EDWARD P. MANGANO
COUNTY EXECUTIVE

SHILA SHAH-GAVNOUDIAS, P.E.
COMMISSIONER

COUNTY OF NASSAU
DEPARTMENT OF PUBLIC WORKS
1194 PROSPECT AVENUE
WESTBURY, NEW YORK 11590-2723

April 24, 2015

Cynthia Whitfield, P.E.
New York State Department of Environmental Conservation
Division of Environmental Remediation, 12th Floor
625 Broadway
Albany, New York 12233-7011

Re: Mitchel Field Purex Groundwater Remediation Facility (MFPGRF),
NYSDEC site #130014:
Review of Groundwater Conditions and Site Remediation Criteria – April 2015

Dear Ms. Whitfield:

The Nassau County Department of Public Works would like to take this opportunity to update your office regarding groundwater conditions at the Purex Remedial site. The attached report includes required groundwater sampling data for the period April 2012 through October 2014. This data supports our previously stated position that treatment of the former ***Plume Area*** is no longer required in the upper and lower portions of the ***Magothy Aquifer***. The report also includes a review of all site conditions (including the containment area) and an evaluation of ***Groundwater Remediation criteria***. The review of the remediation criteria and its associated statistical analysis has been prepared by ***Malcolm Pirnie, the water division of Arcadis***, for the Nassau County Department of Public Works.

Based upon this review of groundwater sampling results and all applicable remediation criteria, the County of Nassau believes that no further groundwater treatment is required at the site. The County also believes that the existing containment area is sound and provides an effective remedy (slurry wall keyed into an existing low permeability stratum) when used in conjunction with a modified groundwater sampling program.

In summary, the County of Nassau would like to formally request New York State Department of Environmental Conservation (NYSDEC) approval for the termination of all groundwater treatment. Further, Nassau County plans to maintain the containment area and would like to propose a modification to the existing groundwater monitoring program to reduce the number of wells to be monitored and the frequency of monitoring. The revised groundwater monitoring plan would be used to evaluate conditions directly downgradient of the former source area and the effectiveness of the existing remedy (slurry wall). Following completion of NYSDEC review of this letter and attached report, Nassau County would like to begin technical discussions regarding the proposed revision of the existing sampling program.

Re: Mitchel Field Purex Groundwater Remediation Facility (MFPGRF),
NYSDEC site #130014:
Review of Groundwater Conditions and Site Remediation Criteria – April 2015

The enclosed submittal can be supplied electronically upon request. If you have any questions regarding our proposal or activities at the site, please contact Mr. Michael Flaherty, Hydrogeologist III at (516) 571-7514.

Very truly yours,

Shila Shah-Gavnoudias, P.E.
Commissioner of Public Works

SSG:KGA:JLD:rp
Attachment
c: Kenneth G. Arnold, Assistant to Commissioner of Public Works
Joseph L. Davenport, Unit Head, Water/Wastewater Engineering Unit
Michael Flaherty, Hydrogeologist III
Joseph DeFranco, Sanitarian III, Department of Health
Walter J. Parish, NYSDEC

PUREX SITE at MITCHEL FIELD GROUNDWATER REMEDIATION

DEPARTMENT OF PUBLIC WORKS

Nassau County

Long Island, New York

REVIEW of ENVIRONMENTAL CONDITIONS and REMEDIATION CRITERIA

2015

Table of Contents

1.0 Introduction

The Mitchel Field Site was acquired from the Purex Corporation by Nassau County to accommodate the construction / expansion of the MSBA (Metropolitan Suburban Bus Authority) Garage site located in East Garden City, New York. During the course of the expansion project; while conducting investigations to evaluate potential new water supply sources, soil and groundwater contamination were discovered at the site in 1981. Following discovery, Nassau County and the Office of the New York State Attorney General initiated legal action against Purex Corporation. This action resulted in a Consent Order which was issued on August 21, 1985 which required Purex Corporation to design, build and operate a treatment system to restore local soil and groundwater to specified target conditions. The Mitchel Field Purex Groundwater Remediation Facility (MFPGRF), was constructed to extract contaminated groundwater from two separate areas (a highly contaminated source area which is surrounded by a hydraulic retaining wall and a more diffuse down gradient plume area), treat the water to meet the State's required standards, and discharge the treated water to a County recharge basin. Purex Corporation initiated groundwater treatment in 1990 and was required to operate the system for a minimum of 10 years. Upon completion of this operational requirement the Nassau County Department of Public Works assumed treatment operations on January 1, 2003 and continues to monitor groundwater at the site.

Groundwater treatment operations at the site were ongoing for over 22 years. Over this time period progress in meeting remedial objectives has been made in the following areas:

- The collection and treatment of volatile organic compounds (VOCs) in the Upper Glacial Aquifer has been completed.
- Total volatile organic compounds (TVOC), concentrations in the source area have been reduced from **600 ppm** to less than **1 ppm**.
- TVOC concentrations in all monitoring wells located in the lower portion of the Magothy aquifer have met the water condition specified in the cleanup criteria for the site.
- TVOC concentrations in those monitoring wells located in the Upper Magothy portion of the down gradient Purex dissolved-phase VOC plume have met the water condition(s) and statistical evaluation specified in the Remediation Criteria (Appendix A).

The County of Nassau believes that cleanup of the Upper Magothy portion of the downgradient plume is complete; although TVOC concentrations in all Lower Magothy monitoring wells are below specified guidance values; low levels of individual VOC's have been detected. The source of this contamination, while unknown is not attributable to activities at Purex. TVOC concentrations greater than **200 ppb** have been observed in five separate lower Magothy well cluster locations ***upgradient*** of the former Purex plume.

This report provides all analytical data collected from groundwater since the submittal of the 2011 Periodic Review Report and presents the results of an evaluation of the Remediation Criteria provided in the Consent Order. Based on the results of this evaluation, the County wishes to revise the groundwater sampling program and request NYSDEC approval for no further groundwater treatment.

2.0 Site Overview

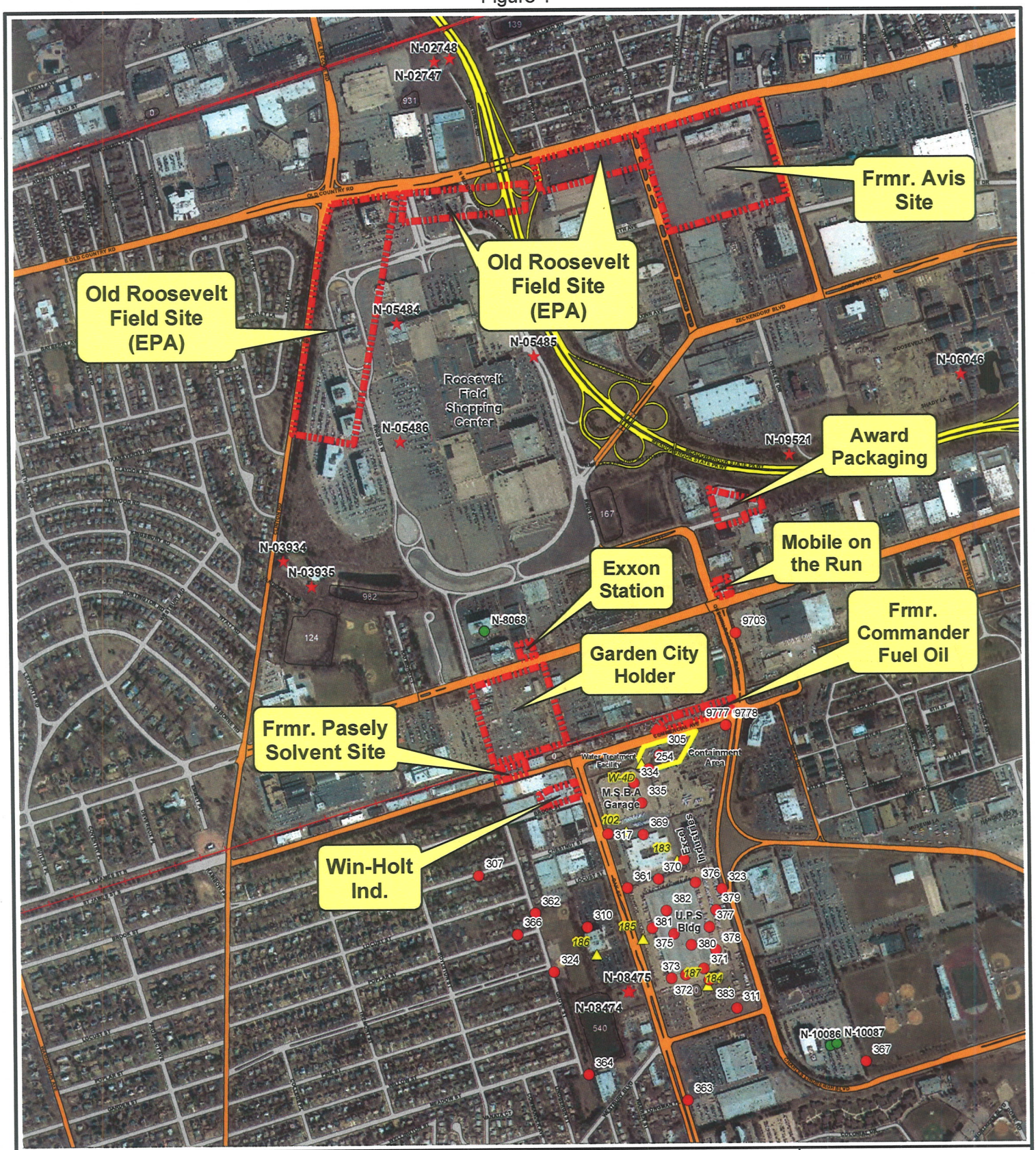
The MFPGRF is located adjacent to the five – acre Metropolitan Suburban Bus Authority (MSBA) bus garage site in East Garden City, New York (figure 1). The site is bounded on the north by Commercial Avenue, Oak Street to the west and Quentin Roosevelt Boulevard to the east. The industrial area immediately surrounding the MFPGRF is occupied by numerous remedial sites including but not limited to the former Commander Oil Corporation Site, the former Pasely Solvent Corporation Site, (EPA ID: NYD991292004), Win-Holt Equipment Corporation (NYSDEC Site# 130088/V-00243-1), Award Packaging Site (site No. 130155), the former Avis Headquarters Site (site No. C130206) and the Old Roosevelt Field Site (EPA Site No. NYSFN0204234), as well as several other small businesses and warehouses. The former Purex Site is also located within 1.5 miles of the Nassau Veterans Memorial Coliseum, Nassau Community College and Hofstra University.

The depth to groundwater in the Mitchel Field area ranges from 20 to 30 feet below grade. The first groundwater investigations conducted at the site in 1984 identified a plume of volatile organic compounds in both the Glacial and Upper portions of the Magothy Aquifer migrating south – southwest of the source area. Total volatile organic concentrations in the source area exceeded **600 ppm**; concentrations decreased in the plume area with increasing distance from the source. Specific organic compounds originally identified at the site included:

- 1, 2 Dichloroethane
- 1,1- Dichloroethylene
- Trans-1,2- Dichlorethylene
- Methylene Chloride
- Tetrachlorethylene
- Toluene
- 1,1,1- Trichloroethane
- Trichloroethylene
- Vinyl Chloride

The MFPGRF was designed by Canonie Environmental for Purex Corporation and included all process equipment associated with air stripping, pressure filtration, carbon adsorption and vapor emission treatment necessary for groundwater treatment and recharge.

Figure 1



Legend

- Former Hazardous Waste Sites
- Public Supply Wells
- Monitoring Wells (Upper Magothy)
- Heating-Cooling Wells
- Purex Recovery Wells(Upper Magothy)
- Containment Area
- Railroad
- NASSAU.RechargeBasins
- Roadway
  - Other
  - County
  - Federal
  - State

Site Location

PUREX SITE & VICINITY

PUREX SITE MAP

Mitchel Field, NY

Prepared By: - NCDPW - Water/Wastewater Engineering Unit

N W E S

0 110220 440 660 880 1,100 Feet

Nassau County

Geographic Information System

Date: 6/28/2012

H:/WATER-WASTEWATER ENGINEERING/PUREX/PUREX SITE & VICINITY MAP(FIG-1) - 8X11 PORT(032812)

The selected remedy for the Purex Mitchel Field Site included remediation which was to be performed in two phases involving source area and plume recovery treatment schemes. During the first phase of operation 700 gpm of groundwater was withdrawn from the source area for treatment and recirculation. Flow into the source area was restricted by the installation of steel sheeting that was keyed into an existing clay confining layer at a depth of approximately 60 ft. below land surface. Simultaneously, 700 gpm of groundwater was recovered from plume area wells for treatment and discharge into the Oak Street recharge basin. The groundwater treatment facility was designed to individually treat these two distinct influent streams during the first phase of operation. This phase concentrated on restoration of the source area and plume recovery within the glacial aquifer.

Upon completion of the source area restoration, the second phase of the site remediation included further cleanup of the Glacial Aquifer as well as plume recovery from the Upper Magothy Formation. During the second phase, the treatment facility was designed to function as a single influent stream process operating at flow rates up to 1,400 gpm. The discovery of volatile organic contamination in the upper portion of the Magothy aquifer led to the design and installation of two additional recovery wells, **W-383D** and **W-187**, south of the UPS building in the summer of 1996, this brought the total number of operating plume recovery wells to five (5). The recovery wells were operated continuously in various configurations from the date of their installation until April 12, 2012, when reduced levels of influent VOC's and an aging treatment system resulted in system shutdown.

3.0 Remedy Performance, Effectiveness, and Protectiveness

The overall remedial performance at the Purex-Mitchel Field Site has been very effective over the 22 years of treatment operations. Although some volatile organic compounds (VOCs) remain inside the source area (which is surrounded by a slurry wall); VOC groundwater concentrations have been reduced over the years from over 600 ppm to less than 1 ppm. Cleanup of the Upper Glacial Plume of volatile organics has been completed.

Remaining groundwater contamination exists in a single narrow plume of low level VOC's originating from an upgradient source located in the Upper Magothy Aquifer. The most recent groundwater samples were collected from twenty-seven (27) groundwater monitoring wells for each of the two (2) Semi-Annual sampling events conducted in 2014. The results of groundwater sampling completed since the submittal of the 2011 PRR including the 2014 Semi-Annual sampling results are presented and compared to site cleanup criteria (Water Condition) in the following tables. These tables list only those compounds that have been historically detected at the Purex site.

2012 Semi – Annual Sampling Results

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2012

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria	WELL W-234 DATE SAMPLED		WELL W-402 DATE SAMPLED		WELL W-405 DATE SAMPLED		WELL W-435 DATE SAMPLED		WELL W-461 DATE SAMPLED		WELL W-302 DATE SAMPLED		WELL W-305 DATE SAMPLED		WELL W-311R DATE SAMPLED	
	(ppb)	4/27/12		4/10/12	10/22/12	4/19/12		5/2/12		5/7/12	10/23/12	4/10/12	10/22/12	4/19/12		4/11/12	10/18/12
1,1,2,2-Tetrachloroethane	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
1,1,1-Trichloroethane	50	**1.53J**		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		**1.74J**	.94J
1,1,2-Trichloro-1,1,2-trifluoroethane	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
1,1,2-Trichloroethane	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		**.88J**	BDL
1,1-Dichloroethane	50	**2.72J**		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		**9.4**	4.78J
1,1-Dichloroethene	5	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
1,2-Dichloroethane	5	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
1,4-Dichlorobenzene	50	BDL		BDL	BDL	BDL		BDL		**1.38J**	BDL	BDL	BDL	BDL		BDL	BDL
Benzene	5	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
Bromodichloromethane	100*	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
Bromoform	100*	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
Carbon Tetrachloride	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
Chlorobenzene	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
Chloroform	100*	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		**4.52J**	3.93J
cis-1,3-Dichloropropene	2	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
cis-1,2-Dichloroethylene	50	**12.9**		BDL	BDL	BDL		BDL		BDL	BDL	**1.53J**	1.96J	BDL		**6.7**	4.22J
Dibromochloromethane	100*	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
Ethyl Benzene	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
m,p-Xylene	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
Methylene Chloride	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
o-Xylene	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
trans-1,3-Dichloropropene	2	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
t-1,2 Dichloroethylene	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
Tetrachloroethylene	50	**58.1**		**2.90J**	**2.47J**	**1.57J**		**1.89J**		**1.0J**	1.61J	**2.62J**	1.87J	**.87J**		**2.84J**	.81J
Toluene	50	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
Trichloroethylene	50	**10.1**		BDL	BDL	**.67J**		**2.22J**		**.92J**	1.42J	**1.98J**	2.30J	BDL		**13.0**	**10.6**
Vinyl Chloride	5	BDL		BDL	BDL	BDL		BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL
TVOC	100	**81.1**	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**29.1**	**10.6**

BDL - Below detection limits **B** - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2012

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria (ppb)	WELL W-361 DATE SAMPLED		WELL W-363 DATE SAMPLED		WELL W-366 DATE SAMPLED		WELL W-367 DATE SAMPLED		WELL W-368 DATE SAMPLED		WELL W-369 DATE SAMPLED		WELL W-370 DATE SAMPLED		WELL W-371 DATE SAMPLED	
		4/9/12	10/26/12			4/9/12	10/23/12	4/6/12	10/18/12			4/9/12	10/22/12	4/10/12	10/22/12	4/12/12	10/24/12
1,1,1,2-Tetrachloroethane	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	50	BDL	BDL			1.04J	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloro-1,1,2-trifluoroethane	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	50	BDL	BDL			BDL	BDL	2.44J	BDL	NA	NA	BDL	BDL	BDL	BDL	.8J	BDL
1,1-Dichloroethene	5	BDL	BDL			BDL	BDL	BDL	1.56J	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloroethane	5	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	.64J	BDL	1.62J	BDL	2.81J	2.61J
Benzene	5	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloromethane	100*	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Bromoform	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Tetrachloride	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	100*	BDL	BDL			BDL	BDL	1.14J	.88J	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	2	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethylene	50	.77J	BDL			BDL	BDL	BDL	BDL	NA	NA	3.46J	4.39J	BDL	BDL	10.3	6.1
Dibromochloromethane	100*	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Ethyl Benzene	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
m,p-Xylene	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
o-Xylene	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	2	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
t-1,2 Dichloroethylene	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethylene	50	6.27	5.8			.76J	BDL	.65J	BDL	NA	NA	4.38J	10.3	BDL	BDL	8.9	8.7
Toluene	50	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethylene	50	1.41J	1.13J			2.23J	4.14J	1.54J	1.04J	NA	NA	16.7	16.7	BDL	BDL	4.24J	3.47J
Vinyl Chloride	5	BDL	BDL			BDL	BDL	BDL	BDL	NA	NA	1.57J	BDL	BDL	BDL	2.25J	1.91J
TVOC	100	6.3	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	27.0	0.0	0.0	19.2	14.8

Well Scheduled for One Sample Per Year

BDL - Below detection limits B - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2012

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria (ppb)	WELL W-372 DATE SAMPLED		WELL W-373 DATE SAMPLED		WELL W-375 DATE SAMPLED		WELL W-377 DATE SAMPLED		WELL W-378 DATE SAMPLED		WELL W-380 DATE SAMPLED		WELL W-381 DATE SAMPLED		WELL W-382 DATE SAMPLED	
		4/12/12		4/12/12	10/26/12	4/17/12		4/17/12	10/24/12	4/12/12		4/24/12		4/23/12		4/23/12	
1,1,1,2-Tetrachloroethane	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
1,1,1-Trichloroethane	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
1,1,2-Trichloro-1,2,2-trifluoroethane	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
1,1,2-Trichloroethane	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
1,1-Dichloroethane	**50**	BDL		**1.2J**	.79J	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
1,1-Dichloroethene	**5**	BDL		**.82J**	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
1,2-Dichloroethane	**5**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
1,4-Dichlorobenzene	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		**.83J**		BDL		BDL	
Benzene	**5**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
Bromodichloromethane	**100***	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
Bromoform	**100***	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
Carbon Tetrachloride	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
Chlorobenzene	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
Chloroform	**100***	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
cis-1,3-Dichloropropene	**2**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
cis-1,2-Dichloroethylene	**50**	**1.28J**		**16.1**	**10.5**	BDL		BDL	BDL	BDL		**4.91J**		BDL		BDL	
Dibromochloromethane	**100***	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
Ethyl Benzene	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
m,p-Xylene	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
Methylene Chloride	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
o-Xylene	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
trans-1,3-Dichloropropene	**2**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
t-1,2 Dichloroethylene	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
Tetrachloroethylene	**50**	BDL		**11.9**	1.10J	BDL		BDL	BDL	BDL		**.65J**		BDL		BDL	
Toluene	**50**	BDL		BDL	BDL	BDL		BDL	BDL	BDL		BDL		BDL		BDL	
Trichloroethylene	**50**	**1.41J**		**7**	2.52J	**1.16J**		BDL	BDL	**44.2**		**1.14J**		BDL		BDL	
Vinyl Chloride	**5**	BDL		BDL	1.34J	BDL		BDL	BDL	BDL		**1.97J**		BDL		BDL	
TVOC	**100**	0.0	0.0	**35.0**	**10.5**	0.0	0.0	0.0	0.0	**44.2**	0.0	0.0	0.0	0.0	0.0	0.0	0.0

BDL - Below detection limits **B** - Analyte detected in associated Method Bl: All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2012

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria	WELL W-383		WELL X-156 / N-9703		WELL X-157 / N-9713		RECOVERY WELL W-3		RECOVERY WELL W-4D		RECOVERY WELL W-183		RECOVERY WELL W-184		RECOVERY WELL W-187		RECOVERY WELL W-383D	
		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED				4/3/12	
	(ppb)	4/11/12	10/24/12																
1,1,1,2-Tetrachloroethane	50	BDL	BDL	Well Scheduled for One Sample Per Year		Well Scheduled for One Sample Per Year		No Entry into Vault No Sample	No Entry into Vault No Sample	No Entry into Vault No Sample	No Entry into Vault No Sample	Pump Failure No Sample	Pump Failure No Sample	Well Off No Sample	Well Off No Sample	NA	Pump Failure No Sample	BDL	NA
1,1,1-Trichloroethane	50	**3.59J**	BDL													NA		BDL	NA
1,1,2-Trichloro-1,1,2-trifluoroethane	50	**3.95J**	BDL													NA		BDL	NA
1,1,2-Trichloroethane	50	BDL	BDL													NA		BDL	NA
1,1-Dichloroethane	50	**1.68J**	**5**													NA		**2.57**	NA
1,1-Dichloroethene	5	**19.2**	3.55J													NA		BDL	NA
1,2-Dichloroethane	5	BDL	**5.69**													NA		BDL	NA
1,4-Dichlorobenzene	50	BDL	.76J													NA		BDL	NA
Benzene	5	BDL	.71J													NA		BDL	NA
Bromodichloromethane	100*	BDL	BDL													NA		BDL	NA
Bromoform	100*	BDL	BDL													NA		BDL	NA
Carbon Tetrachloride	50	BDL	BDL													NA		BDL	NA
Chlorobenzene	50	BDL	BDL													NA		BDL	NA
Chloroform	100*	**9.01J**	BDL													NA		BDL	NA
cis-1,3-Dichloropropene	2	BDL	BDL													NA		**15.9**	NA
cis-1,2-Dichloroethylene	50	**13.7**	**78**													NA		BDL	NA
Dibromochloromethane	100*	BDL	BDL													NA		BDL	NA
Ethyl Benzene	50	BDL	BDL													NA		BDL	NA
m,p-Xylene	50	BDL	BDL													NA		BDL	NA
Methylene Chloride	50	BDL	BDL													NA		BDL	NA
o-Xylene	50	BDL	BDL													NA		BDL	NA
trans-1,3 Dichloropropene	2	BDL	BDL													NA		BDL	NA
t-1,2 Dichloroethylene	50	BDL	BDL													NA		**23.5**	NA
Tetrachloroethylene	50	**5.11J**	**35.2**													NA		BDL	NA
Toluene	50	BDL	BDL													NA		**40.8**	NA
Trichloroethylene	50	**27.1**	**27.7**													NA		**1.27**	NA
Vinyl Chloride	5	BDL	**6.55**													NA		**84.0**	0.0
TVOC	100	**60.0**	**158.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

BDL - Below detection limits B - Analyte detected in associated Method Bl All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

2013 Semi – Annual Sampling Results

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2013

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria	WELL W-234 DATE SAMPLED		WELL W-402 DATE SAMPLED		WELL W-405 DATE SAMPLED		WELL W-435 DATE SAMPLED		WELL W-461 DATE SAMPLED		WELL W-302 DATE SAMPLED		WELL W-305 DATE SAMPLED		WELL W-311R DATE SAMPLED	
	(ppb)	5/1/13	11/8/13	4/15/13	10/1/13		10/29/13	5/1/13		4/5/13	10/3/13	4/5/13	10/1/13	5/2/13	10/29/13	4/10/13	9/30/13
1,1,2,2-Tetrachloroethane	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	50	3.66J	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.24J
112-Trichloro-112-trifluoroethane	50	1.34J	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	1.73J	.89J
1,1,2-Trichloroethane	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	50	2.87J	.54J	.85J	.52J		.52J	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	2.09J
1,1-Dichloroethene	5	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	**5.95**	2.47J
1,2-Dichloroethane	5	**5.1**	4.05J	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	50	.55J	1.08J	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	5	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloromethane	100*	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromoform	100*	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Tetrachloride	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	100*	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	**3.3**	1.57J
cis-1,3-Dichloropropene	2	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethylene	50	**100**	3.05J	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	1.2J	BDL	**28.5**
Dibromochloromethane	100*	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Ethyl Benzene	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
m,p-Xylene	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	1.96BJ	BDL
o-Xylene	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	2	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
t-1,2 Dichloroethylene	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethylene	50	**40.8**	**8.2**	3.77J	**4.1**		**8.79**	1.72J		BDL	2.33J	BDL	**3.2**	1.16J	**9.68**	3.03J	4.64J
Toluene	50	BDL	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethylene	50	**15.8**	1.42J	1.09J	.92J		.56J	1.46J		.89J	1.47J	.58J	**4.7**	BDL	.64J	**9.1**	**11.8**
Vinyl Chloride	5	**9.3**	BDL	BDL	BDL		BDL	BDL		BDL	BDL	BDL	1.43J	BDL	BDL	BDL	BDL
TVOC	100	**171.0**	**8.2**	0.0	**4.1**	0.0	**8.79**	0.0	0.0	0.0	0.0	0.0	**8.0**	0.0	**9.7**	**18.4**	**40.3**

BDL - Below detection limits B - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2013

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria (ppb)	WELL W-361 DATE SAMPLED		WELL W-363 DATE SAMPLED		WELL W-366 DATE SAMPLED		WELL W-367 DATE SAMPLED		WELL W-368 DATE SAMPLED		WELL W-369 DATE SAMPLED		WELL W-370 DATE SAMPLED		WELL W-371 DATE SAMPLED	
		4/29/13	10/3/13		10/21/13	4/16/13	10/1/13	4/10/13	10/31/13			4/11/13	10/2/13	4/10/13	10/15/13	4/16/13	10/21/13
1,1,1,2-Tetrachloroethane	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane	**50**	BDL	BDL		BDL	BDL	BDL	.58J	1.11J	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	**50**	BDL	BDL		BDL	BDL	BDL	BDL	.71J	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	**50**	BDL	BDL		BDL	.55J	BDL	3.66J	**5.65**	NA	NA	1.27J	**2.72**	BDL	BDL	BDL	BDL
1,1-Dichloroethene	**5**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloroethane	**5**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	**5**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloromethane	**100***	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Bromoform	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Tetrachloride	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	**100***	BDL	BDL		BDL	BDL	BDL	BDL	1.55J	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	**2**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethylene	**50**	BDL	BDL		.61J	BDL	BDL	BDL	BDL	NA	NA	BDL	**8.62**	BDL	.52J	BDL	.52J
Dibromochloromethane	**100***	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Ethyl Benzene	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
m,p-Xylene	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride	**50**	BDL	BDL		BDL	BDL	BDL	2.09BJ	BDL	NA	NA	2.45BJ	BDL	2.56BJ	BDL	BDL	BDL
o-Xylene	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	**2**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
t-1,2 Dichloroethylene	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethylene	**50**	3.24J	**3.1**		BDL	1.36J	**2.71**	.84J	BDL	NA	NA	**9**	**10.7**	.75J	BDL	3.49J	BDL
Toluene	**50**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethylene	**50**	BDL	BDL		BDL	2J	**3.39**	.82J	1.49J	NA	NA	**9.36**	**13.8**	BDL	BDL	1.42J	BDL
Vinyl Chloride	**5**	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	3.28J	**2.7**	BDL	BDL	BDL	BDL
TVOC	**100**	0.0	**3.1**	0.0	0.0	0.0	**6.1**	0.0	**5.7**	0.0	0.0	**18.4**	**38.5**	0.0	0.0	0.0	0.0

Well Scheduled for One Sample Per Year

BDL - Below detection limits B - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2013

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria	WELL W-372 DATE SAMPLED		WELL W-373 DATE SAMPLED		WELL W-375 DATE SAMPLED		WELL W-377 DATE SAMPLED		WELL W-378 DATE SAMPLED		WELL W-380 DATE SAMPLED		WELL W-381 DATE SAMPLED		WELL W-382 DATE SAMPLED	
	(ppb)	4/17/13	10/3/13	4/17/13	10/8/13	4/16/13	10/4/13	4/16/13	10/4/13	4/17/13	10/4/13	4/24/13	11/16/13	4/24/13	11/6/13	4/24/13	11/6/13
1,1,1,2-Tetrachloroethane	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloro-1,1,2-trifluoro ethane	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	.91J	2.24J	BDL	BDL	1.79J	1.35J
1,1-Dichloroethane	**50**	BDL	1.03J	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	.68J	BDL	BDL	BDL	BDL
1,1-Dichloroethene	**5**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloroethane	**5**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.26J	BDL	.62J	BDL	BDL
1,4-Dichlorobenzene	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	**5**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloromethane	**100***	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromoform	**100***	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Tetrachloride	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	**100***	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	**2**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethylene	**50**	2.54J	**12.6**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**6.4**	**34.1**	BDL	BDL	BDL	BDL
Dibromochloromethane	**100***	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Ethyl Benzene	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
m,p-Xylene	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
o-Xylene	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	**2**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
t-1,2 Dichloroethylene	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethylene	**50**	1.06J	**2.71**	BDL	.63J	BDL	BDL	BDL	BDL	BDL	.75J	BDL	3.27J	BDL	BDL	BDL	BDL
Toluene	**50**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethylene	**50**	BDL	**4**	BDL	.74J	BDL	BDL	BDL	BDL	**12.9**	**109**	.67J	**4.03**	BDL	BDL	BDL	BDL
Vinyl Chloride	**5**	BDL	**4.18**	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3.15J	**10.8**	BDL	BDL	BDL	BDL
TVOC	**100**	0.0	**23.5**	0.0	0.0	0.0	0.0	0.0	0.0	**12.9**	**109.0**	6.4	**48.9**	0.0	0.0	0.0	0.0

BDL - Below detection limits **B** - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2013

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria (ppb)	WELL W-383 DATE SAMPLED 4/10/13	WELL W-383 DATE SAMPLED 10/2/13	WELL X-156 / N-9703 DATE SAMPLED	WELL X-156 / N-9703 DATE SAMPLED 10/7/13	WELL X-157 / N-9713 DATE SAMPLED	WELL X-157 / N-9713 DATE SAMPLED 10/7/13	RECOVERY WELL W-3 DATE SAMPLED	RECOVERY WELL W-3 DATE SAMPLED	RECOVERY WELL W-4D DATE SAMPLED	RECOVERY WELL W-4D DATE SAMPLED	RECOVERY WELL W-183 DATE SAMPLED	RECOVERY WELL W-183 DATE SAMPLED	RECOVERY WELL W-184 DATE SAMPLED	RECOVERY WELL W-184 DATE SAMPLED	RECOVERY WELL W-187 DATE SAMPLED	RECOVERY WELL W-187 DATE SAMPLED	RECOVERY WELL W-383D DATE SAMPLED	RECOVERY WELL W-383D DATE SAMPLED
1,1,1,2-Tetrachloroethane	50	BDL	BDL	Well Scheduled for One Sample Per Year	BDL	Well Scheduled for One Sample Per Year		No Entry into Vault No Sample	No Entry into Vault No Sample	No Entry into Vault No Sample	No Entry into Vault No Sample	Pump Failure No Sample	Pump Failure No Sample	Well Off No Sample	Well Off No Sample	NA	Pump Failure No Sample		
1,1,1-Trichloroethane	50	BDL	BDL		**21.95**		**8.9**									NA			
1,1,2-Trichloro-1,1,2-trifluoroethane	50	BDL	BDL		BDL		**9.38**									NA			
1,1,2-Trichloroethane	50	BDL	BDL		BDL											NA			
1,1-Dichloroethane	50	**11.5**	**5.81**		**5.1**		**2.83**									NA			
1,1-Dichloroethene	5	**10.2**	**3.56**		**5.4**		**72.9**									NA			
1,2-Dichloroethane	5	BDL	BDL		BDL											NA			
1,4-Dichlorobenzene	50	BDL	1.15J		BDL											NA			
Benzene	5	BDL	BDL		BDL											NA			
Bromodichloromethane	100*	BDL	BDL		BDL											NA			
Bromoform	100*	BDL	BDL		BDL											NA			
Carbon Tetrachloride	50	BDL	BDL		BDL											NA			
Chlorobenzene	50	BDL	BDL		BDL											NA			
Chloroform	100*	BDL	BDL		BDL		1.09J									NA			
cis-1,3-Dichloropropene	2	BDL	BDL		BDL											NA			
cis-1,2-Dichloroethylene	50	BDL	**86**		**5.77**		**3.11**									NA			
Dibromochloromethane	100*	BDL	BDL		BDL											NA			
Ethyl Benzene	50	BDL	BDL		BDL											NA			
m,p-Xylene	50	BDL	BDL		BDL											NA			
Methylene Chloride	50	47.6BJ	BDL		BDL											NA			
o-Xylene	50	BDL	BDL		BDL											NA			
trans-1,3 Dichloropropene	2	BDL	BDL		BDL											NA			
t-1,2 Dichloroethylene	50	BDL	BDL		BDL											NA			
Tetrachloroethylene	50	**45.5**	**49**		**74.0**		**11.9**									NA			
Toluene	50	BDL	.59J		BDL											NA			
Trichloroethylene	50	**28.3**	**20.6**		**4.78**		**6.6**									NA			
Vinyl Chloride	5	16.5J	**11.3**		BDL		1.03J									NA			
TVOC	100	**95.5**	**176.3**	0.0	**117.0**	0.0	**115.6**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		**0.0**	0.0

BDL - Below detection limits B - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

2014 Semi – Annual Sampling Results

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2014

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria	WELL W-234 DATE SAMPLED		WELL W-402 DATE SAMPLED		WELL W-405 DATE SAMPLED		WELL W-435 DATE SAMPLED		WELL W-461 DATE SAMPLED		WELL W-302 DATE SAMPLED		WELL W-305 DATE SAMPLED		WELL W-311R DATE SAMPLED	
	(ppb)	5/7/14	12/5/14	4/16/14	10/20/14	4/23/14	11/21/14	5/7/14		4/16/14	10/20/14	4/16/14	10/20/14	4/23/14	11/21/14	4/14/14	11/3/14
1,1,2,2-Tetrachloroethane	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
112-Trichloro-112-trifluoroethane	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	50	5.5	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethene	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloroethane	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloromethane	100*	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromoform	100*	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Tetrachloride	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	100*	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethylene	50	410	85	BDL	BDL	BDL	BDL	23		BDL	BDL	BDL	5.1	BDL	BDL	74.0	44.0
Dibromochloromethane	100*	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Ethyl Benzene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
m,p-Xylene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
o-Xylene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
t-1,2 Dichloroethylene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethylene	50	120	21	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	18	45.0	BDL
Toluene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethylene	50	57	10	BDL	BDL	BDL	BDL	13		BDL	BDL	BDL	11.0	5.7	BDL	27.0	19.0
Vinyl Chloride	5	13	10	BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
TVOC	100	605.5	126	0.0	0	0.0	0	36.0	0.0	0.0	0.0	0.0	16.1	5.7	18.0	146.0	63.0

BDL - Below detection limits **B** - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2014

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria (ppb)	WELL W-361 DATE SAMPLED		WELL W-363 DATE SAMPLED		WELL W-366 DATE SAMPLED		WELL W-367 DATE SAMPLED		WELL W-368 DATE SAMPLED		WELL W-369 DATE SAMPLED		WELL W-370 DATE SAMPLED		WELL W-371 DATE SAMPLED	
		4/16/14	10/20/14		10/27/14	4/14/14	10/20/14	4/28/14	10/24/14			4/16/14	10/17/14	4/14/14	10/17/14	4/22/14	10/21/14
1,1,1,2-Tetrachloroethane	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloro-1,2,2-trifluoroethane	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethene	5	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloroethane	5	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	5	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloromethane	100*	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Bromoform	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Tetrachloride	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	100*	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	2	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethylene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	**5.5**	BDL	BDL	BDL	BDL
Dibromochloromethane	100*	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Ethyl Benzene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
m,p-Xylene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
o-Xylene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	2	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
t-1,2 Dichloroethylene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethylene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Toluene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethylene	50	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	**11**	**14**	BDL	BDL	BDL	BDL
Vinyl Chloride	5	BDL	BDL		BDL	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL
TVOC	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**11.0**	**19.5**	0.0	0.0	0.0	0.0

Well Scheduled for One Sample Per Year

BDL - Below detection limits B - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2014

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria (ppb)	WELL W-372 DATE SAMPLED		WELL W-373 DATE SAMPLED		WELL W-375 DATE SAMPLED		WELL W-377 DATE SAMPLED		WELL W-378 DATE SAMPLED		WELL W-380 DATE SAMPLED		WELL W-381 DATE SAMPLED		WELL W-382 DATE SAMPLED	
		4/21/14	10/21/14	4/21/14	10/24/14	4/22/14	10/24/14	4/21/14	10/21/14	4/21/14	10/21/14	4/25/14	12/2/14	4/25/14	12/2/14	4/25/14	12/2/14
1,1,1,2-Tetrachloroethane	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloro-1,1,2-trifluoroethane	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethene	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloroethane	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloromethane	100*	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromoform	100*	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Tetrachloride	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	100*	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,3-Dichloropropene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethylene	50	12	31	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dibromochloromethane	100*	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	6.3	27	BDL	BDL	BDL	BDL
Ethyl Benzene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
m,p-Xylene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
o-Xylene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
trans-1,3-Dichloropropene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
t-1,2 Dichloroethylene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethylene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Toluene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5	BDL	BDL	BDL	BDL
Trichloroethylene	50	BDL	9.1	BDL	BDL	BDL	BDL	82	78	BDL	BDL	BDL	13	BDL	BDL	BDL	BDL
Vinyl Chloride	5	BDL	5.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	45.0	0.0	0.0	0.0	0.0
TVOC	100	12.0	45.9	0.0	0.0	0.0	0.0	82.0	78.0	0.0	0.0	6.3					

BDL - Below detection limits B - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

PUREX SITE

CLEANUP CRITERIA (Groundwater Condition) vs. VOC's 2014

VOLATILE ORGANICS COMPOUNDS (ppb)

	Purex Cleanup Criteria (ppb)	WELL W-383 DATE SAMPLED 4/14/14	WELL W-383 DATE SAMPLED 10/17/14	WELL X-156 / N-9703 DATE SAMPLED	WELL X-156 / N-9703 DATE SAMPLED 10/27/14	WELL X-157 / N-9713 DATE SAMPLED	WELL X-157 / N-9713 DATE SAMPLED	RECOVERY WELL W-3 DATE SAMPLED	RECOVERY WELL W-3 DATE SAMPLED	RECOVERY WELL W-4D DATE SAMPLED	RECOVERY WELL W-4D DATE SAMPLED	RECOVERY WELL W-183 DATE SAMPLED	RECOVERY WELL W-183 DATE SAMPLED	RECOVERY WELL W-184 DATE SAMPLED	RECOVERY WELL W-184 DATE SAMPLED	RECOVERY WELL W-187 DATE SAMPLED	RECOVERY WELL W-187 DATE SAMPLED	RECOVERY WELL W-383D DATE SAMPLED	RECOVERY WELL W-383D DATE SAMPLED
1,1,1,2-Tetrachloroethane	50	BDL	BDL	Well Scheduled for One Sample Per Year	BDL	Well Scheduled for One Sample Per Year	BDL	No Entry into Vault No Sample	No Entry into Vault No Sample	No Entry into Vault No Sample	No Entry into Vault No Sample	Pump Failure No Sample	Pump Failure No Sample	Well Off No Sample	Well Off No Sample	NA	Pump Failure No Sample		
1,1,1-Trichloroethane	50	BDL	BDL		BDL		BDL									NA			
1,1,2-Trichloro-1,2,2-trifluoroethane	50	BDL	BDL		BDL		12									NA			
1,1,2-Trichloroethane	50	BDL	BDL		BDL		BDL									NA			
1,1-Dichloroethane	50	BDL	BDL		6.3		74									NA			
1,1-Dichloroethene	5	BDL	BDL		BDL		BDL									NA			
1,2-Dichloroethane	5	BDL	BDL		BDL		BDL									NA			
1,4-Dichlorobenzene	50	BDL	BDL		BDL		BDL									NA			
Benzene	5	BDL	BDL		BDL		BDL									NA			
Bromodichloromethane	100*	BDL	BDL		BDL		BDL									NA			
Bromoform	100*	BDL	BDL		BDL		BDL									NA			
Carbon Tetrachloride	50	BDL	BDL		BDL		BDL									NA			
Chlorobenzene	50	BDL	BDL		BDL		BDL									NA			
Chloroform	100*	BDL	BDL		BDL		BDL									NA			
cis-1,3-Dichloropropene	2	BDL	BDL		BDL		BDL									NA			
cis-1,2-Dichloroethylene	50	43	40		BDL		BDL									NA			
Dibromochloromethane	100*	BDL	BDL		BDL		BDL									NA			
Ethyl Benzene	50	BDL	BDL		BDL		BDL									NA			
m,p-Xylene	50	BDL	BDL		BDL		BDL									NA			
Methylene Chloride	50	BDL	BDL		BDL		BDL									NA			
o-Xylene	50	BDL	BDL		BDL		BDL									NA			
trans-1,3 Dichloropropene	2	BDL	BDL		BDL		BDL									NA			
t-1,2 Dichloroethylene	50	BDL	BDL		BDL		BDL									NA			
Tetrachloroethylene	50	BDL	22		88.0		23									NA			
Toluene	50	BDL	BDL		BDL		BDL									NA			
Trichloroethylene	50	11	15		5.5		9.6									NA			
Vinyl Chloride	5	BDL	BDL		BDL		BDL									NA			
TVOC	100	54.0	77.0	0.0	99.8	0.0	118.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0

BDL - Below detection limits B - Analyte detected in associated Method Blank All results in ppb * - Sum of these four compounds shall not exceed 100 ppb.

- Compound detected at conc. ***above*** cleanup criteria

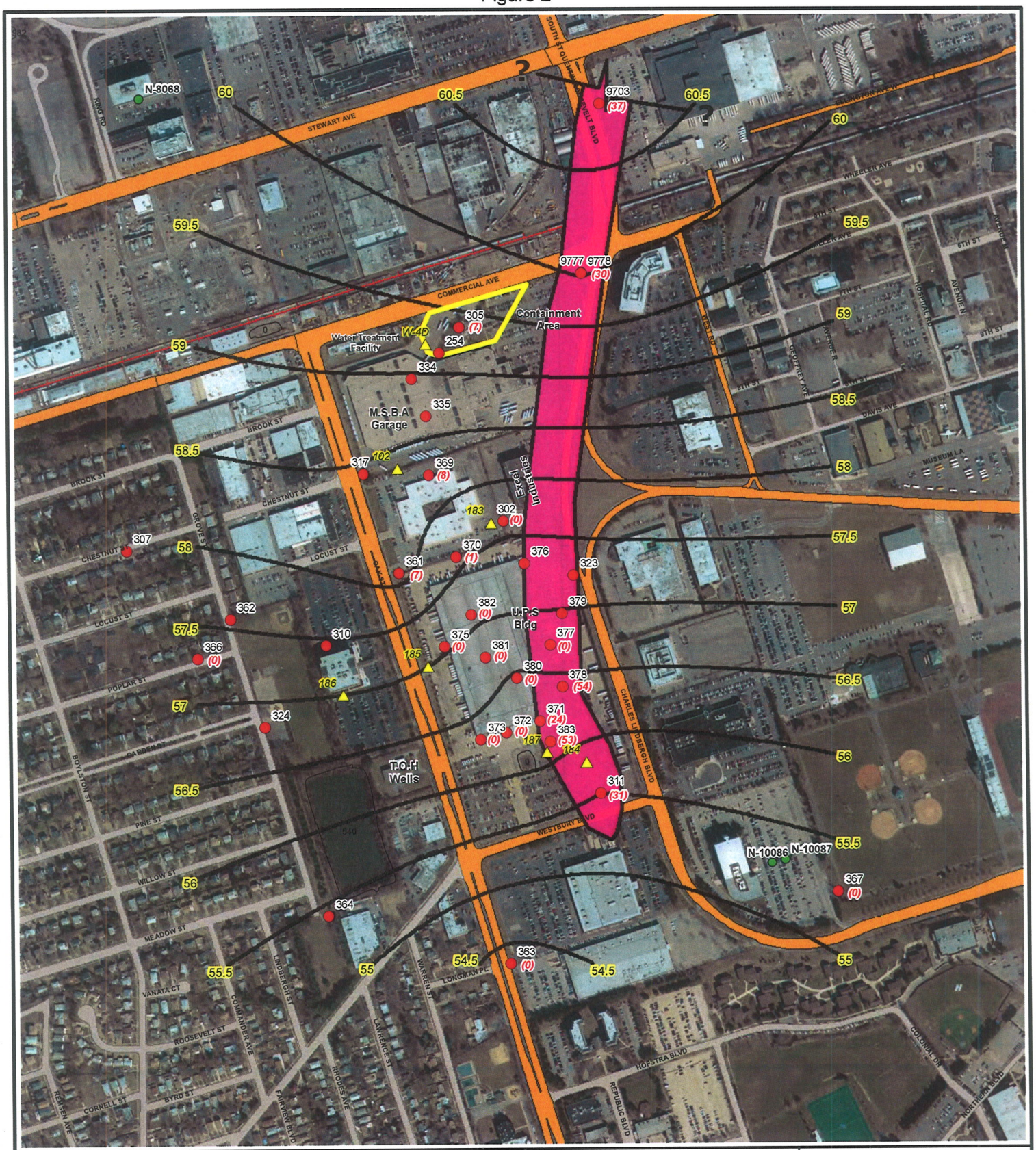
Upper Magothy Groundwater Conditions

The potentiometric surface for the Upper Magothy portion of the aquifer in the vicinity of the Purex site (figure 2) has been prepared using previously collected water level measurements from all available county monitoring wells. Review of the contours prepared for this portion of the aquifer indicates that the overall direction of groundwater flow remains from north-northeast to south-southeast. There are no observable effects created by pumpage from recovery wells in the area. Aerial plots of total volatile organic compound (TVOC) concentrations (> 10 ppb), prepared for the study area from the 2014 monitoring well sampling results, agree with previously generated TVOC maps and reveal a single narrow contiguous dissolved-phase VOC plume with TVOC concentrations ranging up to 146 ppb. The plume originates from offsite sources located upgradient and northeast of the former Purex site and its source area. The southern extent of the dissolved-phase VOC plume is at monitoring well W-311R.

Of the twenty-seven (27) semi-annual monitoring wells where groundwater is sampled, nineteen (19) wells had TVOC concentrations ranging from below detection limit (BDL) to 10 ppb for both 2014 sampling events and six (6) wells had at least one sampling event where its TVOC concentration was greater than 10 ppb but less than the site specific cleanup guideline of 100 ppb. The cleanup guidelines for total VOC's in groundwater were exceeded at one monitoring well location in the Fall 2014 sampling round; W-234 (126 ppb) an Upper Glacial well.

Historically, varying levels of VOCs have been observed to the south beyond the known extent of the former Purex plume in the vicinity of monitoring wells MW-311R, MW-367 and 368. In 2014 these wells had TVOC concentrations ranging from BDL to 146 ppb. This contamination is believed to be associated with the former operation of a closed loop cooling system in the vicinity of 50 Charles Lindbergh Blvd. NYSDEC records indicate that two heating and cooling wells, N-10086 and N-10087 operated in the parking lot of the Reckson Building (50 Charles Lindbergh Blvd). These wells are approximately 900 feet southeast of Purex monitoring well W-311R. Any VOCs that might have been captured by these wells could be introduced to this portion of the aquifer during recharge. During the 2014 sampling rounds groundwater collected from monitoring well W-311R was found to contain up to three (3) VOCs; however only one, cis-1,2-Dichloroethene (74 ppb) exceeded its site specific cleanup guideline of 50 ppb. Historically, dichlorodiflouromethane has also been detected in groundwater samples collected from this well and W-368. This compound is not common to the Purex plume and is a form of Freon that can be linked to cooling system operation.

Figure 2

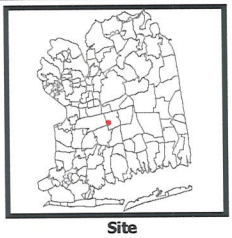


Legend

- Monitoring Wells (Upper Magothy) (26) with TVOC(ppb) Reading for 11/11
- Heating-Cooling Wells
- Purex Recovery Wells(Upper Magothy)
- Containment Area
- Railroad
- Contour Post Map Nov.4, 2011
- NASSAU.RechargeBasins
- Plume Nov.,11

Roadway

- Other
- County
- Federal
- State



Site Location

PUREX/ORF UPPER MAGOTHY POTENTIOMETRIC SURFACE Nov.4, 2011 with TVOC's & Plume

Prepared By: - NCDPW - Water/Wastewater Engineering Unit

N W E S

0 75 150 300 450 600 Feet

Nassau County

Geographic Information System

Date: 4/12/2012

H:/WATER-WASTEWATER ENGINEERING/PUREX/POST MAPS/PUREX-ORF UPPER MAGOTHY POTENTIOMETRIC SURFACE NOV-4-2011 - WITH TVOC(NOVEMBER-2011) & PLUME 8X11 PORT(041812)-FIG 2

In 2012, the MFGRP completed its twenty-second year of treatment. To illustrate the progress made in obtaining the site's clean-up objectives since the treatment system was turned off on April 10, 2012, historical sampling results from wells located within the Upper Magothy portion of the offsite plume that still exhibit measurable levels of contamination in 2014 are summarized in the following table:

Historical High TVOC's

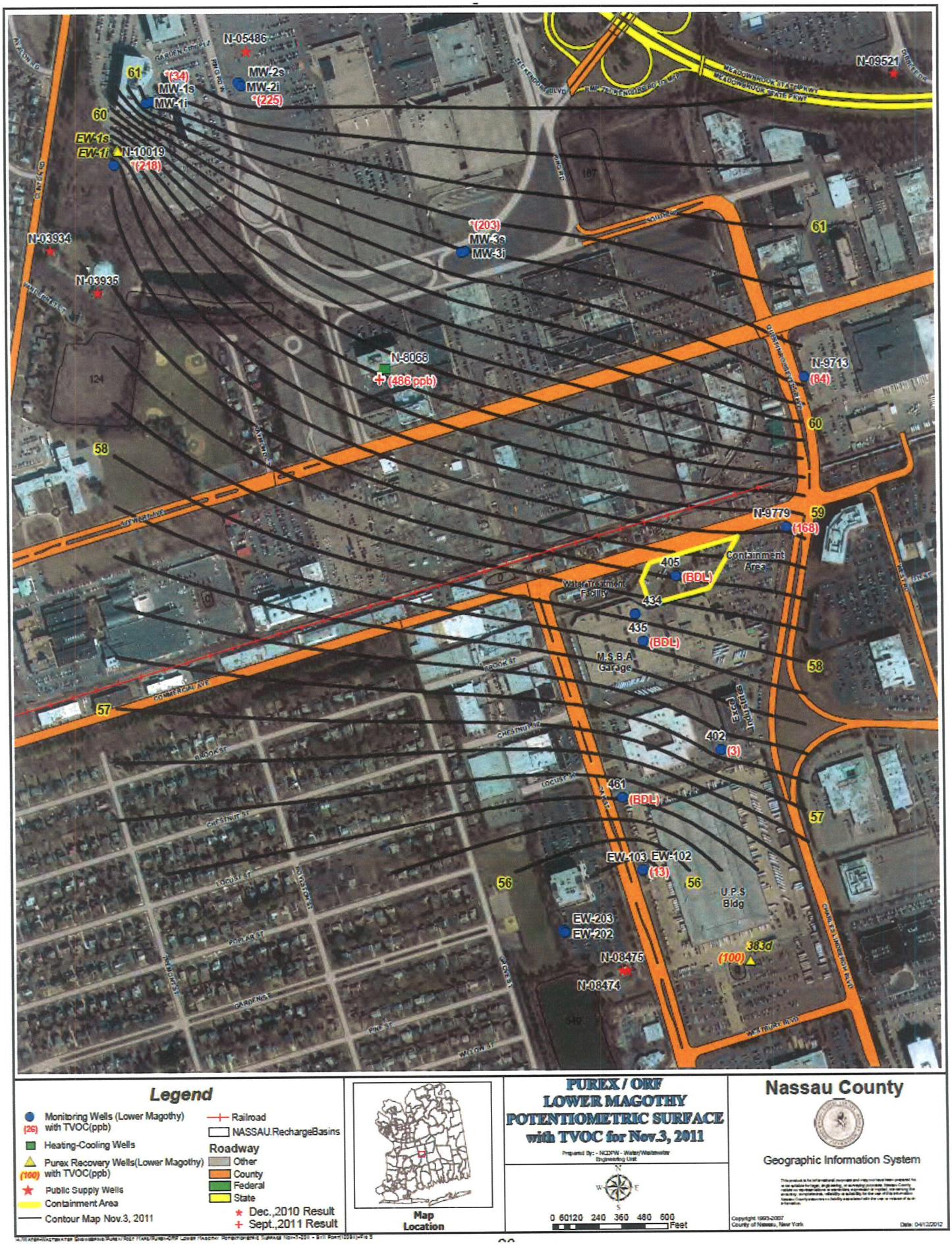
Monitoring Well	Concentration	Date	2014 Concentration
302	23,000 ppb	5/22/90	16 ppb
311R	34,600 ppb	7/20/89	63 ppb
371	22,756 ppb	1/5/95	0 ppb
380	32,780 ppb	10/26/95	45 ppb
381	7,870 ppb	10/25/95	0 ppb
383	23,814 ppb	10/26/95	77 ppb
234	11,411 ppb	7/29/93	126 ppb

Review of the data presented indicates that the Upper Magothy Remediation has essentially been completed at the MFGRP site with all wells exhibiting historically high TVOC levels currently below the Water Condition guidance value of 100 ppb. The current aerial extent and the remaining levels of contamination down gradient of the MFGRP site reflect the sporadic occurrence and low concentrations associated with volatile organic contamination from other up gradient source(s).

Lower Magothy Groundwater Conditions

The potentiometric surface for the Lower Magothy portion of the aquifer in the vicinity of the Purex and Old Roosevelt Field sites (figure 3) has been prepared using water level measurements collected from all available federal (EPA) and county monitoring wells. Review of the contours prepared for this portion of the aquifer indicates that the overall direction of groundwater flow is from north-northeast to south-southeast. The tighter spacing of the contours which is indicative of an increased groundwater flow gradient in the vicinity of the newly installed Extraction Wells for the Old Roosevelt Field Site (located in the northwest corner of the figure) and in the southeast corner of the figure near Town of Hempstead Public Supply wells; N-08474 and N-08475.

Figure 3


N-05486
MW-2s
MW-2i
*(225)
*(34)
MW-1s
MW-1i
61
60
EW-1s
EW-1i
N-10019
*(218)
N-03934
N-03935
N-09521
*(203)
MW-3s
MW-3i
N-8068
+(486 ppb)
N-9713
(84)
N-9779
(168)
405
(BDL)
Containment Area
Water Treatment Facility
434
435
(BDL)
M.S.B.A. Garage
402
(3)
461
(BDL)
EW-103
EW-102
(13)
U.P.S. Bldg
EW-203
EW-202
N-08475
N-08474
383d
(100)
59
58
57
56
Legend
Monitoring Wells (Lower Magothy)
(26) with TVOC(ppb)
Heating-Cooling Wells
Purex Recovery Wells(Lower Magothy)
(100) with TVOC(ppb)
Public Supply Wells
Containment Area
Contour Map Nov.3, 2011
Railroad
NASSAU.RechargeBasins
Roadway
Other
County
Federal
State
* Dec.,2010 Result
+ Sept.,2011 Result
Map Location
PUREX / ORF
LOWER MAGOTHY
POTENTIOMETRIC SURFACE
with TVOC for Nov.3, 2011
Prepared By: - NCDPW - Water/Wastewater Engineering Unit
0 60120 240 360 480 600
Feet
Nassau County
Geographic Information System
Copyright 1993-2007
County of Nassau, New York
Date: 04/12/2012

Groundwater conditions in the Lower Magothy portion of the aquifer downgradient of the former Purex site can also be examined using the semi-annual groundwater data collected in 2014. There are four Lower Magothy downgradient wells which were sampled during this period; W-402, W-405, W-435, and W-461. TVOC concentrations in groundwater samples collected from these wells are very low and below all groundwater guidance values. Four wells exhibited concentrations below detectable limits for both the spring and fall sampling events. A single groundwater monitoring well W-435, had a TVOC of 36 ppb during the spring sampling event. There are also six upgradient monitoring well clusters with monitoring wells screened within this deeper interval including Nassau County Groundwater Monitoring Well Network wells N-9713/X-157, N-9779/X-164 and N-10019.

Two of the six upgradient wells are located to the north and east of the original Purex source area along Quentin Roosevelt Blvd. and at the corner of Quentin Roosevelt Blvd. and Commercial Ave. These two monitoring wells located northeast of the Purex Source Area exhibited much higher TVOC concentrations than the other monitoring downgradient monitoring wells. Lower Magothy monitoring well N-9713/X-157 had a TVOC concentration of 119 ppb in groundwater with 74 ppb of 1,1 Dichloroethene, while Lower Magothy well N-9779/X-164 had a TVOC concentration in groundwater of 180 ppb, including 49 ppb of 1,1 Dichloroethene and 110 ppb of Tetrachloroethylene.

The four other upgradient wells N-10019, MW-1s, MW-2s and MW-3s, (three of which were installed as part of the "Old Roosevelt Field" site investigation) were sampled by CDM for the USEPA in November 2014. The results of this sampling event are still pending.

Review of Current Corrective Measures

Source Area Groundwater Recovery and Treatment

As described in the CMWP, the 2011 Periodic Review Report (PRR) contains the results of a re-evaluation of Source Area groundwater conditions at the former Purex / Mitchel Field site. A total of eleven (11) groundwater monitoring wells located both inside and outside the slurry wall were located and sampled between February 17 and May 2, 2012 for the presence of volatile organic compounds. The TVOC concentrations observed both within the containment area and outside and below the containment area support the County's position that remediation of the source area is essentially complete. Following the most recent review of source area conditions, the remaining VOC's within the source area appear to be contained and hydraulically isolated by the slurry wall which can be considered an effective remedy. As such, there is no technical reason to resume pumping the original recovery wells within the containment area.

Plume Area Groundwater

Review of offsite groundwater quality in comparison to the Water Condition established in the Consent Order for the wells sampled as part of the monitoring program, indicate that individual compound and TVOC concentrations in those monitoring wells located in the Upper Magothy portion of the down gradient Purex Plume have met the Water Condition specified in the cleanup criteria for the site or have met statistical criteria for closure.

TVOC concentrations in monitoring wells located in the lower portion of the Magothy aquifer have met the Water Conditions specified in the cleanup criteria for the site.

Review of Remediation Criteria

Nassau County procured the services of Malcolm Pirnie, Inc, the Water Division of ARCADIS U.S., Inc. (ARCADIS) to review the groundwater analytical data and complete an evaluation of the Remediation Criteria developed for the MFPGRF as part of the 1985 Consent Order. The Remediation Criteria, which is provided in Appendix A, details the conditions under which an extraction or monitoring well can be shut down or abandoned. The results of ARCADIS' evaluation are provided in Appendix B and summarized below.

VOC concentrations at each monitoring well have remained below the Water Condition of 100 parts per billion (ppb) total VOCs since 2006, with the exception of the April 2013 and April and December 2014 results from W-234 (upper glacial well) and the October 2013 result from W-378. The following individual VOCs at the listed wells were present in groundwater sampled from monitoring well network wells since 2011 at concentrations exceeding the respective Water Condition:

- Cis-1,2-dichloroethene (cis-1,2-DCE), tetrachrolorethene (PCE), trichloroethene (TCE), and vinyl chloride (VC) at W-234
- 1,1-dichloroethene (1,1-DCE) and cis-1,2-DCE at W-311R
- VC at W-372
- TCE at W-378
- VC at 380
- 1,1-DCE, cis-1,2-DCE, and VC at W-383

The detected concentrations in three of these cases (cis-1,2-DCE and VC at W-372, and cis-1,2-DCE at W-383) have only exceeded the respective Water Condition in one sample collected in the past 8 years. As shown in the following table, only five VOCs (TCE, PCE, 1,1-DCE, cis-1,2-DCE, and VC) are detected in groundwater sampled from wells associate with the Purex site.

According to the Remediation Criteria, an extraction or purge well may be shut down if either the first or second criterion of the Remediation Criteria is met. As explained in Appendix B, the second criterion is satisfied for 11 of the 12 Water Condition exceedances when evaluating current (2014) groundwater analytical data. The Remediation Criteria were also met at the time the remedial system was shut off in April 2012.

Review of Groundwater VOC Analytical Data
Purex Site at Mitchel Field
East Garden City, New York

Compound		1,1-DCE	Cis-1,2-DCE	PCE	TCE	Vinyl Chloride	1,1-DCA	1,2-DCA	1,1,1-TCA	1,1,2-TCA	1,1,2,2-PCA	1,1,2-trichloro-1,2,2-trifluoroethane	1,4-Dichlorobenzene	trans-1,2-DCE	Benzene	Bromodichloromethane	Carbon Tetrachloride	Chlorobenzene	Chloroform	Ethylbenzene	Methylene Chloride	Toluene	Xylene
Water Condition (µg/L)		5	50	50	50	5	50	5	50	50	50	50	50	50	5	100	50	50	100	50	50	50	50
Screened Interval	Well																						
Glacial	W-234	<	>	>	>	>	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-302	ND	<	ND	<	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-305	ND	ND	<	<	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-311R	>	>	<	<	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-334	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-361	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-363	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-366	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-367	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-369	ND	<	ND	<	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-370	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-371	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-372	ND	<	ND	<	>	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-373	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-378	ND	ND	ND	>	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-380	ND	<	ND	<	>	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-381	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-382	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Upper Magothy	W-383	>	>	<	<	>	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lower Magothy	W-402	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lower Magothy	W-405	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lower Magothy	W-434	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lower Magothy	W-435	ND	<	ND	<	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lower Magothy	W-461	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

ND	Not detected in samples collected during 2014 sampling events
<	Detected at a concentration less than the respective Water Condition during at least one of the previous 12 sampling events
>	Concentration greater than Water Condition in at least one of the previous 12 sampling events

The Water Condition is a site-specific remediation criterion set in the Order on Consent.

4.0 Conclusions and Recommendations

The original remedy (pump and treat used in combination with soil flushing and impermeable barriers) selected for the site in 1985 has proven to be highly effective. Levels of TVOCs have been significantly reduced in groundwater, unsaturated soils have been remediated and hydraulic control within the containment area is maintained. The remedy for the source (a slurry containment wall) has been effective. The containment (source) area does not appear to be a continuing source of VOCs to downgradient areas. The remedial system operated from 1990 to 2012 and was successful at lowering groundwater VOC concentrations to the limits of technical feasibility, often by as much as four orders of magnitude (>99.9% reduction at several wells). Groundwater concentrations at several wells have decreased from the dozens of parts per million 20 years ago to the low parts per billion currently. Groundwater VOC concentrations do not exceed the respective Water Condition at monitoring wells located within 1000 feet downgradient of the source area. The twenty two (22) years of treatment have eliminated TVOC contamination from the ***Upper Glacial*** portion of the offsite plume and have reduced volatile organic concentrations in the ***Upper Magothy*** portion of the offsite plume to levels below the Water Condition established in the remedial criteria section of the original Consent Judgment at most monitoring and recovery well locations. Those wells where VOC groundwater concentrations exceed the Water Condition have stabilized and appear to have been impacted by other contaminated sites. Contamination in the ***Lower Magothy*** portion of the aquifer is confined to a single well location and appears to have been impacted by other industrial source(s).

Overall, the intent and objectives of the Consent Order have been met. ***The Total VOC concentrations in groundwater at the offsite monitoring well locations are below the value specified (100 ppb) in the Water Condition or have met statistical criteria for closure.*** The source area contamination has been reduced significantly and controlled by the remedial program defined in the Consent Order. There is a concern on behalf of the County that numerous sources of volatile organics (including Old Roosevelt Field) are contributing to the overall extent of contamination in the area and should be investigated further by a regulatory agency. Additionally, the remaining VOCs and ***source area*** groundwater conditions have been re-evaluated and with NYSDEC approval the County would like to consider the existing slurry wall and its underlying clay as an acceptable remedy when combined with a revised sampling program.

The County believes that with the exception of the ***Source Area, the requirements for site closure have been achieved because the offsite wells are below the site specific Water Condition or have met statistical criteria for closure***. The treatment plant equipment, offsite piping and recovery wells have all reached the end of their useful life and were deactivated in April 2012. The capital costs to restart the remedial system would be significant. The County does not believe such an investment is warranted. The County would like to initiate discussions with NYSDEC on the creation of a revised groundwater sampling program, with a reduced number of downgradient wells to be monitored at a reduced frequency.

Appendix A
Remediation Criteria

Appendix E

REMEDIATION CRITERIA

Shutdown at any one or more of the extraction or purge wells shall occur when the "Remediation Criteria" are met. The Remediation Criteria are met when either condition described below is met:

1. The Water Condition set forth in Table 3 is met for three consecutive months, in accordance with the following methodology:
   (a) Samples taken from the extraction or purge well and related monitoring wells will be analyzed and the data will be statistically evaluated to determine the concentrations for individual compounds and Total Volatile Organic Compounds. If there is no statistically significant difference between the data and the Water Condition at the 95 percent confidence limit (using "t" statistics) then the extraction or purge well may be shut down. In the event that the analysis of the extraction or purge well data meets the Water Condition and the related monitoring wells do not, the extraction or purge well may be shut down and the Remedial System adjusted as appropriate. The need for the installation of additional extraction or purge wells will be assessed on the basis of whether additional wells are necessary to affect the areas which are contaminated with chemicals attributable to the Property.
2. The "Zero Slope Condition" is met as follows: when the slope of the curve of the concentrations of the chemicals listed in Table 2 and Total Volatile Organic Compounds, as calculated is deemed zero. The determination of said concentration shall be made on a well-by-well basis at all pertinent extraction, purge, and monitoring wells within the containment area or within the offsite area. The determination of whether there is a zero slope shall be made as follows:
   (a) Samples shall be taken at the locations and frequencies stated in the Monitoring Plan.

(b) The data collected over the preceding twelve (12) month period will be examined and the concentration values for the individual compounds and the Total Volatile Organic Compounds and the associated confidence limits will be computed and plotted.

(c) If the curve suggested by these data points is linear, then a straight line using least squares regression model shall be fitted to the data and the slope of the fitted line shall be considered as the estimated slope for purposes of this paragraph.

(d) If the data points suggest a non-linear form, then an exponential curve using a least squares regression model shall be fitted to the data. The estimated slope for purposes of this paragraph shall be the first derivative of the curve at a value of time halfway between the dates of the last two sample points.

(e) The estimated slope shall be deemed to be zero if:

1) that slope is less than or equal to zero and greater than or equal to negative 30 ppb/year; and

2) the rate of change of that slope is equal to zero or indicates a continuously decreasing concentration.

(f) If the mean concentration in a well is less than or equal to 200 ppb, and the procedure defined above results in a positive slope, then the 95 percent confidence interval shall be calculated for the slope of the regression line; if a zero slope is within this confidence interval, then the estimated slope shall be deemed to be zero.

(g) The concentration at a well shall be deemed to meet the Zero Slope Condition if the estimated slope is deemed to be zero.

Data showing contamination that can statistically be demonstrated as not attributable to the original Purex Property may be excluded from the data evaluation used to determine whether the Remediation Criteria has been met. This exclusion shall be made upon confirmation of a non-Property source.

Table 3

Water Condition

Parameter	Concentration
Benzene	5
Toluene	50
Xylene	50
Trichloroethene	50
Tetrachloroethene	50
1,1-Dichloroethene	5
cis-1,2-Dichloroethene	50
trans-1,2-Dichloroethene	50
trans-1,3-Dichloropropene	2
cis-1,3-Dichloropropene	2
Methylene Chloride	50
Chloroform	100*
1,1,2-Trichloroethane	50
1,2-Dichloroethane	5
1,1,2,2-Tetrachloroethane	50
1,1,1-Trichloroethane	50
1,1,2-Trichloro-1,2,2-trifluoroethane	50
Bromodichloromethane	100*
Dibromochloromethane	100*
Bromoform	100*
1,1-Dichloroethane	50
Carbon Tetrachloride	50
1,4-Dichlorobenzene	50
Vinyl Chloride	5
Chlorobenzene	50
Ethyl Benzene	50
Total Compounds	100

NOTES:

(1) Concentrations in ug/1 (micrograms/liter), parts per billion.

(2) Sum of these four compounds shall not exceed 100 ug/1. (*)

(3) Total compounds are defined as the sum of all the compounds listed above.

(4) As set forth in Appendix C, Section 6, the methodologies to be used are EPA methods 624 and 625. Any analyte not found in concentrations at or above the method's detection limit shall be deemed to meet the Water Condition.

Appendix B
Evaluation of Purex Remediation Criteria

ARCADIS of New York, Inc.
855 Route 146
Suite 210
Clifton Park
New York 12065
Tel 518 250 7300
Fax 518 250 7301

MEMO

To:
Michael Flaherty (Nassau County)

Copies:
Bruce Nelson (ARCADIS)

From:
Mark Flusche (ARCADIS)

Date:
March 30, 2015

ARCADIS Project No.:
00726616.0001

Subject:
Evaluation of Purex Remediation Criteria
NYSDEC Site No. 130014

Remediation Criteria Evaluation Tasks

At the request of Nassau County, ARCADIS of New York, Inc. (ARCADIS) completed an evaluation of the Remediation Criteria developed for the MFPGRF as part of the 1985 Consent Order. ARCADIS has:

- Reviewed the 2009 and 2011 Periodic Review Reports and the 2003 Groundwater Monitoring Report prepared by Woodard and Curran;
- Reviewed historical and current (through 2014) groundwater VOC analytical data;
- Reviewed Remediation Criteria established for the site (Consent Order Appendix E);
- Compared groundwater concentrations at wells associated with the site to site-specific Water Conditions provided in the Consent Order; and
- Performed the statistical analysis described in the Consent Order for all wells where concentrations currently exceed the respective Water Conditions.

Summary of Data Review and Statistical Evaluation Results

The wells with groundwater containing VOCs at concentrations greater than the corresponding Water Condition are shown on Figure 1. The 25 wells in the monitoring well network were included in the following evaluation. As such, data from upgradient and source area wells contained within the slurry wall were not evaluated.

The containment (source) area does not appear to be a continuing source of VOCs to downgradient areas because elevated concentrations of VOCs are not present in groundwater in the Upper Magothy within 1,000 feet downgradient of the source area (Figure 1). As such, the containment slurry wall is an effective remedy for the source area. VOC concentrations at each monitoring well have remained below the Water Condition of 100 parts per billion (ppb) total VOCs since 2006, with the exception of the April 2013 and April and December 2014 results from W-234 (upper glacial well) and the October 2013 result from W-378. The following individual VOCs at the listed wells were present in groundwater sampled from monitoring well network wells since 2011 at concentrations exceeding the respective Water Condition:

- Cis-1,2-dichloroethene (cis-1,2-DCE), tetrachrolorethene (PCE), trichloroethene (TCE), and vinyl chloride (VC) at W-234
- 1,1-dichloroethene (1,1-DCE) and cis-1,2-DCE at W-311R
- VC at W-372
- TCE at W-378
- VC at 380
- 1,1-DCE, cis-1,2-DCE, and VC at W-383

The detected concentrations in three of these cases (cis-1,2-DCE and VC at W-372, and cis-1,2-DCE at W-383) have only exceeded the respective Water Condition in one sample collected in the past 8 years. A summary of the 1,1-DCE, cis-1,2-DCE, PCE, TCE, and VC concentrations at these wells in groundwater sampled since 2002 is provided in Table 1.

Appendix E (Remediation Criteria) to the Consent Order assumes that groundwater samples would be collected monthly. Nassau County has, with the concurrence of the NYSDEC, been sampling semi-annually since 2004. As such, the methodology described in Consent Order Appendix E cannot be precisely followed. Instead, groundwater analytical data from the most recent 12 sampling events over 6 to 8 years were evaluated for individual VOCs at wells with concentrations exceeding a respective Water Condition. The following summarizes a statistical evaluation showing that the Remediation Criteria are currently met and were also met at the time the remedial system was shut down in April 2012.

According to the Remediation Criteria, an extraction or purge well may be shut down if either the first or second criterion is met. The first criterion is not met because the 95 percent confidence limit exceeds the respective Water Conditions (Table 2). The second criterion, which was selected for the evaluation of the Remediation Criteria, is the zero slope condition, which is met when the slope of the curve of the VOC concentrations (straight line for linear data or exponential curve for non-linear data) is zero. The estimated slope is deemed to be zero if the slope is less than or equal to zero and greater than or equal to negative 30 ppb/year and the rate of change of that slope is equal to zero or indicated a continuously decreasing concentration. The results of this evaluation are presented in Table 3.

According to paragraph 2(f) of the Remediation Criteria, the second criterion would be satisfied if the zero slope falls inside the 95% confidence interval on the slope, then the criterion is met, provided that the average concentrations of the COCs is less than 200 ppb. This evaluation satisfies the zero slope condition when transformations are made (square root or logarithm of the data to produce a normally distributed data set). Further, much of the data are censored (non-detect). When censorship is accounted for and transformed data are used, Table 4 shows that the criterion is satisfied for 11 of the 12 Water Condition exceedances.

The statistical evaluations show that the Remediation Criteria are met when evaluating current groundwater analytical data. The Remediation Criteria were also met at the time the remedial system was shut off in April 2012. In the five years before the remedial system was deactivated, the Water Condition was exceeded for 1,1-DCE at W-311R, TCE at W-378, and VC at W-383. The same statistical evaluation described above was performed on these three Water Condition Exceedances for the previous 12 sampling events ending in November 2011. The first criterion is not met because the 95 percent confidence limit exceeds the respective Water Conditions (Table 5). A zero slope condition exists for VC at W-383 because the slope of VC concentrations at W-383 is negative (Table 6). The 1,1-DCE concentrations at W-311R and TCE concentrations at W-378 satisfy the second criterion according to paragraph 2(f) of the Remediation Criteria (Table 7). The average concentration in each case is less than 200 ppb, and the zero slope falls in the confidence interval for 1,1-DCE in W-311R and for trichloroethene in W-378. The results presented in Tables 6 and 7 show that the Remedial Criteria were met at the time the remedial system was shut off.

Recommendations

The treatment plant equipment, off-site piping, and recovery wells reached the end of their useful life and were deactivated in April 2012. The capital costs to restart the remedial system would be significant. As presented above, groundwater data met the Remediation Criteria at the time the remedial system was shut down in 2012. The remedial system operated from 1990 to 2012 (22 years) and was successful at lowering groundwater VOC concentrations by as much as four orders of magnitude (>99.9% reduction at several wells). Groundwater concentrations at several wells have decreased from the dozens of parts per million 20 years ago to the low parts per billion currently. In addition, the remedy for the source (a slurry

containment wall) has been effective. The containment (source) area does not appear to be a continuing source of VOCs to downgradient areas.

The Remediation Criteria have been achieved, current Water Condition exceedances are restricted to a limited number of wells and individual VOCs, and upgradient sources may have contributed to the current Water Condition exceedances. The 2011 Periodic Review Report recommended that the extraction and treatment of off-site groundwater in both the upper and lower portions of the Magothy Aquifer be discontinued because the groundwater VOC concentrations were generally less than the corresponding Water Condition. The review of the groundwater data corroborates this recommendation because the Remediation Criteria have been met. Groundwater with VOC concentrations greater than the respective Water Condition, which appears to be related to upgradient VOC sources, is restricted to a few monitoring wells. Lower Magothy groundwater VOC concentrations greater than the Water Condition are restricted to the recovery well W-383D. The monitoring well network and sampling plan should be evaluated to develop a recommendation for a proposed reduction in sample locations and frequency.

Attachments

Figure 1 – Monitoring Well Locations

Table 1 – Select Groundwater VOC Analytical Data

Table 2 – Upper Confidence Limits on the Concentration

Table 3 – Mann-Kendall Trend Analysis

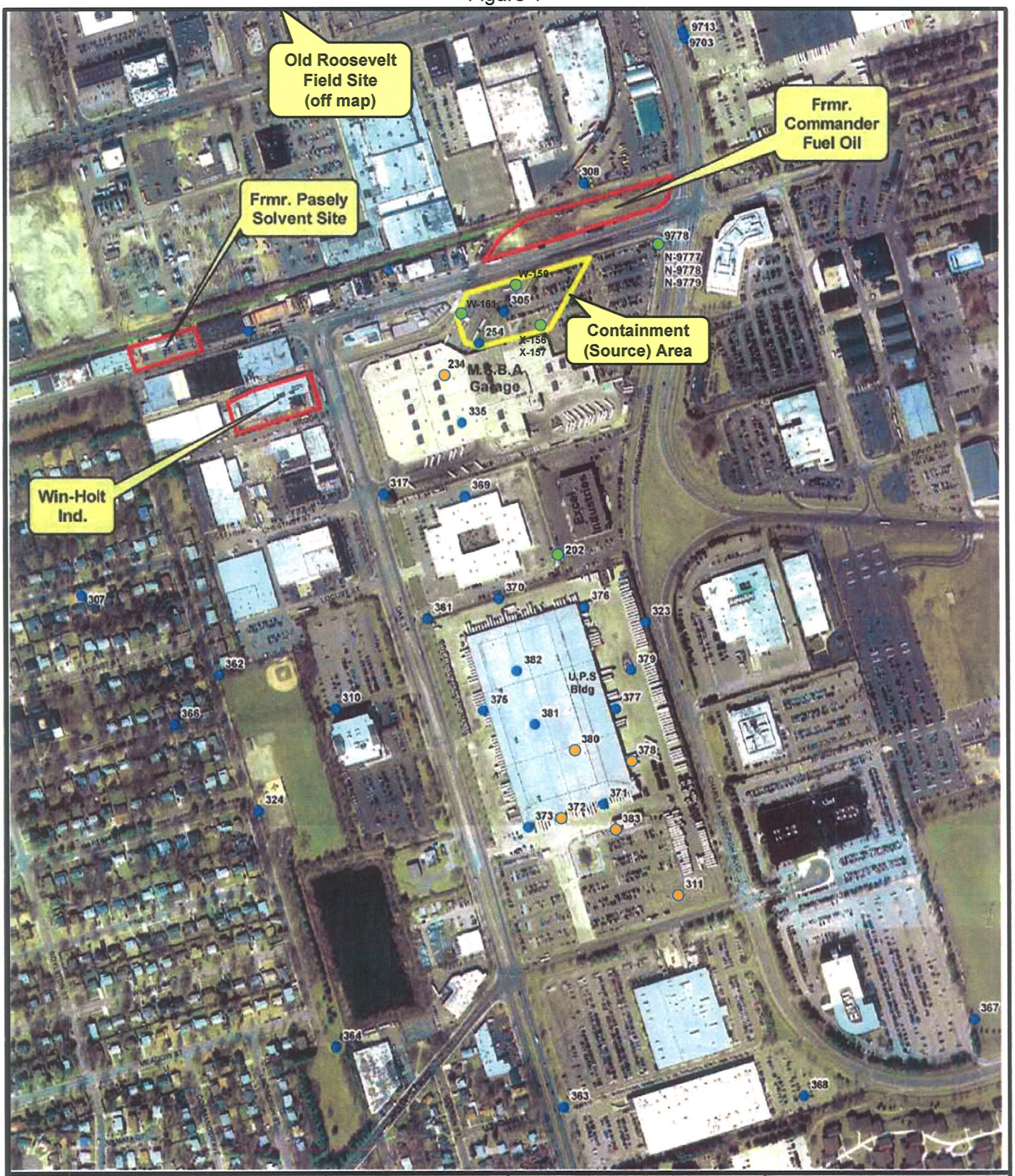
Table 4 – Zero Slope Condition - Remediation Criteria Paragraph 2(f)

Table 5 – Upper Confidence Limits on the Concentration, Data at Remedial System Shutdown

Table 6 – Mann-Kendall Trend Analysis, Data at Remedial System Shutdown

Table 7 – Zero Slope Condition - Remediation Criteria Paragraph 2(f), Data at Remedial System Shutdown

Figure 1



LEGEND

- Monitoring Well or Well Cluster with No Water Condition Exceedance
- Well in Monitoring Well Network with Groundwater Concentration Exceeding a Water Condition
- Well not in Monitoring Well Network with Groundwater Concentration Exceeding a Water Condition

Site Location

PUREX SITE & VICINITY

MONITORING WELL LOCATIONS

Mitchel Field, NY

N W E S

0 62.5 125 250 375 500 Feet

Nassau County

Geographic Information System

Date: 6/10/2009

Table 1
Select Groundwater VOC Analytical Data
Purex Site at Mitchel Field
East Garden City, New York

Compound		1,1-DCE	Cis-1,2-DCE	PCE	TCE	VC
Water Condition (µg/L)		5	50	50	50	5
Well	Sampling Date					
W-234	9/25/03		2.2	39.5	< 1.7	< 1.1
W-234	5/18/04		275	152	92.9	6.1
W-234	10/26/04		763	473	80.5	4.1
W-234	5/4/05		28.7	57.8	7.7	< 1
W-234	11/28/05		< 0.7	276	78.5	26
W-234	4/26/06		278	501	74.5	2.1
W-234	10/31/06		3200	520	240	32
W-234	4/25/07		26	39	3.8	< 1.0
W-234	10/24/07		1.1	37	2	< 1.0
W-234	4/3/08		4.4	13	3.4	< 1.0
W-234	10/21/08		< 1.0	7.7	< 1.0	< 1.0
W-234	4/13/09		< 1.0	4	3.4	< 1.0
W-234	11/16/09		0.86	4.2	1.1	< 1.0
W-234	4/9/10		ND	ND	ND	ND
W-234	12/16/10		8.2	11	2.9	< 1.0
W-234	4/8/11		0.57J	8.4	0.73J	ND
W-234	11/16/11		4.88J	38.1	6.18	ND
W-234	4/27/12		12.9	58.1	10.1	ND
W-234	5/1/13		100	40.8	15.8	9.3
W-234	11/8/13		3.05J	8.2	1.42J	ND
W-234	5/7/14		410	120	57	13
W-234	12/5/14		85	21	10	10
W-311R	1/17/02	13.4	215			
W-311R	9/23/03	< 1.2	47.3			
W-311R	5/11/04	< 1.2	70.8			
W-311R	10/22/04	1.2	63.1			
W-311R	4/26/05	2.1	105			
W-311R	10/20/05	2.1	68			
W-311R	4/21/06	3	46.8			
W-311R	10/31/06	5.3	52			
W-311R	4/19/07	6	24			
W-311R	10/22/07	6.3	2.4			
W-311R	3/27/08	6.3	5.9			
W-311R	10/14/08	8.2	2.9			
W-311R	4/1/09	10	3.4			
W-311R	10/26/09	8.3	2.8			
W-311R	5/13/10	9.7	3.9			
W-311R	10/25/10	9.6	4.1			
W-311R	4/7/11	2.7	0.87J			
W-311R	11/1/11	6.36	8.1			
W-311R	4/11/12	9.4	6.7			
W-311R	4/14/14	<10	74			
W-311R	11/3/14	<5	44			

Highlighted results exceed the respective Water Condition, a site-specific remediation criterion set in the Order on Consent.

Table 1
Select Groundwater VOC Analytical Data
Purex Site at Mitchel Field
East Garden City, New York

Compound		1,1-DCE	Cis-1,2-DCE	PCE	TCE	VC
Water Condition (µg/L)		5	50	50	50	5
Well	Sampling Date					
W-372	1/17/02					< 1.1
W-372	9/22/03					< 1.1
W-372	5/12/04					< 1.1
W-372	10/22/04					< 1.1
W-372	10/31/05					< 1
W-372	4/21/06					< 1
W-372	10/26/06					< 1.0
W-372	4/23/07					< 1.0
W-372	3/21/08					< 1.0
W-372	10/16/08					< 1.0
W-372	4/8/09					< 1.0
W-372	11/2/09					< 1.0
W-372	5/17/10					ND
W-372	10/25/10					ND
W-372	4/7/11					< 1.0
W-372	11/4/11					ND
W-372	4/12/12					ND
W-372	4/17/13					ND
W-372	10/3/13					4.18
W-372	4/21/14					<5
W-372	10/21/14					5.8
W-378	1/18/02				9.4	
W-378	9/22/03				< 1.7	
W-378	5/12/04				< 1.7	
W-378	10/22/04				2.3	
W-378	4/26/05				23.1	
W-378	10/21/05				2	
W-378	4/21/06				4.1	
W-378	10/26/06				1.8	
W-378	4/23/07				2.3	
W-378	3/26/08				2	
W-378	10/16/08				7	
W-378	4/7/09				14	
W-378	11/5/09				29	
W-378	5/17/10				47	
W-378	10/29/10				< 1.0	
W-378	4/4/11				26	
W-378	11/3/11				54.3	
W-378	4/12/12				44.2	
W-378	4/16/13				12.9	
W-378	10/4/13				109	
W-378	4/21/14				82	
W-378	10/21/14				75	

Highlighted results exceed the respective Water Condition, a site-specific remediation criterion set in the Order on Consent.

Table 1
Select Groundwater VOC Analytical Data
Purex Site at Mitchel Field
East Garden City, New York

Compound		1,1-DCE	Cis-1,2-DCE	PCE	TCE	VC
Water Condition (µg/L)		5	50	50	50	5
Well	Sampling Date					
W-380	1/30/02					< 1.1
W-380	9/24/03					29.3
W-380	5/17/04					6.2
W-380	5/5/05					8
W-380	11/21/05					7.9
W-380	4/25/06					6.9
W-380	10/30/06					11
W-380	4/24/07					2.1
W-380	10/23/07					1.2
W-380	4/2/08					1.6
W-380	10/17/08					1.4
W-380	4/6/09					1.6
W-380	11/9/09					< 1.0
W-380	3/29/10					< 1.0
W-380	12/9/10					< 1.0
W-380	5/9/11					< 1.0
W-380	11/18/11					1.37J
W-380	4/24/12					1.97J
W-380	4/24/13					3.15J
W-380	11/6/13					10.8
W-380	4/25/14					<5
W-380	12/2/14					13
W-383	1/30/02	285	1954			980
W-383	9/23/03	< 1.2	10.9			< 1.1
W-383	5/12/04	< 1.2	15.4			3.2
W-383	10/22/04	< 1.2	7.9			1.9
W-383	10/19/05	3.1	30.9			30.8
W-383	4/21/06	3.2	58			34.4
W-383	4/19/07	< 1.0	7.5			< 1.0
W-383	10/22/07	< 1.0	4.9			< 1.0
W-383	3/27/08	< 1.0	55			26
W-383	10/14/08	< 1.0	4.9			< 1.0
W-383	4/7/09	< 1.0	4.3			< 1.0
W-383	10/26/09	ND	4.8			ND
W-383	4/9/10	ND	1.5			ND
W-383	12/2/10	< 1.0	5.1			< 1.0
W-383	4/7/11	< 1.0	1.7			< 1.0
W-383	11/3/11	ND	29.2			10.7
W-383	4/10/13	10.2	ND			16.5J
W-383	10/2/13	3.56	86			11.3
W-383	4/14/14	<10	43			<10
W-383	10/17/14	<5	40			11

Highlighted results exceed the respective Water Condition, a site-specific remediation criterion set in the Order on Consent.

Table 2
Upper Confidence Limits on the Concentration
Purex Site at Mitchel Field
East Garden City, New York

Well	Constituent	Samples	Detections	Detection Rate (%)	Distribution	Outliers	Detects only Distribution	Detects only Outliers	95% UCL µg/L	Water Condition µg/L
W-234	cis-1,2-DCE	12	9	75.00%	Lognormal	0	Cube-root	0	410	50
W-234	Tetrachloroethene	12	11	91.67%	Square-root	0	Square-root	0	96.4	50
W-234	Trichloroethene	12	10	83.33%	Lognormal	0	Cube-root	0	70.1	50
W-234	Vinyl chloride	12	3	25.00%	Unknown	0	Normal	0	13	5
W-311R	1,1-DCE	12	10	83.33%	Normal	0	Normal	0	12.0	5
W-311R	cis-1,2-DCE	12	12	100.00%	Lognormal	1	Lognormal	1	55.9	50
W-372	Vinyl chloride	12	2	16.67%	Unknown	0	n.a.	n.a.	5.80	5
W-378	Trichloroethene	12	11	91.67%	Normal	0	Normal	0	104	50
W-380	Vinyl chloride	12	7	58.33%	Lognormal	0	Lognormal	0	17.0	5
W-383	1,1-DCE	12	2	16.67%	Unknown	1	n.a.	n.a.	10.2	5
W-383	cis-1,2-DCE	12	11	91.67%	Square-root	0	Square-root	0	87.0	50
W-383	Vinyl chloride	12	5	41.67%	Unknown	0	Normal	0	26.0	5
W-311R*	cis-1,2-DCE	11	11	100.00%	Lognormal	0	Lognormal	0	27.8	50

Footnotes:
µg/L: micrograms per liter.
Distributions determined by the Ladder of Powers and the Shapiro-Wilk test for Normality.
Outliers determined by the Dixon Test for Outliers run at 99% confidence on transformed data.
UCL: Upper confidence limit.
Water Condition: A remediation criterion set in the Order on Consent.
Shading indicates that the 95% UCL exceeds the Water Condition.
Calculations made with a statistical outlier omitted are indicated with an asterisk (*).

Table 3
Mann-Kendall Trend Analysis
Purex Site at Mitchel Field
East Garden City, New York

Well	Constituent	Samples	Detections	Detection Rate (%)	Mann-K S-stat	Mann-K $\alpha = 0.05$	Sen's $\alpha = 0.10$
W-234	cis-1,2-DCE	12	9	75.00%	35	Upward	Upward
W-234	Tetrachloroethene	12	11	91.67%	34	Upward	Upward
W-234	Trichloroethene	12	10	83.33%	31	Upward	Upward
W-234	Vinyl chloride	12	3	25.00%	26	Upward	No trend
W-311R	1,1-DCE	12	10	83.33%	6	No trend	No trend
W-311R	cis-1,2-DCE	12	12	100.00%	34	Upward	Upward
W-372	Vinyl chloride	12	2	16.67%	30	Upward	No trend
W-378	Trichloroethene	12	11	91.67%	32	Upward	Upward
W-380	Vinyl chloride	12	7	58.33%	38	Upward	Upward
W-383	1,1-DCE	12	2	16.67%	30	Upward	No trend
W-383	cis-1,2-DCE	12	11	91.67%	8	No trend	No trend
W-383	Vinyl chloride	12	5	41.67%	17	No trend	No trend
W-311R*	cis-1,2-DCE	11	11	100.00%	8	No trend	No trend

Footnotes:
Mann-K S-stat: Mann-Kendall S-statistic.
Mann-K: Mann-Kendall test result run at 95% Confidence (a 0.05 level of significance) with 0.025 % significance on each tail.
Sen's: Sen's Slope Estimator, run at a 0.10 level of significance (0% confidence).
Note that all three cases in which Sen's Slope Estimator did not confirm the Mann-Kendall result involved detection rates of 25% or less.
Calculations made with a statistical outlier omitted are indicated with an asterisk (*).

Table 4
Zero Slope Condition - Remediation Criteria Paragraph 2(f)
Purex Site at Mitchel Field
East Garden City, New York

Well	Constituent	Samples	Detections	Detection Rate (%)	Distribution	Slope	Mean Concentration µg/L	95% LCL µg/L	95% UCL µg/L	Criterion Satisfied
W-234	cis-1,2-DCE	12	9	75.00%	Lognormal	0.0022	91.3	-0.0635	0.0678	Yes
W-234	Tetrachloroethene	12	11	91.67%	Square-root	0.0025	91.3	-0.0534	0.0584	Yes
W-234	Trichloroethene	12	10	83.33%	Lognormal	0.0014	91.3	-0.0996	0.1024	Yes
W-234	Vinyl chloride	12	3	25.00%	Unknown	0.0046	91.3	-0.0265	0.0357	Yes
W-311R	1,1-DCE	12	10	83.33%	Normal	-0.0015	20.3	-0.0732	0.0702	a
W-311R	cis-1,2-DCE	12	12	100.00%	Lognormal	0.0011	20.3	-0.1148	0.1171	Yes
W-372	Vinyl chloride	12	2	16.67%	Unknown	0.0018	1.4	-0.0786	0.0822	Yes
W-378	Trichloroethene	12	11	91.67%	Normal	0.0331	41.7	0.0287	0.0374	No
W-380	Vinyl chloride	12	7	58.33%	Lognormal	0.0011	3.1	-0.1253	0.1275	Yes
W-383	1,1-DCE	12	2	16.67%	Unknown	0.0023	32.1	-0.0534	0.0580	Yes
W-383	cis-1,2-DCE	12	11	91.67%	Square-root	0.0014	32.1	-0.0663	0.0691	Yes
W-383	Vinyl chloride	12	5	41.67%	Unknown	0.0015	32.1	-0.0238	0.0268	Yes

Footnotes:
µg/L: micrograms per liter.
Distributions determined by the Ladder of Powers and the Shapiro-Wilk test for Normality.
Outliers determined by the Dixon Test for Outliers run at 99% confidence on transformed data.
UCL: Upper confidence limit.
Water Condition: A remediation criterion set in the order on consent.
Shading indicates that the 95% UCL exceeds the Water Condition.
a. Since the data set has a negative slope, the zero slope criteria is already satisfied.

Table 5
Upper Confidence Limits on the Concentration, Data at Remedial System Shutdown
Purex Site at Mitchel Field
East Garden City, New York

Well	Constituent	Samples	Detections	Detection Rate (%)	Distribution	Outliers	Detects only Distribution	Detects only Outliers	95% UCL µg/L	Water Condition µg/L
W-311R	1,1-DCE	12	12	100.00%	Normal	0	Normal	0	11.4	5
W-378	Trichloroethene	12	11	91.67%	Square-root	0	Square-root	0	59	50
W-383	Vinyl chloride	12	4	33.33%	Unknown	0	Normal	0	34.4	5

Footnotes:
µg/L: micrograms per liter.
Distributions determined by the Ladder of Powers and the Shapiro-Wilk test for Normality.
Outliers determined by the Dixon Test for Outliers run at 99% confidence on transformed data.
UCL: Upper confidence limit.
Water Condition: A remediation criterion set in the Order on Consent.
Shading indicates that the 95% UCL exceeds the Water Condition.

Table 6
Mann-Kendall Trend Analysis, Data at Remedial System Shutdown
Purex Site at Mitchel Field
East Garden City, New York

Well	Constituent	Samples	Detections	Detection Rate (%)	Mann-K S-stat	Mann-K $\alpha = 0.05$	Sen's $\alpha = 0.10$
W-311R	1,1-DCE	12	12	100.00%	27	No trend	No trend
W-378	Trichloroethene	12	11	91.67%	33	Upward	Upward
W-383	Vinyl chloride	12	4	33.33%	-4	No trend	No trend

Footnotes:
Mann-K S-stat: Mann-Kendall S-statistic.
Mann-K: Mann-Kendall test result run at 95% Confidence (a 0.05 level of significance) with 0.025 % significance on each tail.
Sen's: Sen's Slope Estimator, run at a 0.10 level of significance (0% confidence).

Table 7
Zero Slope Condition - Remediation Criteria Paragraph 2(f), Data at Remedial System Shutdown
Purex Site at Mitchel Field
East Garden City, New York

Well	Constituent	Samples	Detections	Detection Rate (%)	Distribution	Slope [µg/L]/yr	Mean Concentration µg/L	Slope 95% LCL [µg/L]/yr	Slope 95% UCL [µg/L]/yr	Criterion Satisfied
W-311R	1,1-DCE	12	12	100.00%	Normal	0.447	6.8	-29.53	30.42	Yes
W-378	Trichloroethene	12	11	91.67%	Square-root	0.803	15.8	-23.09	24.70	Yes
W-383	Vinyl chloride	12	4	33.33%	Unknown	-4.211	32.1	a	a	Yes

Footnotes:
[µg/L]/yr: micrograms per liter per year, equivalent to "ppb/yr" in the Remediation Criteria
µg/L: micrograms per liter.
Distributions determined by the Ladder of Powers and the Shapiro-Wilk test for Normality.
LCL: Lower confidence limit.
UCL: Upper confidence limit.
For W-378, slopes and confidence limits are presented without back-transformation in order to show the capture of the zero slope.
a. Since the data set has a negative slope, the zero slope criteria is already satisfied.