/L	33.96 NTU	12.0 mV	17.54 ft	200.00 ml/min
9/25/2018 9:15 AM	24:00	7.58 pH	13.52 °C	556.96 µS/cm	0.13 mg/L	32.30 NTU	15.6 mV	17.54 ft	200.00 ml/min
9/25/2018 9:18 AM	27:00	7.59 pH	13.52 °C	558.19 µS/cm	0.12 mg/L	21.23 NTU	12.6 mV	17.54 ft	200.00 ml/min
9/25/2018 9:21 AM	29:33	7.59 pH	13.52 °C	559.56 µS/cm	0.11 mg/L	27.23 NTU	14.6 mV	17.54 ft	200.00 ml/min

9/25/2018 9:24 AM	32:33	7.60 pH	13.52 °C	560.20 µS/cm	0.10 mg/L	36.32 NTU	9.2 mV	17.54 ft	200.00 ml/min
9/25/2018 9:27 AM	35:33	7.60 pH	13.52 °C	563.23 µS/cm	0.09 mg/L	29.28 NTU	5.6 mV	17.54 ft	200.00 ml/min
9/25/2018 9:30 AM	38:33	7.61 pH	13.52 °C	562.09 µS/cm	0.09 mg/L	21.94 NTU	5.2 mV	17.54 ft	200.00 ml/min
9/25/2018 9:33 AM	41:33	7.61 pH	13.52 °C	563.64 µS/cm	0.09 mg/L	22.60 NTU	1.1 mV	17.54 ft	200.00 ml/min
9/25/2018 9:36 AM	44:33	7.61 pH	13.54 °C	563.49 µS/cm	0.09 mg/L	17.51 NTU	3.4 mV	17.54 ft	200.00 ml/min
9/25/2018 9:39 AM	47:33	7.61 pH	13.55 °C	564.83 µS/cm	0.08 mg/L	14.41 NTU	2.9 mV	17.54 ft	200.00 ml/min
9/25/2018 9:42 AM	50:33	7.62 pH	13.56 °C	565.38 µS/cm	0.08 mg/L	16.49 NTU	3.4 mV	17.54 ft	200.00 ml/min
9/25/2018 9:45 AM	53:33	7.62 pH	13.55 °C	565.20 µS/cm	0.08 mg/L	18.65 NTU	3.7 mV	17.54 ft	200.00 ml/min
9/25/2018 9:48 AM	56:33	7.62 pH	13.57 °C	566.92 µS/cm	0.08 mg/L	11.89 NTU	2.5 mV	17.54 ft	200.00 ml/min
9/25/2018 9:51 AM	59:33	7.62 pH	13.58 °C	567.45 µS/cm	0.07 mg/L	14.50 NTU	1.6 mV	17.54 ft	200.00 ml/min
9/25/2018 9:54 AM	01:02:33	7.62 pH	13.56 °C	568.64 µS/cm	0.07 mg/L	11.46 NTU	2.8 mV	17.54 ft	200.00 ml/min
9/25/2018 9:57 AM	01:05:33	7.62 pH	13.56 °C	569.34 µS/cm	0.07 mg/L	6.57 NTU	2.8 mV	17.54 ft	200.00 ml/min
9/25/2018 10:00 AM	01:08:33	7.62 pH	13.56 °C	570.38 µS/cm	0.07 mg/L	8.73 NTU	5.8 mV	17.54 ft	200.00 ml/min
9/25/2018 10:03 AM	01:11:33	7.62 pH	13.56 °C	572.25 µS/cm	0.07 mg/L	10.87 NTU	7.7 mV	17.54 ft	200.00 ml/min
9/25/2018 10:06 AM	01:14:33	7.62 pH	13.55 °C	573.13 µS/cm	0.06 mg/L	6.45 NTU	7.8 mV	17.54 ft	200.00 ml/min
9/25/2018 10:09 AM	01:17:33	7.63 pH	13.55 °C	574.68 µS/cm	0.06 mg/L	6.20 NTU	4.8 mV	17.54 ft	200.00 ml/min
9/25/2018 10:12 AM	01:20:33	7.62 pH	13.55 °C	574.68 µS/cm	0.06 mg/L	6.02 NTU	3.2 mV	17.54 ft	200.00 ml/min
9/25/2018 10:15 AM	01:23:33	7.62 pH	13.53 °C	574.64 µS/cm	0.06 mg/L	6.50 NTU	3.5 mV	17.54 ft	200.00 ml/min

Samples

Sample ID:	Description:
MW-02	TCL-VOC Fraction Only

Created using VuSitu from In-Situ, Inc.
Low-Flow Test Report:

Test Date / Time: 9/25/2018 8:49:36 AM Project: Olean Well Field - Loohns Cleaners Source Area MW-3 Operator Name: M.Denno, R.Finke

Location Name: MW-3	Pump Type: Grundfos RediFLO2	Instrument Used: Aqua TROLL 600
Well Diameter: 2 in	S.S. Submersible Pump	Vented
Casing Type: PVC	Tubing Type: 5/8" O.D. LDPE with	Serial Number: 540432
Screen Length: 10 ft	1/2" I.D. Teflon-Lined	
Top of Screen: 25 ft	Tubing Inner Diameter: 0.5 in	
Total Depth: 33.98 ft	Tubing Length: 40 ft	
Initial Depth to Water: 16.5 ft	Pump Intake From TOC: 31 ft	
	Estimated Total Volume Pumped:	
	20013.334 ml	
	Flow Cell Volume: 130 ml	
	Final Flow Rate: 200 ml/min	
	Final Draw Down: 0.15 ft	

Test Notes: VOCs Only

Weather Conditions:

Rain. 54F

Low-Flow Readings:

Date Time	Elapsed Time	рН	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth To Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.1	
9/25/2018 8:49 AM	00:00	7.77 pH	12.76 °C	419.98 µS/cm	0.95 mg/L	179.90 NTU	115.2 mV	16.50 ft	200.00 ml/min
9/25/2018 8:52 AM	03:00	7.86 pH	12.48 °C	429.10 µS/cm	0.14 mg/L	164.77 NTU	88.3 mV	16.50 ft	200.00 ml/min
9/25/2018 8:55 AM	06:00	7.88 pH	12.80 °C	430.59 µS/cm	0.13 mg/L	154.05 NTU	68.1 mV	16.50 ft	200.00 ml/min
9/25/2018 8:58 AM	08:53	7.88 pH	12.94 °C	432.81 µS/cm	0.13 mg/L	111.78 NTU	55.3 mV	16.50 ft	200.00 ml/min
9/25/2018 8:59 AM	09:59	7.89 pH	12.98 °C	433.44 µS/cm	0.12 mg/L	89.22 NTU	50.9 mV	16.50 ft	200.00 ml/min
9/25/2018 9:02 AM	12:59	7.89 pH	13.02 °C	433.33 µS/cm	0.11 mg/L	69.03 NTU	41.5 mV	16.50 ft	200.00 ml/min
9/25/2018 9:05 AM	15:59	7.89 pH	13.01 °C	433.02 µS/cm	0.11 mg/L	33.81 NTU	35.2 mV	16.50 ft	200.00 ml/min
9/25/2018 9:08 AM	18:59	7.90 pH	12.99 °C	429.89 µS/cm	0.10 mg/L	37.51 NTU	33.3 mV	16.50 ft	200.00 ml/min
9/25/2018 9:11 AM	21:59	7.89 pH	12.95 °C	428.39 µS/cm	0.09 mg/L	38.39 NTU	25.6 mV	16.50 ft	200.00 ml/min
9/25/2018 9:14 AM	24:59	7.89 pH	12.93 °C	429.44 µS/cm	0.09 mg/L	18.22 NTU	21.0 mV	16.50 ft	200.00 ml/min
9/25/2018 9:17 AM	27:59	7.89 pH	13.07 °C	430.78 µS/cm	0.10 mg/L	24.45 NTU	16.3 mV	16.55 ft	200.00 ml/min

9/25/2018 9:20 AM	31:04	7.90 pH	13.17 °C	435.68 µS/cm	0.12 mg/L	8.97 NTU	14.8 mV	16.65 ft	200.00 ml/min
9/25/2018 9:23 AM	34:04	7.89 pH	13.34 °C	428.91 µS/cm	0.13 mg/L	11.38 NTU	10.6 mV	16.65 ft	200.00 ml/min
9/25/2018 9 [.] 26 AM	37:04	7.89 pH	13.45 °C	436.07 µS/cm	0.13 mg/L	7.91 NTU	8.3 mV	16.65 ft	200.00 ml/min
9/25/2018 9:29 AM	40:04	7.89 pH	13.49 °C	432.40 µS/cm	0.13 mg/L	14.45 NTU	5.2 mV	16.65 ft	200.00 ml/min
9/25/2018 9:32 AM	43:04	7.88 pH	13.46 °C	430.76 µS/cm	0.14 mg/L	10.84 NTU	4.2 mV	16.65 ft	200.00 ml/min
9/25/2018 9:35 AM	46:04	7.89 pH	13.47 °C	430.61 µS/cm	0.15 mg/L	6.87 NTU	2.2 mV	16.65 ft	200.00 ml/min
9/25/2018	49:04	7.89 pH	13.47 °C	432.77 µS/cm	0.14 mg/L	4.78 NTU	1.2 mV	16.65 ft	200.00 ml/min
9/25/2018	52:04	7.89 pH	13.48 °C	433.60 µS/cm	0.14 mg/L	7.24 NTU	0.1 mV	16.65 ft	200.00 ml/min
9/25/2018	55:04	7.88 pH	13.50 °C	430.03 µS/cm	0.14 mg/L	7.32 NTU	-1.6 mV	16.65 ft	200.00 ml/min
9/25/2018	58:04	7.89 pH	13.53 °C	434.73 µS/cm	0.14 mg/L	4.82 NTU	-2.8 mV	16.65 ft	200.00 ml/min
9/25/2018	01:01:04	7.89 pH	13.56 °C	433.49 µS/cm	0.14 mg/L	3.92 NTU	-4.8 mV	16.65 ft	200.00 ml/min
9/25/2018	01:04:04	7.88 pH	13.55 °C	433.34 µS/cm	0.14 mg/L	5.62 NTU	-5.3 mV	16.65 ft	200.00 ml/min
9:53 AM 9/25/2018	01:07:04	7.89 pH	13.57 °C	433.99 µS/cm	0.14 mg/L	6.28 NTU	-4.2 mV	16.65 ft	200.00 ml/min
9:56 AM 9/25/2018	01:10:04	7.89 pH	13.60 °C	433.59 µS/cm	0.13 mg/L	4.26 NTU	-5.4 mV	16.65 ft	200.00 ml/min
9:59 AM 9/25/2018	01:13:04	7.89 pH	13.65 °C	434.38 µS/cm	0.14 mg/L	3.49 NTU	-6.4 mV	16.65 ft	200.00 ml/min
10:02 AM 9/25/2018	01:16:04	7.88 pH	13.61 °C	434.36 µS/cm	0.13 mg/L	4.03 NTU	-6.4 mV	16.65 ft	200.00 ml/min
10:05 AM 9/25/2018	01.19.04	7.88 pH	13.59 °C	434.94 uS/cm	0.14 mg/l	5.18 NTU	-8.0 mV	16.65 ft	200.00 ml/min
10:08 AM 9/25/2018	01.22.04	7 89 pH	13 56 °C	430.76 µS/cm	0.13 mg/l	4 58 NTU	-10.7 mV	16.65.ft	200.00 ml/min
10:11 AM 9/25/2018	01:25:04	7 80 pH	13.54 °C	422.77 uS/cm	0.13 mg/l	2 29 NTU	11.8 m\/	16.65 ft	200.00 ml/min
10:14 AM 9/25/2018	01:20:04	7.09 pH	13.54 C	433.77 μ3/cm	0.13 mg/L	3.30 NTU	-11.0111	10.05 ft	200.00 m/min
10:17 AM	01:28:04	7.89 pH	13.56 °C	434.45 µS/cm	0.13 mg/L	4.82 NTU	-13.8 mV	16.65 ft	200.00 mi/min
9/25/2018 10:20 AM	01:31:04	7.89 pH	13.61 °C	431.18 µS/cm	0.13 mg/L	5.30 NTU	-13.9 mV	16.65 ft	200.00 ml/min
9/25/2018 10:23 AM	01:34:04	7.89 pH	13.64 °C	434.04 µS/cm	0.13 mg/L	4.24 NTU	-14.5 mV	16.65 ft	200.00 ml/min
9/25/2018 10:26 AM	01:37:04	7.90 pH	13.68 °C	434.52 µS/cm	0.13 mg/L	4.01 NTU	-16.7 mV	16.65 ft	200.00 ml/min
9/25/2018 10:29 AM	01:40:04	7.89 pH	13.73 °C	438.00 µS/cm	0.13 mg/L	3.88 NTU	-16.0 mV	16.65 ft	200.00 ml/min

Samples

Sample ID:

Description:

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 9/25/2018 10:58:27 AM Project: Olean Well Field - Loohns Cleaners Source Area MW-4 Operator Name: M.Denno, R.Finke

Location Name: MW-4	Pump Type: Grundfos RediFLO2	Instrument Used: Aqua TROLL 600
Well Diameter: 2 in	S.S. Submersible Pump	Vented
Casing Type: PVC	Tubing Type: 5/8" O.D. LDPE with	Serial Number: 540432
Screen Length: 10 ft	1/2" I.D. Teflon-Lined	
Top of Screen: 20 ft	Tubing Inner Diameter: 0.5 in	
Total Depth: 28.65 ft	Tubing Length: 35 ft	
Initial Depth to Water: 17.75 ft	Pump Intake From TOC: 26.65 ft	
	Estimated Total Volume Pumped:	
	15170 ml	
	Flow Cell Volume: 130 ml	
	Final Flow Rate: 200 ml/min	
	Final Draw Down: 0 ft	

Test Notes:

Weather Conditions:

Overcast, 60F

Low-Flow Readings:

Date Time	Elapsed Time	рН	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth To Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.1	
9/25/2018 10:58 AM	00:00	7.71 pH	12.76 °C	311.78 µS/cm	0.84 mg/L	356.89 NTU	118.7 mV	17.75 ft	200.00 ml/min
9/25/2018 11:01 AM	03:00	7.73 pH	12.67 °C	307.97 µS/cm	0.55 mg/L	368.56 NTU	122.3 mV	17.75 ft	200.00 ml/min
9/25/2018 11:04 AM	06:00	7.73 pH	13.01 °C	314.41 µS/cm	0.45 mg/L	137.02 NTU	113.5 mV	17.75 ft	200.00 ml/min
9/25/2018 11:07 AM	09:00	7.73 pH	13.44 °C	314.90 µS/cm	0.36 mg/L	68.65 NTU	109.4 mV	17.75 ft	200.00 ml/min
9/25/2018 11:10 AM	12:00	7.72 pH	13.59 °C	314.13 µS/cm	0.24 mg/L	92.23 NTU	97.9 mV	17.75 ft	200.00 ml/min
9/25/2018 11:13 AM	15:00	7.72 pH	13.74 °C	314.45 µS/cm	0.22 mg/L	49.65 NTU	83.5 mV	17.75 ft	200.00 ml/min
9/25/2018 11:16 AM	18:00	7.72 pH	13.77 °C	314.45 µS/cm	0.20 mg/L	29.39 NTU	72.3 mV	17.75 ft	200.00 ml/min
9/25/2018 11:19 AM	21:00	7.72 pH	13.83 °C	314.07 µS/cm	0.19 mg/L	18.55 NTU	64.1 mV	17.75 ft	200.00 ml/min
9/25/2018 11:22 AM	24:00	7.71 pH	13.87 °C	313.15 µS/cm	0.18 mg/L	27.69 NTU	57.7 mV	17.75 ft	200.00 ml/min
9/25/2018 11:23 AM	24:51	7.72 pH	13.87 °C	312.96 µS/cm	0.18 mg/L	21.48 NTU	54.8 mV	17.75 ft	200.00 ml/min
9/25/2018 11:26 AM	27:51	7.71 pH	13.86 °C	312.50 µS/cm	0.17 mg/L	14.20 NTU	50.3 mV	17.75 ft	200.00 ml/min

9/25/2018 11:29 AM	30:51	7.72 pH	13.91 °C	311.88 µS/cm	0.17 mg/L	11.52 NTU	49.8 mV	17.75 ft	200.00 ml/min
9/25/2018 11:32 AM	33:51	7.72 pH	13.91 °C	311.13 µS/cm	0.17 mg/L	12.69 NTU	48.4 mV	17.75 ft	200.00 ml/min
9/25/2018 11:35 AM	36:51	7.71 pH	13.92 °C	310.76 µS/cm	0.16 mg/L	10.26 NTU	44.9 mV	17.75 ft	200.00 ml/min
9/25/2018 11:38 AM	39:51	7.72 pH	13.96 °C	310.17 µS/cm	0.16 mg/L	6.83 NTU	44.3 mV	17.75 ft	200.00 ml/min
9/25/2018 11:41 AM	42:51	7.72 pH	14.00 °C	309.74 µS/cm	0.16 mg/L	6.04 NTU	43.4 mV	17.75 ft	200.00 ml/min
9/25/2018 11:44 AM	45:51	7.73 pH	14.00 °C	309.15 µS/cm	0.16 mg/L	5.50 NTU	42.3 mV	17.75 ft	200.00 ml/min
9/25/2018 11:47 AM	48:51	7.72 pH	14.01 °C	308.80 µS/cm	0.15 mg/L	7.91 NTU	40.3 mV	17.75 ft	200.00 ml/min
9/25/2018 11:50 AM	51:51	7.72 pH	14.01 °C	308.52 µS/cm	0.15 mg/L	6.46 NTU	39.9 mV	17.75 ft	200.00 ml/min
9/25/2018 11:53 AM	54:51	7.72 pH	14.06 °C	308.18 µS/cm	0.15 mg/L	7.90 NTU	36.5 mV	17.75 ft	200.00 ml/min
9/25/2018 11:56 AM	57:51	7.73 pH	14.05 °C	307.68 µS/cm	0.15 mg/L	5.82 NTU	37.5 mV	17.75 ft	200.00 ml/min
9/25/2018 11:59 AM	01:00:51	7.73 pH	14.15 °C	307.61 µS/cm	0.15 mg/L	4.93 NTU	36.6 mV	17.75 ft	200.00 ml/min
9/25/2018 12:02 PM	01:03:51	7.73 pH	14.20 °C	307.07 µS/cm	0.14 mg/L	4.74 NTU	34.0 mV	17.75 ft	200.00 ml/min
9/25/2018 12:05 PM	01:06:51	7.72 pH	14.16 °C	306.90 µS/cm	0.14 mg/L	6.48 NTU	28.7 mV	17.75 ft	200.00 ml/min
9/25/2018 12:08 PM	01:09:51	7.73 pH	14.17 °C	306.47 µS/cm	0.14 mg/L	5.07 NTU	29.6 mV	17.75 ft	200.00 ml/min
9/25/2018 12:11 PM	01:12:51	7.72 pH	14.16 °C	306.59 µS/cm	0.13 mg/L	5.33 NTU	32.2 mV	17.75 ft	200.00 ml/min
9/25/2018 12:14 PM	01:15:51	7.73 pH	14.22 °C	306.20 µS/cm	0.13 mg/L	5.09 NTU	30.0 mV	17.75 ft	200.00 ml/min

Samples

Sample ID:

Description:

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 9/25/2018 10:57:43 AM Project: Olean Well Field - Loohns Cleaners Source Area MW-5 Operator Name: M.Denno, R.Finke

Location Name: MW-5	Pump Type: Grundfos RediFLO2	Instrument Used: Aqua TROLL 600
Well Diameter: 2 in	S.S. Submersible Pump	Vented
Screen Length: 10 ft	Tubing Type: 5/8" O.D. LDPE with	Serial Number: 540503
Top of Screen: 39 ft	1/2" I.D. Teflon-Lined	
Total Depth: 49 ft	Tubing Inner Diameter: 0.5 in	
Initial Depth to Water: 18.21 ft	Tubing Length: 54 ft	
	Pump Intake From TOC: 47 ft	
	Estimated Total Volume Pumped:	
	16200 ml	
	Flow Cell Volume: 130 ml	
	Final Flow Rate: 200 ml/min	
	Final Draw Down: 0 ft	

Test Notes:

Weather Conditions:

Overcast, 60*F

Low-Flow Readings:

Date Time	Elapsed Time	рН	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth To Water	Flow
		+/- 0.1	+/- 3 %	+/- 3 %	+/- 10 %	+/- 10 %	+/- 10	+/- 0.33	
9/25/2018 10:57 AM	00:00	7.40 pH	12.94 °C	493.40 µS/cm	1.67 mg/L	288.90 NTU	161.4 mV	18.21 ft	200.00 ml/min
9/25/2018 11:00 AM	03:00	7.41 pH	12.86 °C	493.29 µS/cm	1.64 mg/L	341.30 NTU	198.8 mV	18.21 ft	200.00 ml/min
9/25/2018 11:03 AM	06:00	7.42 pH	12.80 °C	493.70 µS/cm	1.55 mg/L	224.96 NTU	207.5 mV	18.21 ft	200.00 ml/min
9/25/2018 11:06 AM	09:00	7.42 pH	13.21 °C	495.14 µS/cm	1.51 mg/L	178.47 NTU	198.5 mV	18.21 ft	200.00 ml/min
9/25/2018 11:09 AM	12:00	7.42 pH	13.45 °C	494.75 µS/cm	1.51 mg/L	228.60 NTU	207.7 mV	18.21 ft	200.00 ml/min
9/25/2018 11:12 AM	15:00	7.42 pH	13.38 °C	493.62 µS/cm	1.52 mg/L	189.04 NTU	204.0 mV	18.21 ft	200.00 ml/min
9/25/2018 11:15 AM	18:00	7.42 pH	13.28 °C	493.91 µS/cm	1.49 mg/L	130.54 NTU	200.3 mV	18.21 ft	200.00 ml/min
9/25/2018 11:18 AM	21:00	7.41 pH	13.33 °C	494.05 µS/cm	1.46 mg/L	104.76 NTU	195.4 mV	18.21 ft	200.00 ml/min
9/25/2018 11:21 AM	24:00	7.41 pH	13.34 °C	493.88 µS/cm	1.44 mg/L	84.55 NTU	185.4 mV	18.21 ft	200.00 ml/min
9/25/2018 11:24 AM	27:00	7.41 pH	13.28 °C	493.21 µS/cm	1.44 mg/L	66.66 NTU	185.8 mV	18.21 ft	200.00 ml/min
9/25/2018 11:27 AM	30:00	7.41 pH	13.22 °C	493.27 µS/cm	1.43 mg/L	62.79 NTU	182.5 mV	18.21 ft	200.00 ml/min

9/25/2018 11:30 AM	33:00	7.42 pH	13.26 °C	493.63 µS/cm	1.42 mg/L	35.83 NTU	178.5 mV	18.21 ft	200.00 ml/min
9/25/2018 11:33 AM	36:00	7.42 pH	13.20 °C	493.21 µS/cm	1.42 mg/L	39.88 NTU	182.7 mV	18.21 ft	200.00 ml/min
9/25/2018 11:36 AM	39:00	7.42 pH	13.17 °C	493.25 µS/cm	1.43 mg/L	30.14 NTU	180.6 mV	18.21 ft	200.00 ml/min
9/25/2018 11:39 AM	42:00	7.42 pH	13.20 °C	493.54 µS/cm	1.42 mg/L	39.34 NTU	183.2 mV	18.21 ft	200.00 ml/min
9/25/2018 11:42 AM	45:00	7.42 pH	13.49 °C	493.64 µS/cm	1.45 mg/L	41.13 NTU	183.1 mV	18.21 ft	200.00 ml/min
9/25/2018 11:45 AM	48:00	7.42 pH	13.46 °C	493.28 µS/cm	1.44 mg/L	35.32 NTU	184.8 mV	18.21 ft	200.00 ml/min
9/25/2018 11:48 AM	51:00	7.41 pH	13.46 °C	493.15 µS/cm	1.44 mg/L	18.17 NTU	181.2 mV	18.21 ft	200.00 ml/min
9/25/2018 11:51 AM	54:00	7.41 pH	13.63 °C	493.91 µS/cm	1.44 mg/L	28.67 NTU	182.7 mV	18.21 ft	200.00 ml/min
9/25/2018 11:54 AM	57:00	7.42 pH	13.68 °C	493.40 µS/cm	1.43 mg/L	34.02 NTU	182.2 mV	18.21 ft	200.00 ml/min
9/25/2018 11:57 AM	01:00:00	7.41 pH	13.61 °C	493.28 µS/cm	1.43 mg/L	18.79 NTU	183.4 mV	18.21 ft	200.00 ml/min
9/25/2018 12:00 PM	01:03:00	7.41 pH	13.79 °C	493.95 µS/cm	1.42 mg/L	12.84 NTU	181.0 mV	18.21 ft	200.00 ml/min
9/25/2018 12:03 PM	01:06:00	7.42 pH	13.83 °C	493.65 µS/cm	1.42 mg/L	20.69 NTU	178.5 mV	18.21 ft	200.00 ml/min
9/25/2018 12:06 PM	01:09:00	7.42 pH	13.75 °C	493.31 µS/cm	1.42 mg/L	13.14 NTU	177.7 mV	18.21 ft	200.00 ml/min
9/25/2018 12:09 PM	01:12:00	7.41 pH	13.74 °C	493.07 µS/cm	1.42 mg/L	15.35 NTU	183.5 mV	18.21 ft	200.00 ml/min
9/25/2018 12:12 PM	01:15:00	7.41 pH	13.69 °C	493.48 µS/cm	1.41 mg/L	11.43 NTU	183.8 mV	18.21 ft	200.00 ml/min
9/25/2018 12:15 PM	01:18:00	7.41 pH	13.88 °C	493.95 µS/cm	1.41 mg/L	10.86 NTU	185.5 mV	18.21 ft	200.00 ml/min
9/25/2018 12:18 PM	01:21:00	7.41 pH	14.01 °C	493.92 µS/cm	1.41 mg/L	11.76 NTU	185.0 mV	18.21 ft	200.00 ml/min

Samples

Sample ID:	Description:
MW-05 & MW-06	TCL VOC Fraction

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APPENDIX E LINKS TO REFERENCES:

Federal MCLs: http://water.epa.gov/drink/contaminants/upload/mcl-2.pdf

State Water Criteria: http://www.dec.ny.gov/regs/4590.html