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LOCKHEED MARTIN

DATE: September 24, 2004

TO: Terrence Johnson, U.S. EPA/ERTC Work Assignment Manager

THROUGH: Parry Bhambra, REAC Operations Section Leader

FROM: Lawrence P. Kaelin, REAC Task Leader

SUBJECT: THE LIBERTY INDUSTRIES AND FINISHING SITE, UPGRADIENT SOURCE WORK ASSIGNMENT EAC00048 - TRIP REPORT

BACKGROUND

The Liberty Industries and Finishing Site (Liberty Site) is a former aircraft parts manufacturing and plating facility in Farmingdale, New York (NY). A groundwater plume of chlorinated hydrocarbons (primarily tetrachloroethylene [PCE] and to a lesser extent trichloroethylene) and dissolved metals emanate from the Liberty Site to the south in a pattern consistent with the regional groundwater flow (REAC 2002). In addition to the Liberty Site source for dissolved contaminants, there is the potential that hydraulically upgradient source(s) may also contribute the groundwater plume. Dry cleaning operations have, for a number of years, been conducted from a location (Cleaners) at the Farmingdale Plaza Shopping Center (Shopping Center). The Cleaners is presently being operated by the Farmingdale Plaza Cleaners, Inc.. This Cleaners is situated hydraulically upgradient from the Liberty Site and is a possible PCE source to the groundwater plume. The Shopping Center is located just north of the Liberty Site and is home to the Waldbaum's Supermarket (Waldbaum), the aforementioned dry cleaner, a Chinese restaurant and a convenience store. Adjacent to the Shopping Center are access roads, a paved parking lot, a McDonald's restaurant, residential homes and the Hardscrabble Apartments for Seniors (Figure 1).

Response Engineering and Analytical Contract (REAC) personnel provided technical assistance to the Environmental Protection Agency (EPA) Region II On Scene Coordinator (OSC) at the request of the EPA Environmental Response Team Center (ERTC) Work Assignment Manager (WAM) during a soil gas sampling and analysis exercise at the Shopping Center. The objective of the exercise was to determine if a source of PCE is present in the shallow subsurface immediately upgradient of the Liberty Site in the vicinity of the Cleaners at the Shopping Center.

OBSERVATIONS AND ACTIVITIES

Soil Gas Sampling and Analysis

From May 03 through 09, 2004, REAC personnel conducted an on-site soil gas survey using a combination of manual slam-bar methods and a direct-push drilling unit (Geoprobe®) to advance a 1-inch diameter rod to a depth of approximately four feet below ground surface (bgs). From that depth, soil gas samples were

collected in 1-liter (L) Tedlar™ bags using a vacuum box, Gilligan Pump™ and stainless-steel tube sampling assembly and immediately submitted for on-site field screening analysis. A Perkin Elmer Photovac Model Voyager™ field- portable gas chromatograph (FPGC) was used to provide the on-site field screening analysis for PCE in the soil gas samples. A subset of the soil gas samples were sent to the REAC Laboratory in Edison, New Jersey (NJ) for laboratory confirmation analysis of the field screening results for PCE.

Copies of the field log notebooks with the raw field data and daily injection log generated during the on-site analysis of the soil gas samples are presented in Appendix A. In addition, copies of the field log books documenting the indoor soil gas locations and general site comments and information are presented in Appendix A. The following is a chronology of field activities during this exercise.

On May 03, 2004, REAC personnel mobilized to the Liberty Site. Sub-slab soil gas samples, taken underneath the concrete floor slab, were collected from the back room storage area at the southern end of Waldbaum and a partitioned area containing the dry cleaning unit in the Cleaners (Figure 2). Sub-slab soil gas sampling points were obtained using an impact drill to penetrate the concrete floor slab and a manual slam bar to advance a 1-inch rod to four feet bgs. Soil gas samples were collected in 1-liter (L) Tedlar™ bags as previously described and immediately submitted to the field laboratory located at the Liberty Site treatment building for on-site PCE field screening analysis using a FPGC. Samples DC-1, WB-1, WB-2 and WB-3 were collected and analyzed during this period.

From May 04 through 06, 2004 soil gas sampling was conducted in the parking lot and access roads within the Shopping Center complex (Figure 3). A Geoprobe® model 540B direct-push drilling unit was used to advance a 1-inch diameter rod through the blacktop to a depth of four feet below ground surface (bgs) and soil gas samples were collected in 1-L Tedlar™ bags as previously outlined. Soil gas samples SG-3, SG-6, SG-9, SG-12, and SG-19 through SG-64 were collected and screened on-site for PCE at the field laboratory during this period. Two blank soil gas samples: GB-1 (Geoprobe Sampling Equipment Blank) and TBS-1 (Teflon Tubing Blank) were also collected and analyzed on-site for PCE via FPGC.

Concurrent with the on-site sampling and field analysis activities, seven replicate soil gas samples (SG-35, SG-41, SG-42, SG-49, SG-50, SG-51, SG-56) were collected in evacuated 6-L SUMMA™ canisters for confirmatory laboratory analysis by gas chromatography/mass spectrometry (GC/MS) using a modified Method TO-15 procedure (EPA 1999). In addition, an ambient air background sample (AMB-1) was collected in an evacuated 6-L SUMMA™ canisters for modified TO-15 GC/MS confirmatory laboratory analysis.

On May 07, 2004, soil gas samples were collected at the access roads and front lawns adjoining the Apartments, adjacent to the Shopping Center (Figure 3). Soil gas sampling points were advanced to a depth of four feet bgs using a combination of manual slam bar and direct-push drilling techniques, as appropriate. The soil gas samples SG-65 through SG-79 were collected in Tedlar bags as previously described and immediately submitted for on-site analysis of PCE via FPGC during this period.

On May 08, 2004, additional sub-slab soil gas samples were collected in the Waldbaum back room storage area and manager's office (WB-4 through WB-6) and the clothes pressing area, boiler room, walkway and partitioned area with the dry cleaner unit, in the Cleaners (DC-2 through DC-5), using the methods previously described (Figure 2). Samples were immediately submitted for on-site analysis of PCE via FPGC during this period.

Concurrent with the on-site sampling and field analysis activities, six replicate soil gas samples (DC-2, DC-3, DC-5, and WB-4 through WB-6) were collected in evacuated 6-L SUMMA canisters for confirmatory laboratory TO-15 GC/MS analysis. In addition, an ambient air sample, at breathing height, (DC-0) was collected in an evacuated 6-L SUMMA canister, from the partitioned area with the dry cleaner unit in the Cleaners, for confirmatory laboratory modified TO-15 GC/MS analysis.

Sampling Location Mapping

Global Positioning System (GPS) equipment was used to document the spatial locations of the soil gas samples collected in the parking lot, access roads and lawns of the Shopping Center and adjacent Hardscrabble Apartments. Indoor sub-slab locations collected in the Waldbaum storage area and the Cleaners were mapped by manual measurements and hand drawn sketches in field logbooks and are considered approximate. The compiled GPS data documenting the soil gas sample spatial locations are presented in Appendix B.

RESULTS

Soil Gas Results

Table 1 shows the PCE concentrations determined on-site by the FPGC for the soil gas locations from the parking lots, access roads and lawns from the Shopping Center and adjacent Apartments as well as the sub-slab locations from the Waldbaum and Cleaners areas.

Figure 4 shows the spatial distribution of soil gas concentrations located in the parking lots, access roads and lawns of the Shopping Center and adjacent Apartments. Soil gas concentrations ranged from non-detect (ND) to 2,683 parts per billion on a volumetric basis (ppbv). The highest soil gas PCE concentrations are clustered about the southeast corner of the Shopping Center access road and parking lot, in proximity to the Cleaners, and decreases with distance from this area.

The soil gas concentrations to the southeast of the Shopping Center and adjacent to the McDonald's restaurant remained above background (approximately 100 ppbv). The extent of contamination beyond the boundary of the Shopping Center parking lot and onto the McDonald's property can not be determined due to lack of sampling points in this area. No sampling was done on the McDonald's property as access was not granted.

Figure 5 shows the approximate spatial distribution of the soil gas concentrations from the sub-slab soil locations from the Waldbaum and Cleaners areas. PCE concentrations determined by the FPGC ranged from 231 to greater than (>) 37,500 ppbv, with the highest sub-slab soil gas concentrations of PCE found beneath the Cleaners, ranging from 2, 854 to > 37, 500 ppbv. The highest PCE concentration was determined at sample location DC-1, the partitioned room with the dry cleaner unit in the Cleaners (Figure 2). DC-1 was sampled and analyzed on May 03 yield a PCE concentration of > 37, 500 as previously stated, but is considered an estimate because the PCE value exceeded the linearity of the FPGC instrumentation. This location was re-sampled on May 8 (DC-5), and the PCE level was again beyond the linearity of the FPGC and was estimated at >17, 292 ppbv. Confirmatory analysis on sample DC-5 yielded a result of 39,000 ppbv of PCE, the highest PCE result for the Site.

Figure 6 combines the PCE field screening results via FPGC from the sub-slab, Shopping Center and Apartments sample locations into a single concentration contour map. The sub-slab locations are higher on average than the Shopping Center and Apartments locations, with a maximum PCE concentration of > 37, 500 ppbv verses 3, 810 ppbv, respectively. The pattern of the concentration contour indicates the likelihood of a PCE source centered proximal to the Farmingdale Plaza Cleaners.

Confirmation of FPGC Results

Table 2 presents only the PCE results from the confirmatory laboratory TO-15 GC/MS analysis for the 16 soil gas, ambient air, background and trip blank samples collected in an evacuated 6-L SUMMA™ canisters. The Final Analytical Report compiling the results of 27 compounds from the modified TO-15 analyte list is presented in Appendix C.

Table 3 presents the relative percent difference (RPD) for PCE results calculated on a subset of FPGC and confirmatory samples. The FPGC result for sample DC-5 was not used to calculate the RPD because the PCE concentration was estimated since the value was beyond the linearity of the FPGC instrument. In addition, the FPGC result for sample SG-35 was also not used because it was ND. The average RPD was 11, although the RPDs for samples DC-2 (4, 423 ppbv PCE) and WB-4 (3, 263 ppbv PCE) were more than twice that value at 26 and 27, respectively. This suggests a divergence between the FPGC and confirmatory data sets at FPGC PCE values above 3, 000 ppbv.

Linear Regression (LR) was performed on the PCE data set from Table 3 using the C/MS data as the dependent values (y-abscissa axis) and the FPGC data as the independent values (x-ordinate axis). Figure 7 depicts the LR for all the paired data points yielding a slope of 2.6641 and a coefficient of determination (R^2) of 0.8502. As the slope approaches unity (1.0) the FPGC and GC/MS data approaches a one to one correspondence. A slope of more than 1 (2.6641) indicates that the FPGC is yielding lower PCE results (under reporting) compared to the GC/MS results. As the R^2 value approaches unity, the comparability between the FPGC and GC/MS data is represented more fully by the LR equation. A R^2 value of 0.6 or greater is considered adequate when comparing screening and confirmatory data sets (OSWER 1991).

Figure 8 depicts the Linear regression for only the paired data points below 3, 000 ppbv for the FPGC, yielding a slope of 1.401 and a R^2 of 0.9275. Both the slope and R^2 values approach closer to the ideal value of unity in this case. This further underscores the point that FPGC probably underestimated the soil gas PCE concentrations, especially for values above 3, 000 ppbv.

CONCLUSIONS AND FUTURE ACTIVITIES

The soil gas survey conducted in May 2004 at the Liberty Industries and Finishing Site - Upgradient Source indicates the likelihood of a PCE source contributing to the groundwater plume, from the shallow sub-surface underneath the sub-slab of the Farmingdale Plaza Cleaners, Farmingdale Plaza Shopping Center, 450 Main Street, Farmingdale, NY. A soil sampling exercise centered at the Farmingdale Plaza Cleaners should be undertaken to quantify the amount of PCE at the source and the areal and vertical extent of this source.

REFERENCES

REAC 2002. Work Plan for Work Assignment: 0-254, Liberty Industrial Finishing Site, Farmingdale (Long Island), NY. May 10, 2002

OSWER 1991. OSWER Directive 9360.4-10. Removal Program, Representative Sampling Guidance, Volume 1: Soil. November 1991.

cc: Central File - WA # EAC00048 (w/attachment)
Electronic File - L:/Archive/REAC4/0048/D/TR/073004
Dennis Miller, REAC Program Manager (cover page only)

TABLES

TABLE 1
FPGC Field Screening Results for Tetrachloroethylene
Liberty Industries and Finishing Site - Upgradient Source
Trip Report
September 2004

Sample	Sample Date	Soil Gas Location	Sub-Location	PCE (ppbv)	Depth Feet (bgs)
DC-1	5/3/2004	Dry Cleaners	Partitioned Room	>37, 500[E]	4
DC-2	5/8/2004	Dry Cleaners	Clothes Pressing Area	4,423	4
DC-3	5/8/2004	Dry Cleaners	Boiler Room	2, 854	4
DC-4	5/8/2004	Dry Cleaners	Walk-way Area	7, 133	4
DC-5	5/8/2004	Dry Cleaners	Partitioned Room (Re-sampled)	>17, 292[E]	4
GB-1	5/5/2004	Geoprobe Blank	NA	ND	NA
SG-3	5/4/2004	Shopping Center	Access Road	ND	4
SG-6	5/4/2004	Shopping Center	Access Road	48	4
SG-9	5/4/2004	Shopping Center	Access Road	61	4
SG-12	5/4/2004	Shopping Center	Access Road	90	4
SG-19	5/4/2004	Shopping Center	Access Road	ND	4
SG-20	5/4/2004	Shopping Center	Parking Lot	ND	4
SG-21	5/4/2004	Shopping Center	Parking Lot	17	4
SG-22	5/4/2004	Shopping Center	Parking Lot	ND	4
SG-23	5/4/2004	Shopping Center	Parking Lot	ND	4
SG-24	5/5/2004	Shopping Center	Parking Lot	ND	4
SG-25	5/4/2004	Shopping Center	Parking Lot	19	4
SG-26	5/4/2004	Shopping Center	Parking Lot	17	4
SG-27	5/4/2004	Shopping Center	Parking Lot	23	4
SG-28	5/4/2004	Shopping Center	Parking Lot	ND	4
SG-29	5/4/2004	Shopping Center	Parking Lot	158	3.2

TABLE 1
FPGC Field Screening Results for Tetrachloroethylene
Liberty Industries and Finishing Site - Upgradient Source
Trip Report
September 2004

Sample	Sample Date	Soil Gas Location	Sub-Location	PCE (ppbv)	Depth Feet (bgs)
SG-30	5/5/2004	Shopping Center	Parking Lot	ND	4
SG-31	5/4/2004	Shopping Center	Parking Lot	ND	4
SG-32	5/5/2004	Shopping Center	Parking Lot	ND	4
SG-33	5/5/2004	Shopping Center	Parking Lot	ND	4
SG-34	5/5/2004	Shopping Center	Parking Lot	72	4
SG-35	5/5/2004	Shopping Center	Parking Lot	ND	4
SG-36	5/5/2004	Shopping Center	Parking Lot	ND	4
SG-37	5/5/2004	Shopping Center	Parking Lot	44	4
SG-38	5/5/2004	Shopping Center	Parking Lot	945	4
SG-39	5/5/2004	Shopping Center	Parking Lot	3, 554	4
SG-40	5/5/2004	Shopping Center	Parking Lot	347	4
SG-41	5/5/2004	Shopping Center	Parking Lot	110	4
SG-42	5/5/2004	Shopping Center	Parking Lot	110	4
SG-43	5/6/2004	Shopping Center	Parking Lot	ND	4
SG-44	5/6/2004	Shopping Center	Parking Lot	ND	4
SG-45	5/6/2004	Shopping Center	Parking Lot	ND	4
SG-46	5/6/2004	Shopping Center	Parking Lot	15	4
SG-47	5/5/2004	Shopping Center	Parking Lot	3, 810	4
SG-48	5/6/2004	Shopping Center	Parking Lot	2, 191	4
SG-49	5/6/2004	Shopping Center	Parking Lot	94	4
SG-50	5/6/2004	Shopping Center	Parking Lot	490	4
SG-51	5/6/2004	Shopping Center	Parking Lot	78	4

TABLE 1
FPGC Field Screening Results for Tetrachloroethylene
Liberty Industries and Finishing Site - Upgradient Source
Trip Report
September 2004

Sample	Sample Date	Soil Gas Location	Sub-Location	PCE (ppbv)	Depth Feet (bgs)
SG-52	5/6/2004	Shopping Center	Parking Lot	20	4
SG-53	5/6/2004	Shopping Center	Parking Lot	ND	4
SG-54	5/6/2004	Shopping Center	Parking Lot	14	4
SG-55	5/6/2004	Shopping Center	Access Road	2, 006	4
SG-56	5/6/2004	Shopping Center	Access Road	1, 850	4
SG-57	5/6/2004	Shopping Center	Access Road	1, 308	4
SG-58	5/6/2004	Shopping Center	Access Road	432	4
SG-59	5/6/2004	Shopping Center	Access Road	713	4
SG-60	5/6/2004	Shopping Center	Access Road	65	4
SG-61	5/6/2004	Shopping Center	Access Road	77	4
SG-62	5/6/2004	Shopping Center	Access Road	162	4
SG-63	5/6/2004	Shopping Center	Access Road	115	4
SG-64	5/6/2004	Shopping Center	Access Road	27	4
SG-65	5/7/2004	Apartments	Access Road	ND	4
SG-66	5/7/2004	Apartments	Access Road	ND	4
SG-67	5/7/2004	Apartments	Access Road	25	4
SG-68	5/7/2004	Apartments	Access Road	ND	4
SG-69	5/7/2004	Apartments	Access Road	41	4
SG-70	5/7/2004	Apartments	Lawn	65	4
SG-71	5/7/2004	Apartments	Lawn	293	4
SG-72	5/7/2004	Apartments	Apartments	ND	4
SG-73	5/7/2004	Apartments	Lawn	20	4

TABLE 1
FPGC Field Screening Results for Tetrachloroethylene
Liberty Industries and Finishing Site - Upgradient Source
Trip Report
September 2004

Sample	Sample Date	Soil Gas Location	Sub-Location	PCE (ppbv)	Depth Feet (bgs)
SG-74	5/7/2004	Apartments	Access Road	166	4
SG-75	5/7/2004	Apartments	Lawn	45	4
SG-76	5/7/2004	Apartments	Access Road	210	4
SG-77	5/7/2004	Apartments	Lawn	181	4
SG-78	5/7/2004	Apartments	Access Road	62	4
SG-79	5/7/2004	Apartments	Parking Lot	34	4
TBS-1	5/5/2004	Tube Blank Sample	NA	ND	NA
WB-1	5/3/2004	Waldbaum	Back Room Storage Area	713	4
WB-2	5/3/2004	Waldbaum	Back Room Storage Area	1, 020	4
WB-3	5/3/2004	Waldbaum	Back Room Storage Area	231	4
WB-4	5/8/2004	Waldbaum	Manager's Office	3, 263	4
WB-5	5/8/2004	Waldbaum	Back Room Storage Area	1, 302	4
WB-6	5/8/2004	Waldbaum	Back Room Storage Area	895	4

FPGC = Field portable gas chromatograph
PCE = Tetrachloroethylene
ppbv = Parts per billion by volume
bgs = Below ground surface
[E] = Exceeds linear range of FPGC
NA = Not Applicable
ND = Not detected

TABLE 2
Confirmatory Laboratory Results for Tetrachloroethylene
Liberty Industries and Finishing Site - Upgradient Source
Trip Report
September 2004

Sample	Sample Date	Soil Gas Location	Sub-Location	PCE (ppbv) GC/MS
AMB-1*	5/5/2004	Ambient Air	Background	ND
DC-0 *	5/8/2004	Dry Cleaner Shop	Partitioned Room (Ambient Air)	15
DC-2	5/8/2004	Dry Cleaner Shop	Clothes Pressing Area	14, 000
DC-3	5/8/2004	Dry Cleaner Shop	Boiler Room	4, 000
DC-5	5/8/2004	Dry Cleaner Shop	Partitioned Room (Re-sampled)	39, 000
SG-35	5/5/2004	Shopping Center	Parking Lot	10
SG-41	5/5/2004	Shopping Center	Parking Lot	90
SG-42	5/5/2004	Shopping Center	Parking Lot	130
SG-42-replicate	5/6/2004	Shopping Center	Parking Lot	131
SG-49	5/6/2004	Shopping Center	Parking Lot	120
SG-50	5/6/2004	Shopping Center	Parking Lot	740
SG-51	5/6/2004	Shopping Center	Parking Lot	76
SG-56	5/6/2004	Shopping Center	Access Road	2, 400
Trip Blank *	5/8/2004	Trip Blank	Trip Blank	ND
WB-4	5/8/2004	Waldbaum	Manager's Office	11, 000
WB-5	5/8/2004	Waldbaum	Back Room Storage Area	2, 700
WB-6	5/8/2004	Waldbaum	Back Room Storage Area	560

PCE = Tetrachloroethylene
ppbv = Parts per billion by volume
GC/MS = Gas chromatograph /mass spectrometer
* = Not a soil gas sample, ambient air
ND = Not detected

TABLE 3
RPD for Confirmatory and Field Screening Results
Liberty Industries and Finishing Site - Upgradient Source
Trip Report
September 2004

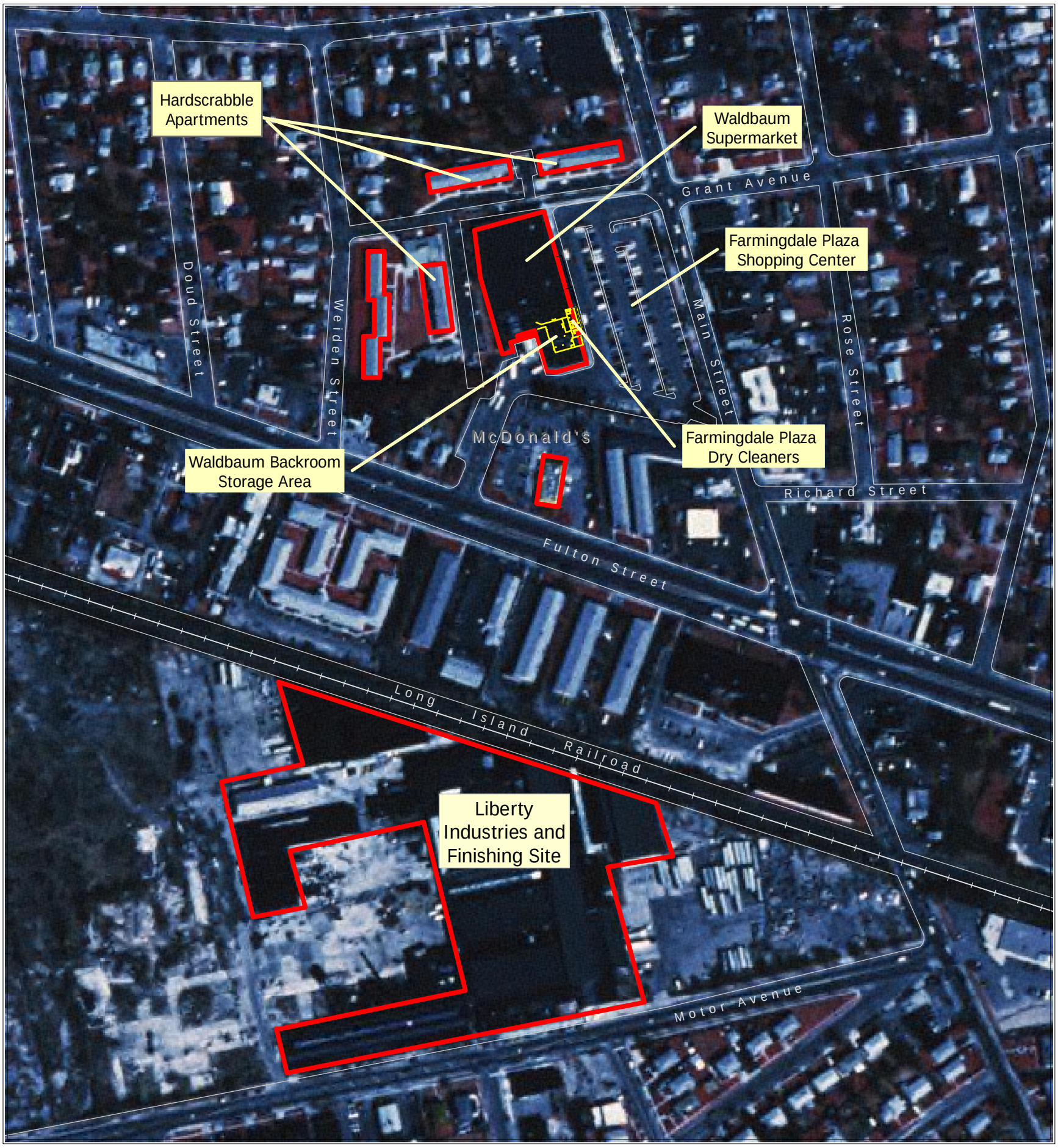
Sample	PCE (ppbv) GC/MS	PCE (ppbv) FPGC	RPD
DC-2	14,000	4, 423	26
DC-3	4,000	2, 854	8.4
SG-41	90	110	5.0
SG-42	129	110	4.0
SG-49	118	94	5.7
SG-50	740	490	10
SG-51	76	78	0.64
SG-56	2,400	1, 850	6.5
WB-4	11,200	3, 263	27
WB-5	2,660	1, 302	17
WB-6	562	895	11
Average RPD			11

PCE = Tetrachloroethylene
ppbv = Parts per billion by volume
GC/MS = Gas chromatograph /mass spectrometer
FPGC = Field portable gas chromatograph
RPD = Relative percent difference
ND = Not detected

Where:

$$RPD = (|Data1 - Data2| \div ((Data1 + Data2) / 2)) \times 100$$

FIGURES



Map created using site survey GPS data and U.S. Census 2000 demographic data

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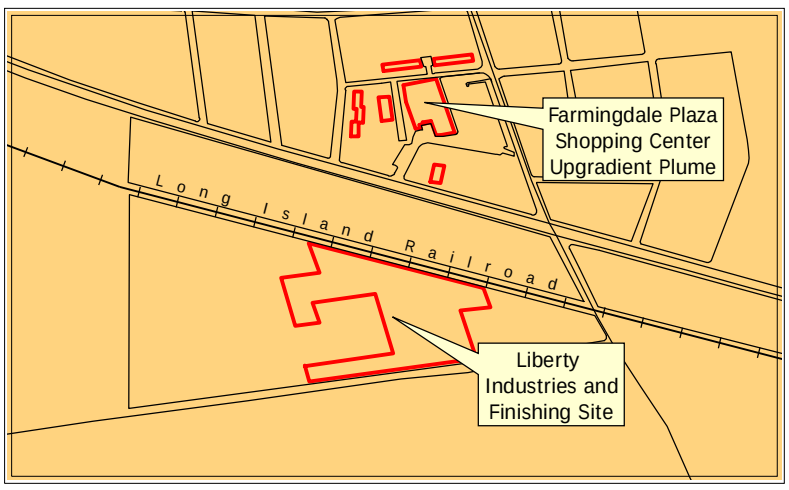
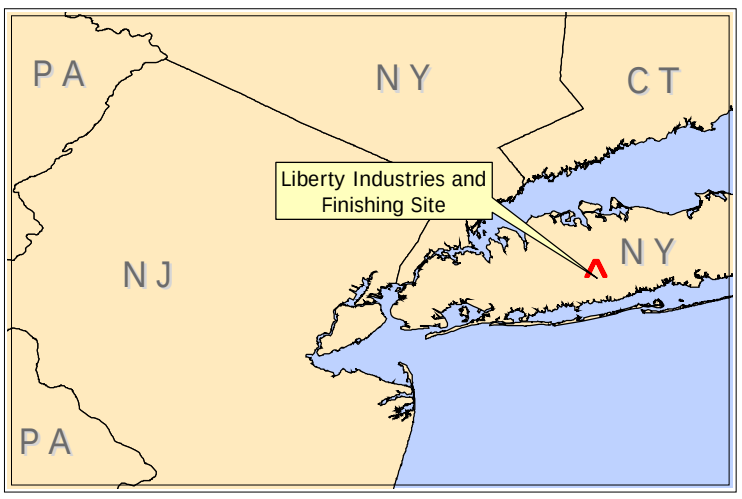
Zone: 18N
Datum: NAD83
Units: Meters

Magnetic North

70 0 70 140 Meters





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U.S. EPA Environmental Response Team Center
Response Engineering and Analytical Contract
EP-C-04-032
W.A.# EAC00048

Figure 1
Site Location Map
Liberty Industries and Finishing Site
Upgradient Plume
Farmingdale, NY

WALDBAUM SUPERMARKET

GENERAL STORE AREA

EXIT

WB-6

WALDBAUM SUPERMARKET

BACK ROOM

STORAGE AREA

MEAT
PACKING
ROOM

BOILER ROOM

DC-3

CLOTHES
PRESSING
AREA

DC-2

CLEANERS

CLOTHES RACKS, GENERAL STORAGE

DC-1,DC-5

DRY CLEANING
UNIT

PARTITIONED AREA

DC-4

FRONT DESK

FRONT DESK

FRONT DOOR

FRONT LOBBY

WB-5

COOLER

WB-4

WB-3

WB-1

WB-2

COOLER

MANAGER'S
OFFICE

HBC
CAGE

LEGEND

▲ SOIL GAS LOCATIONS

GRAPHIC SCALE

5 0 5 10 Feet

(Approximate)

NOTE:

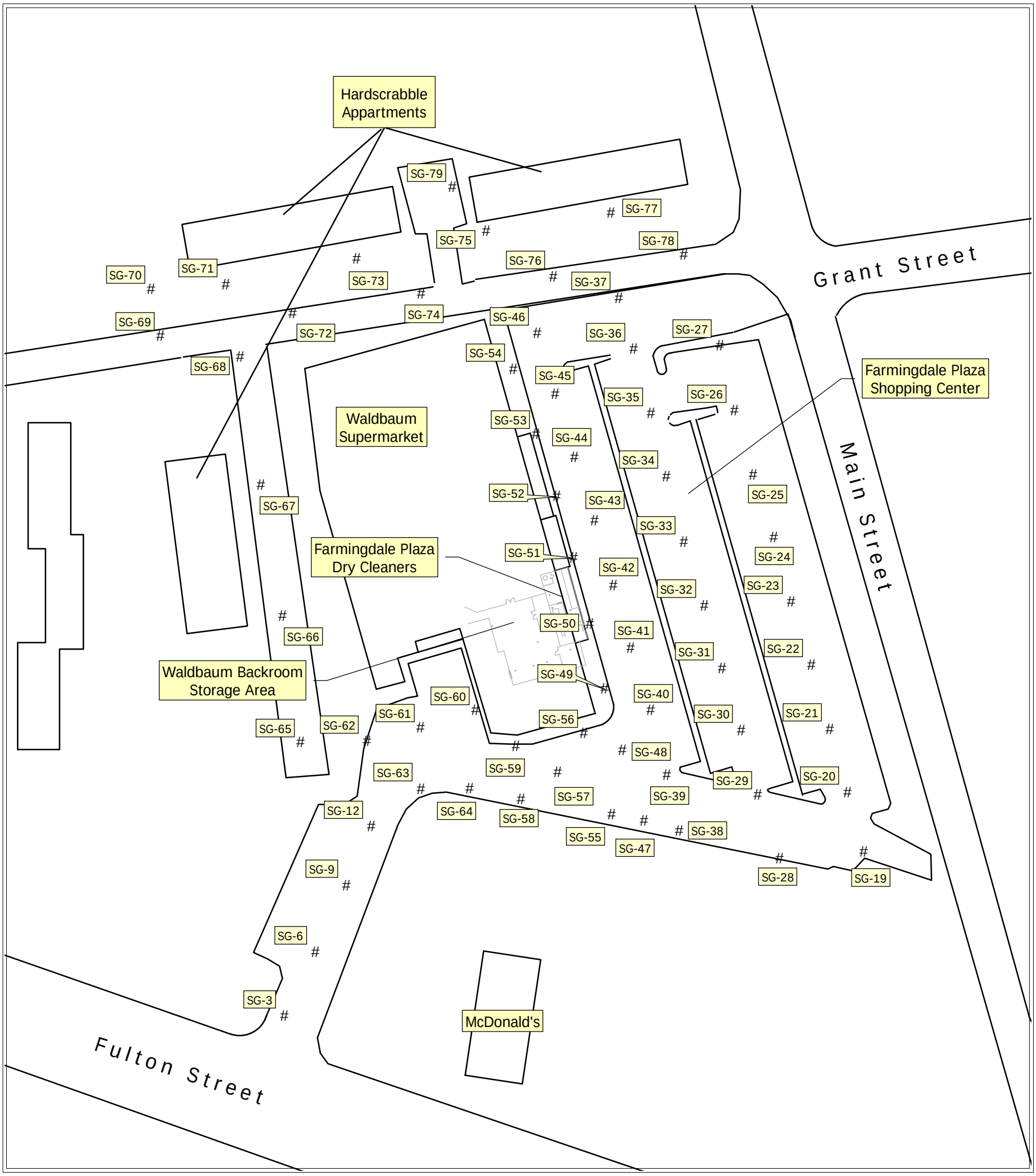
THE SPATIAL RELATIONSHIP OF THE CLEANERS SHOP TO THE WALDBAUMS SUPERMARKET BACK ROOM AND MANAGER'S OFFICE IS APPROXIMATE.

FIGURE 2
SUB-SLAB SOIL GAS LOCATION
LIBERTY INDUSTRIES AND FINISHING SITE
UPGRADIENT PLUME
FARMINGDALE, NY

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
EP-C04-032
W.O.# EAC00048

07/28/04

REAC4/048/SUB_SLAB_LOC.DWG



Map created using Site Survey GPS data and USGS DOQs

Map Creation Date: 23September2004

Coordinate metadata: System: UTM
Zone: 18N
Datum: NAD83
Units: Meters

25 0 25 50
Meters

Legend

\# SOIL GAS LOCATIONS

Magnetic North

Figure 3
Soil Gas Locations
Shopping Center and Appartments
Liberty Industries and Finishing Site
Upgradient Plume
Farmingdale, NY

U.S. EPA Environmental Response Team Center
Response Engineering and Analytical Contract
EP-C-04-032
W.A.# EAC00048

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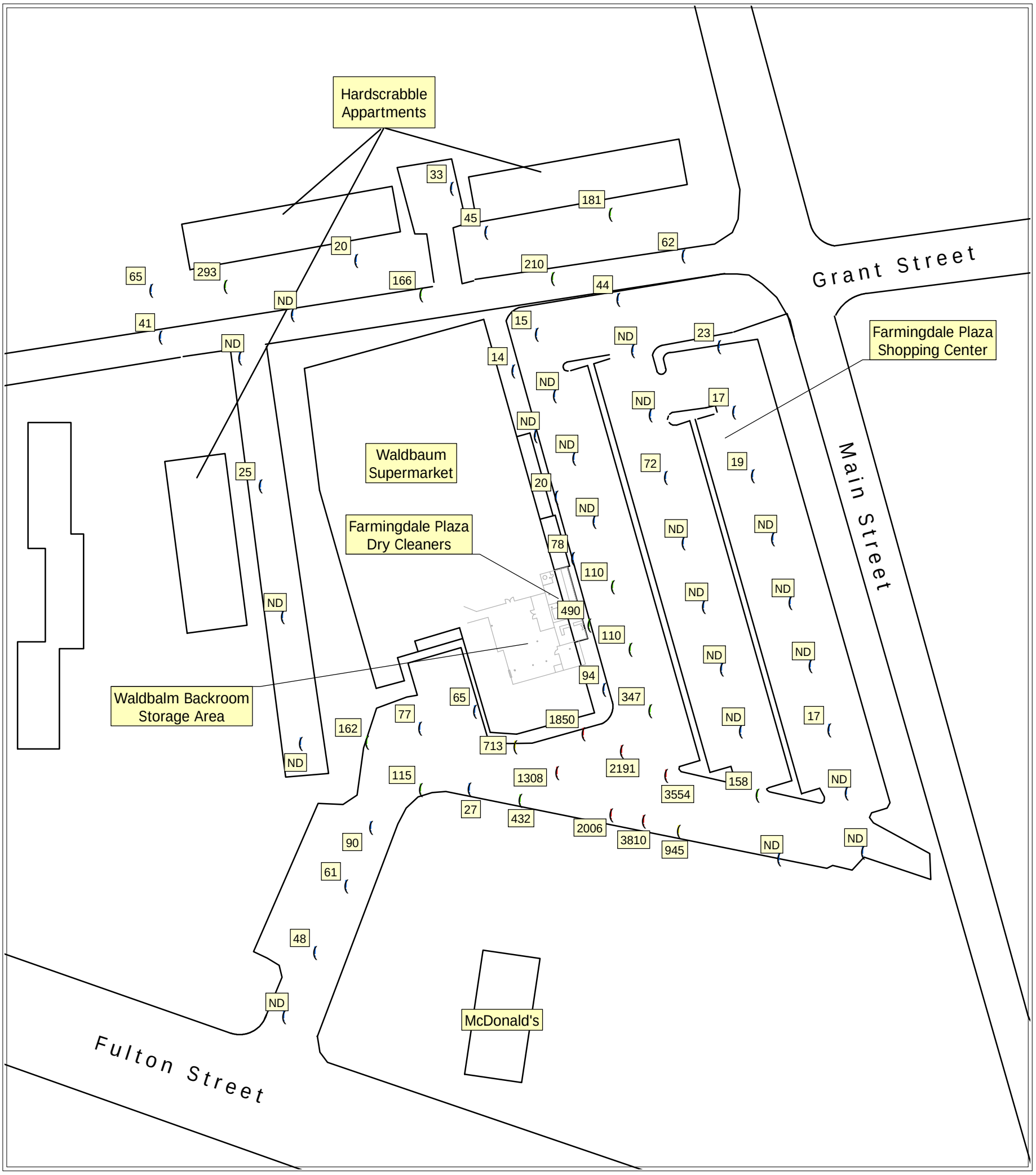

Map created using Site Survey GPS data and USGS DOQs

Map Creation Date: 23September2004

Coordinate metadata: System: UTM
Zone: 18N
Datum: NAD83
Units: Meters

Legend

PCE = TETRACHLOROETHENE (ppbv)

- ND - 100
- 101 - 500
- 501 - 1000
- > 1000

ppbv = PARTS PER BILLION, VOLUME

*Disclamer: Preliminary results.
Data have not been Quality Checked.

Magnetic North

25 0 25 50 Meters

U.S. EPA Environmental Response Team Center
Response Engineering and Analytical Contract
EP-C-04-032
W.A.# EAC00048

Figure 4
Soil Gas Concentrations
Shopping Center and Appartments
Liberty Industries and Finishing Site
Upgradient Plume
Farmingdale, NY

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WALDBAUM SUPERMARKET

GENERAL STORE AREA

EXIT

WB-6
895

MEAT
PACKING
ROOM

BOILER ROOM

DC-3
2854

CLOTHES
PRESSING
AREA

DC-2
4423

CLEANERS

DC-1,
DC-5
>37,500,
>17,292

DRY CLEANING
UNIT

PARTITIONED AREA

CLOTHES RACKS, GENERAL STORAGE

DC-4
7133

WALDBAUM SUPERMARKET

BACK ROOM

STORAGE AREA

WB-5
1302

COOLER

FRONT DESK

FRONT DESK

FRONT DOOR

FRONT LOBBY

WB-4
3263

COOLER

WB-3
231

WB-1
713

WB-2
1020

MANAGER'S
OFFICE

HBC
CAGE

LEGEND

TETRACHLOROETHENE (ppbv)
VIA FPGC

- 0 - 100
- 101 - 500
- 501 - 1000
- 1001 - 2000
- > 2001

ppbv = PARTS PER BILLION, VOLUME AS
FPGC = FIELD PORTABLE GAS
CHROMOTOGRAPH .

NOTE:

THE SPATIAL RELATIONSHIP OF THE CLEANERS TO THE WALDBAUMS SUPERMARKET BACK ROOM AND MANAGER'S OFFICE IS APPROXIMATE.

GRAPHIC SCALE

5 0 5 10 Feet

(Approximate)

FIGURE 5
SUB-SLAB SOIL GAS CONCENTRATION
LIBERTY INDUSTRIES AND FINISHING SITE
UPGRADIENT PLUME
FARMINGDALE, NY

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
EP-C04-032
W.O.# EAC00048

07/28/04

REAC4/048/SUB_SLAB_CONC.DWG

Hardscrabble Appartments

Grant Street

Farmingdale Plaza Shopping Center

Waldbaum Supermarket

Main Street

Farmingdale Plaza Dry Cleaners

Waldbaum Backroom Storage Area

McDonald's

Fulton Street

Map created using Site Survey GPS data and USGS DOQQs
Map Creation Date: 23September2004
Coordinate metadata: System: UTM
Zone: 18N
Datum: NAD83
Units: Meters

25 0 25 50 Meters

Magnetic North

Legend

\# SAMPLE LOCATION

PCE = TETRACHLOROETHENE (ppbv)

< 100	501 - 1,000
101 - 200	1,001 - 1,500
201 - 300	1,501 - 2,000
301 - 400	2,001 - 2,500
401 - 500	> 2,500

ppbv = PARTS PER BILLION, VOLUME

*Disclaimer: Preliminary results.
Data have not been Quality Checked.

U.S. EPA Environmental Response Team Center
Response Engineering and Analytical Contract
EP-C-04-032
W.A.# EAC00048

Figure 6
Concentration Contour Map
Liberty Industries Finishing Site
Upgradient Plume
Farmingdale, NY

Data: g:\arcviewprojects\REAC4/00-048/import_tables/LS_365.mdb
MXD file path: g:\arcinfoprojects\REAC4\EAC00048_Liberty\048_LI_sgctour_f6

Figure 7: Linear Regression for PCE (All Points)

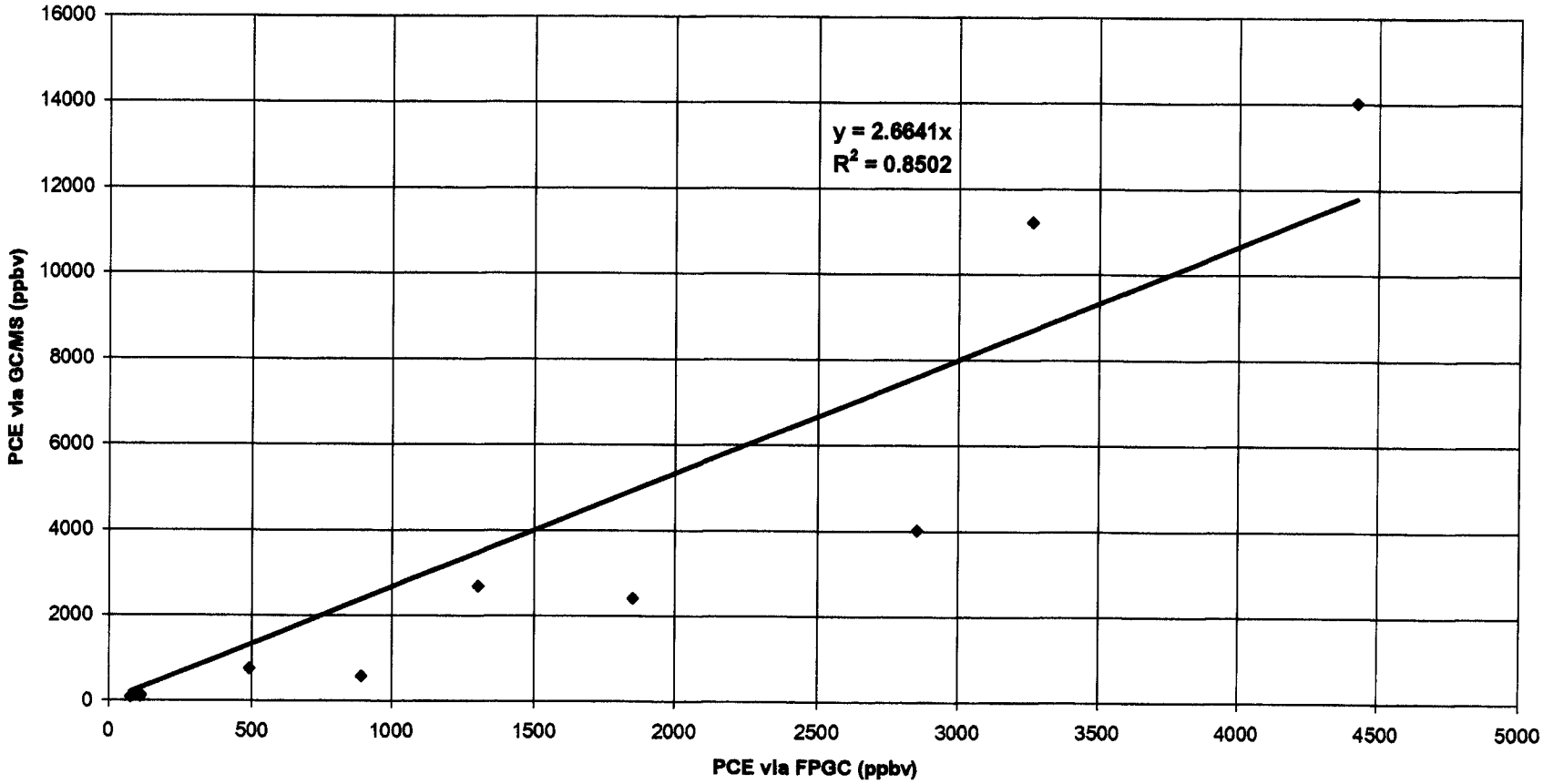
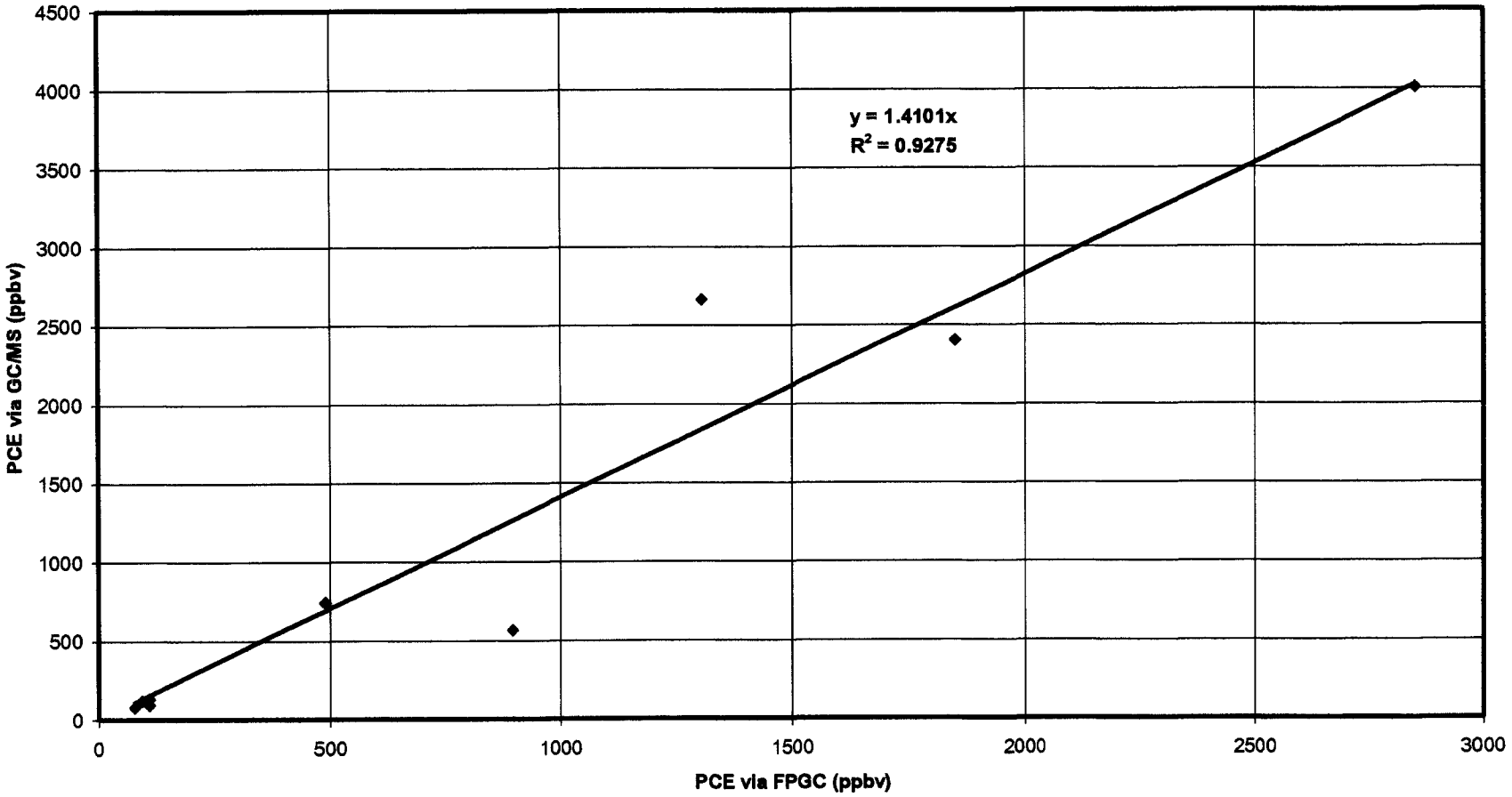


Figure 8: Linear Regression for PCE (FPGC < 3000)



APPENDIX A
Copies of Field Logbooks
Liberty Industries and Finishing Site - Upgradient Source
Trip Report
September 2004

If Found, Please Return To:

Name: _____

LOCKHEED-MARTIN/REAC
2890 Woodbridge Avenue
Edison, NJ 08837-3679
Phone: (732) 321-4200

ALL

Name

Addre

Phon

Proje

COC & Sample Shipping Procedures

Peer Review
Makes a copy
Remove pink copy for the Task Leader
Place the original in a plastic bag, seal, and secure to the lids inside the cooler
Tape and custody seal the cooler

Call Sample Receiving Hotline (732) 632-9345
Cell Phone (609) 440-1483

- Fedex Tracking #s
- Chain of Custody #s
- # of Coolers
- # of samples (matrices & requested analysis
- Sub-contract laboratory info.

Subcontracting Representative
Fax (732) 494-4020 COC
Follow up to confirm sample receipt

Clear Vi... this style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

CONTENTS		
PAGE	REFERENCE	DATE
	dry well 1 x	
	Cac [illegible]	
	parking lot	
	3 well	
	3 dry well	
	[illegible]	
	WELL #4	
	x nne parking lot	
	well	
	near dumpsters	

2

Liberty Metal
Site

Tom II/OSC
Terence Johnson-ERT

upgradient 5A noisy
5B 15
x working [illegible]

wells in Parking lot
of woldbourns super
mkt
Main St / Fulton St

[illegible]
Right [illegible] Motor Area
55 motor Area on
right

Plume upgradient
from 55 Motor ~~Area~~
another source ??

~ 100 - 200 yards from
parking lot

[illegible] - [illegible]
not affect

[illegible]

B

fence [illegible]

@ [illegible] st

Sp R03513B

well #4 p4

R 03 514A

R0325 14B

dry well by dumpster

R0325 14C

well by [illegible]

R032514D

dry well by tr[illegible]

R0 3 2 5 14E

well by walk way

[illegible] to

[illegible] from

parking lot

R0 32514F

dry well by walkway

R0 32514G

dry well space 1

at 1st parking

space.

R032514H
well across from
space 1 by
fence

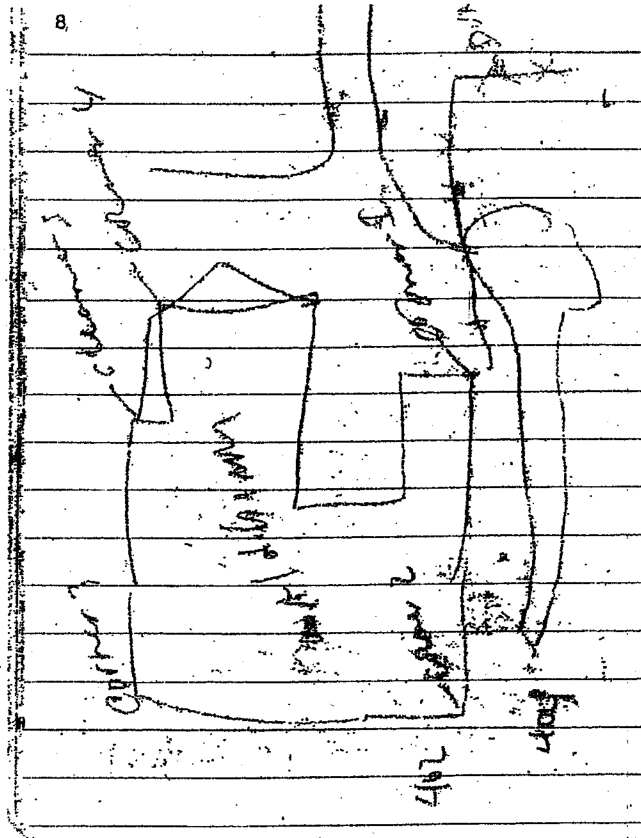
R032514 I
~~2 wells~~ mid pt
between 2 ~~wells~~
by fence line/
30 yd. [illegible]
PAC dumpsters

R032514 J
dry well at corner
lot parking at
[illegible] entrance

R032514K
2 wells off site
~~[illegible]~~ parking
lot ~~in~~ between
Units 15/42 (bldg 402)

R032514 L
well x 404
well across from
building 414 by
exit/entrance along
building 402

R032514M
dry well at cul de sac
end of road (bldg 408



R032514N
corner 1
back of wall [illegible]
at corner [illegible]
near dumpster

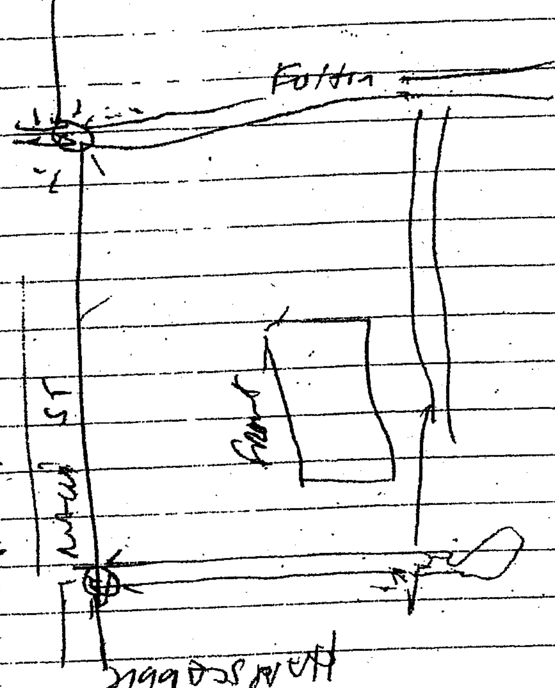
R032514O
corner 2
back of wall
at corner/ ~~[illegible]~~ from
Hard scaffold 402 x
404

R032514P
corner 3
front corner/Right

RO 32514 P
cleaning;
front of wild b...
at corner of turns
in front of cleaners

RO 325 15 A
Corner 4
front of ... 1 ... b...
corner store
RO 32575 B
Corner 5

Main & Fult



Fulton at farmside

to 110 South

Southern State Pkwy
west

6/20

FORESTRY SUPPLIERS
49365

JOB BOOK

FROM PENINSULAR PUBLISHING

PROJECT NAME Liberty

PROJECT NUMBER 365

CREW LPK FPGC

DATE _____ BOOK # ____ OF ____

WEATHER _____

REAC II - B - 0344

FIELD BOOK
16 PAGE
8 LEAVES
50% RAG

IF FOUND PLEASE RETURN TO:

If Found, Please Return To:

Name: _____

LOCKHEED-MARTIN/REAC
2890 Woodbridge Avenue
Edison, NJ 08837-3679
Phone: (732) 321-4200

COC & Sample Shipping Procedures

Peer review COC record Remove pink copy for the Task Leader Place original COC in a plastic bag, seal, and secure to the lid inside the cooler. Tape and seal the cooler.	Call Sample Receiving Hotline at (732) 632-9345 or SRT's Cell Phone (609) 234-5318. Give -FedEx tracking # -Chain of Custody Record #s -# of Coolers -# of samples and matrices -Analyses requested -Subcontract lab info Fax COC record to (732) 494-4021 (REAC analyses) or (732) 494-4020 (subcontract analyses) Follow-up to confirm sample receipt.

CURVE FORMULAS

$T = R \tan \frac{1}{2} I$

$T = \frac{50 \tan \frac{1}{2} I}{\text{Sin.} \frac{1}{2} D}$

$\text{Sin.} \frac{1}{2} D = \frac{50}{R}$

$\text{Sin.} \frac{1}{2} D = \frac{50 \tan \frac{1}{2} I}{T}$

$R = T \cot. \frac{1}{2} I$

$R = \frac{50}{\text{Sin.} \frac{1}{2} D}$

$E = R \text{ ex. sec } \frac{1}{2} I$

$E = T \tan \frac{1}{4} I$

$\text{Chord def.} = \frac{\text{chord}^2}{R}$

$\text{No. chords} = \frac{I}{D}$

$\text{Tan. def.} = \frac{1}{2} \text{ chord def.}$

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.) and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

GENERAL DATA

Right Angle Triangles. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10. $10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. 25. $25^2 \div 200 = 3.125$; $100 - 3.125 = 96.875$ = Base.

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

Leveling. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.574d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{2}{3}d^2$. The combined correction is negative.

Probable Error. If d_1, d_2, d_3, etc. are the discrepancies of various results from the mean, and if Σd^2 = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean =

$$\pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$$

MINUTES IN DECIMALS OF A DEGREE

1′	.0167	11′	.1833	21′	.3500	31′	.5167	41′	.6833	51′	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

INCHES IN DECIMALS OF A FOOT

1-16	3-32	1/8	3-16	1/4	5-16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

5/6/04. Photovac GC

SG-57 5/6/04 @ 1512

B4050625 PID ECD

TCE 0.024

PCE 0.921 113

BK

B4050626

SG 58 5/6/04 14.55

B4050627 PID ECD

TCE — —

PCE 0.304 3.612

SG 59 5/6/04 1430

B4050628 PID ECD

TCE 0.821 —

PCE 0.502 6.750

SG 59 (repeat) PID ECD

B4050629 TCE 0.020 —

PCE 0.493 6.340

BK

B4050630

5/6/04 Photovac GC

SG 55 5/6/04 @ 15:50
B4050631

	PID	ECD
TCE	0.000	—
PCE	1.463	16.2

BLK
B4050632

SG 60 5/6/04 @ 16:52
B4050633

	PID	ECD
TCE	0.005	—
PCE	0.046	0.437

SG 61 5/6/04 @ 16:40
B4050634

	PID	ECD
TCE	.005	—
PCE	.057	0.518

SG 62 5/6/04 @ 16:17
B4050635

	PID	ECD
TCE	.003	—
PCE	.114	.628

SG 63 5/6/04 @ 17:25
B4050636

	PID	ECD
TCE	—	—
PCE	0.081	.321

5/6/04 Photovac GC

SG 64 5/6/04 @ 17:08
B4050637

	PID	ECD
TCE	—	—
PCE	.049	.238

STD B
B4050638

	PID	ECD
TCE	.899	3.332
PCE	1.287	10.8

STD B
B4050639

	PID	ECD
TCE	.903	3.425
PCE	1.252	11.1

May 07, 2004 Photovac GC

5/7/04

BLK
B4050700

STD C (1)
B4050701

	PID	ECD
TCE	.470	1.389
PCE	.181	.650

STD B
B4050702

	PID	ECD
TCE	1.050	1.685
PCE	1403	6.248

003

05/07/04 Photovac GC

STD

B4050703

	PID	ECD
TCE	.096	1.909
PCE	1.401	1.131

BLK

B4050704

Reset SG 65 → 71

SG 65 5/7/04 @ 0915

B4050705

	PID	ECD
TCE	—	—
PCE	.009	.592

SG 66 5/7/04 @ 0935

B4050706

TCE	.015	—
PCE	.007	.436

SG 67 5/7/04 @ 0948

B4050707

	PID	ECD
TCE	.015 .019	—
PCE	.007 .009	.455

SG 68 5/7/04 @ 1005

B4050708

	PID	ECD
TCE	.007	—
PCE	—	.577

SG 69 5/7/04 @ 10:20

B4050709

	PID	ECD
TCE	.014	—
PCE	.003	.405

SG 70 5/7/04 @ 1028

B4050710

	PID	ECD
TCE	.018	—
PCE	.049	.591

SG 71 5/7/04 @ 1039

B4050711

	PID	ECD
TCE	.018	—
PCE	.022	.622

SG 72 5/7/04 @ 1110

B4050712

	PID	ECD
TCE	—	—
PCE	.003	.447

SG 73 5/7/04 @ 1100

B4050713

	PID	ECD
TCE	—	—
PCE	.015	.155

NS

5/7/04 Photovac GC

SG74	5/7/04 @ 1125			
B4050714		PID	ECD	
	TCE	.014	—	
	PCE	0.126	.090	
SG75	5/7/04 @ 1158			
B4050715		PID	ECD	
	TCE	.010	—	
	PCE	.034	.257	
SG77	5/7/04 @ 1135			
B4050716		PID	ECD	
	TCE	.017	—	
	PCE	0.137	1.081	
SG76	5/7/04 @ 1336			
B4050717		PID	ECD	
	TCE	.621	—	
	PCE	0.159	.981	
SG78	5/7/04 @ 1400			
B4050718		PID	ECD	
	TCE	0.014	1.256	
	PCE	0.047		

5/7/04 Photovac GC

SG77 repeat		PID	ECD
B4050719	TCE	0.018	—
	PCE	0.164	.158
SG78 repeat		PID	ECD
B4050720	TCE	.020	—
	PCE	0.278	—
SG76 repeat		PID	ECD
B4050721	TCE	—	—
	PCE	.002	.090
?			
STD C		PID	ECD
B4050722	TCE	.018	.800
	PCE	.144	3.232
STD B		PID	ECD
B4050723	TCE	0.890	3.28
	PCE	1.348	10.8
BLK		OK	
B4050724			

007

5/7/04 Prototype QC

S6-79 5/7/04 @ 1330

B4050728

	PID	ECD
TCE	—	—
PCE	0.026	0.300

DC-2 5/7/04 1710

B4050726

	PID	ECD
TCE	0.035	—
PCE	3.351	28.2

BLK OK

B4050727

DC-3 5/7/04 @ 1728

B4050728

	PID	ECD
TCE	0.024	—
PCE	2.182	22.5

BLK OK

B4050729

DC-4 5/7/04 @ 1743

B4050730

	PID	ECD
TCE	0.029	—
PCE	5.404	33.6

5/7/04 Prototype QC

BLK OK

B4050731

DC-5 5/7/04 1756

B4050732

	PID	ECD
TCE	0.054	—
PCE	13.1	48.7

Rescale

BLK

B4050733

STDC ?? PID ECD

B4050734

TCE	.816	
PCE	1.844	

Carry over

	PID	ECD
STDC		
B4050735	TCE .418	
	PCE .164	

	PID	ECD
STD B		
B4050736	TCE .965	3.71
	PCE 1.339	11.01

009

5/8/04 Photowsc May 08, 2004

BlK
B4050800 OK

STD C(27) PID GCD
B4050801 TCE .141 —
PCE .152 .909

STD B PID GCD
B4050802 TCE 1.112 3.043
PCE 1.456 10.5

STD B PID ECD
B4050803 TCE 1.035 3.347
PCE 1.412 10.6

BlK
B4050804 OK

WB-6 5/8/04 @ 1050
B4050805 PID GCD
TCE — —
PCE .1668 1.1

WB-6 (repeat) PID GCD
B4050806 TCE —
PCE .566 10.8

5/8/04 Photowsc

BlK B4050807 → OK

WB-5 5/8/04 @ 1036
B4050808 PID GCD
TCE — —
PCE .912 13.8

WB-5 repeat PID GCD
B4050809 TCE
PCE

BlK B4050810 OK

WB-4 5/8/04 @ 1012
B4050811 PID GCD
TCE 0.005 —
PCE 2.435 25.6

WB-4 repeat PID GCD
B4050812 TCE .006
PCE 2.434 25.7

BlK OK
B4050813

B4050814 STD C

	PID	ECD
TCE	.123	.628
PCE	.147	1.303

STD B

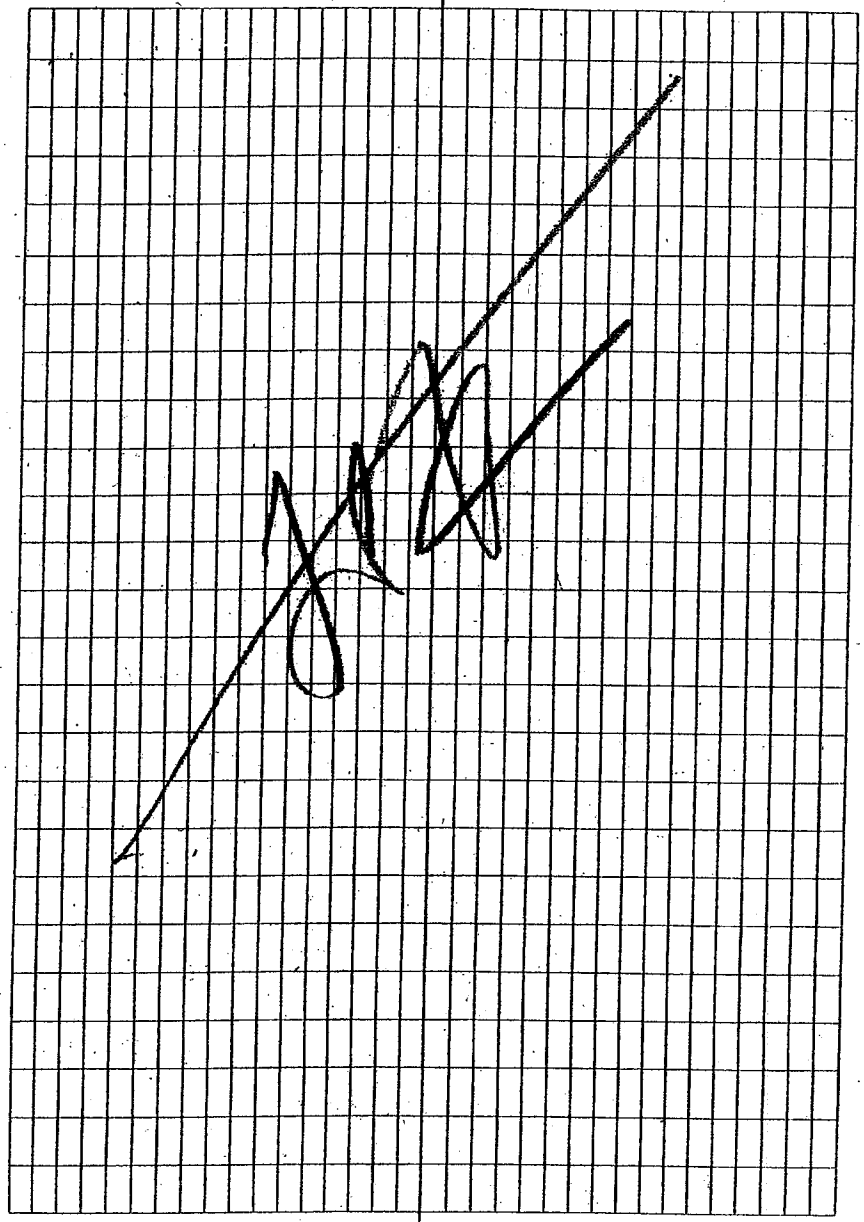
B4050815

	PID	ECD
TCE	1.064	4.399
PCE	1.388	~~4.335~~ 12.9

STD B

B4050816

	PID	ECD
TCE	1.023	4.293
PCE	1.372	~~4.293~~ 13.0



013

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JOB BOOK

FROM PENINSULAR PUBLISHING

PROJECT NAME Liberty

PROJECT NUMBER 365

CREW LPIC - FPGC

DATE _____ BOOK # ____ OF ____

WEATHER _____

REAC III - B- 0345

FIELD BOOK
16 PAGE
8 LEAVES
50% RAG

CURVE FORMULAS

$T = R \tan \frac{1}{2} I$

$T = \frac{50 \tan \frac{1}{2} I}{\text{Sin. } \frac{1}{2} D}$

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$R = T \cot . \frac{1}{2} I$

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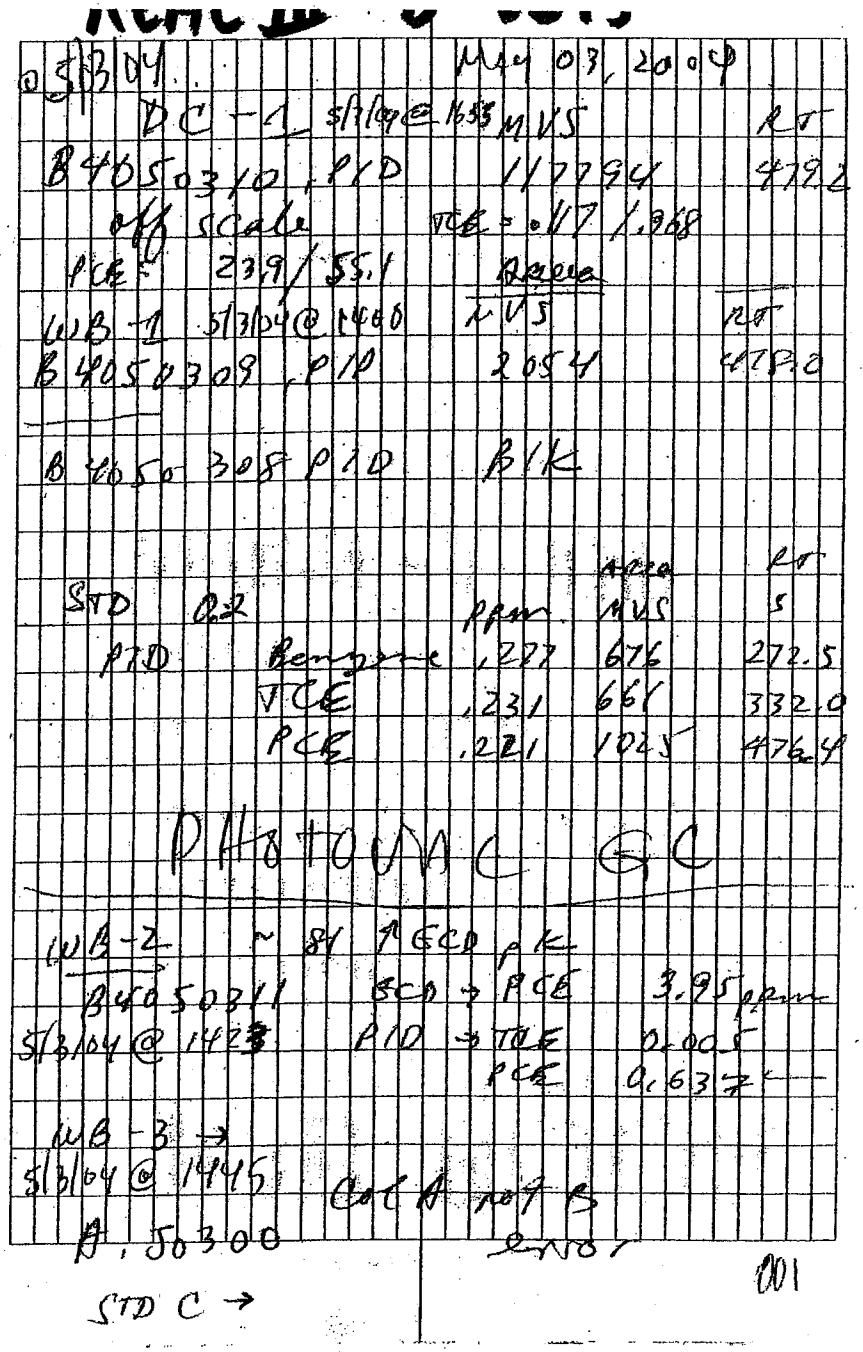
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

INCHES IN DECIMALS OF A FOOT

1-16	3-32	1/8	3-16	1/4	5-16	3/8	7/16	1/2	9/16	5/8	11/16
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167



05/03/04

B4050301.PID STDC

STDC 4050302.PID/ECD

STD B 4050312.PID/ECD

	RT	conc	mVs
ECD PCE	492	5.402	13103
PID Benz	272.8	1.159	2827
TCE	334.9	0.941	2691
PCE	485.2	1.293	5984

Blank Air B4050313 PID/ECD
on peak @ 87.6

Blank Air B4050314 PID/E
on @ 88

WB-3 (B4050301.PID)
B4050414 Benzene 0.306
5/3/04 @ 1443 TCE 0.016
PCE 0.159
ECD PCE 0.339

05/04/04 Photo VAC GC

Blank ENG
A4050400.PID

STDC TCE 0.011 ECD
B4050401 PCB 0.192 1.358

ECD
STD B TCE 1.45
PCE

Blk B04050402
ambient SG-3, 6, 9, 12

SG-3		PID	ECD
5/04/04 @ 1015	TCE	—	0.165
B 04050403	PCE	0.004	—

SG-6 big early eluting ~100 sec peak on ECD/PID

B04050404	TCE	—	0.021
	PCE	0.033	0.121

5/4/04 @ 1050

003

05/04/04 — PID — ECD

SG-09
B04050405 — TCE — 0.38
5/4/04 @ 1120 — PCE 0.042 — 0.299

SG-12 5/4/04 @ 1140 — ECD
B04050406. TCE — 0.158
PCE 0.062 — 0.413
recd SG 19)

SG 19 5/4/04 @ 1545 PID ECD
(Check on TT) TCE —
B04050407 PID/ECD ND's PCE — 0.125

STD B
B04050408 B04050408 PID
PID/ECD
recd SG 21, 22, 23 TCE .086 1.81
PCE 1.132 7.16

SG-20 5/4/04 @ 1510 PID ECD
B04050409 TCE — 0.034
PCE 0.006 .034

SG 21 5/4/04 @ 15:30 PID ECD
B04050410 TCE — —
PCE 0.012 0.027

05/04/04

SG-22 B04050411 NDs
5/4/04 @ 1555
recd SG 25, 26, 27 (no SG 24)

SG-23 5/4/04 @ 15:55 NDs
B04050412, PID/ECD TCE —
PCE 0.004 .021

SG 25 PID ECD
5/4/04 @ 1645 TCE — —
B04050413 PCE 0.013 0.040

Saved on disk I

SG 26 5/4/04 @ 1700 PID ECD
B04050415 TCE — —
PCE 0.012 0.071

(B04050414 already used)

SG-27 5/4/04 @ 1645 PID ECD
B04050416 TCE — —
PCE 0.016 0.101

BLK NDs
B04050417

005

05/04/04

STD B
B040504B

BLK
B040504I9
rec'd S6-28, 29, 31 (no 30)

SG 28 - 5/4/04 @ 1800
B040504 20

SG 29 5/4/04 @ 1710
B040504 21

SG 31 5/4/04 @ 1840
B040504 22

STD B

	PID	ECD
TCE	0.958	2.159
PCE	1.267	7.71

	TCE PID/ PCE ECD
NDs	(no 30)

	PID	ECD
TCE	—	—
PCE	—	0.074

	PID	ECD
TCE	—	—
PCE	0.109	0.666

	PID	ECD
TCE	—	—
PCE	0.004	0.059

	PID	ECD
TCE	0.973	2.194
PCE	1.269	8.157

Photo UNC GC

05/05/04
BLK
B040505 00

	PID	ECD
TCE	.128	.161
PCE	1.52	3.478

STD C
B040505 01

	PID	ECD
TCE	.956	1.604
PCE	1.270	6.985

STD B
B040505 02

BLK

rec'd SG-30, 32, 33, 34
new computer desktop

SG-30
B040500

	PID	ECD
TCE	—	—
PCE	0.005	0.104

5/5/04 @ 0940

SG-32
B040505 03

	PID	ECD
TCE	—	.395
PCE	—	.009

5/5/04 @ 1000

SG-33
B040505 04
5/5/04 @ 1025

	PID	ECD
TCE	—	—
PCE	—	0.986

007

5/5/04 Florocarbon GC

SG-34 PID ECD
B4050503 TCE – –
5/5/04 @ 1053 PCE 0.048 0.869
rec'd 35 GB-1, TBS-1

SG-35 PID ECD
B4050504 TCE – –
5/5/04 @ 1232 PCE 0.007 0.966

STD B
505 PID ECD
TCE 0.877 2.241
PCE 1.212 9.257

Blk
B4050506
rec'd SG 36, 37

SG-36 PID ECD
5/5/04 @ 1315 TCE – –
B4050507 PCE 0.007 –

GB-1 Geoprobe Blank ND3
B4050508
5/5/04 @ 1410

TBS-1 tube blank sample ND
B4050509
5/5/04 1353

SG-24 PID ECD
B4050510 TCE – –
5/5/04 @ 1417 PCE 0.005 0.182

STD C PID ECD
B4050511 TCE ~~0.~~ .174 0.680
PCE ~~0.265~~ .139 1.592

STD B PID ECD
B4050512 TCE ~~5.762~~ 0.863 2.444
PCE ~~2.307~~ 1.211 9.880

STD B PID ECD
B4050513 TCE .870 3.450
PCE 1.219 10.2

Blk PID ECD
B4050514 TCE – –
PCE 0.003 0.041

SG-37 PID ECD
B4050515 TCE 0.009 ~~.444~~
5/5/04 1330 PCE 0.029 .244

009

5/5/04

		PID	ECD
SG-38 B4050516	TCE	.014	~
	PCE	.630	4.635
~~A~~ 5/5/04 @ 1535			(10/ ECD
PCE hit BLK B4050517	PCE		.002/.113
B4050517			
SG-47 5/5/04 15:55			
5/5/04 @ 1555		PID	ECD
B4050518	TCE	0.062	—
B4050518	PCE	2.683	25.9
~~A~~ PCE hit			
BLK B4050519		PID	ECD
	TCE	0.005	—
	PCE	0.013	.113
SG-39		PID	ECD
B4050520	TCE	.127	.088
	PCE	2.369	11.9
~~A~~ hit PCE 5/5/04 @ 1624			
BLK		PID	ECD
B4050521	TCE	0.005	—
	PCE	0.052	0.126
SG 40		PID	ECD
B4050522	TCE	—	—
5/5/04 @ 1650	PCE	.231	~~1.775~~ 2.762

5/5/04

		PID	ECD
BLK B4050523	TCE		
	PCE		
		PID	ECD
SG 41	TCE	—	ND
B4050524	PCE	0.073	1.491
5/5/04 @ 1714		PID	ECD
SG 42	TCE	—	—
B4050525	PCE	0.073	1.507
5/5/04 @ 1745			

SUMMA SO FAR

SG-42	can # 69	5/5/04 @ 1755
SG-41	can # 82	5/5/04 1725
SG 35	can # 55	5/5/04 12:34

		PID	ECD
BLK B4050526	TCE		
	PCE		

NDs

011

5/5/04

		PID	ECD
STDC	TCE	.109	.635
B4050527	PCE	.135	1.254
STD B		PID	ECD
B4050528	TCE	.856	0.439
	PCE	1.185	5.618

05/06/04 May 6, 2004

BLK
B4050600

		PID	ECD
STDC (?)	TCE	.136	1.629
B4050601	PCE	.164	1.135
STD B		PID	ECD
B4050602	TCE	1.018	1.638
	PCE	1.391	6.147

BK1
B4050603

5/6/04

SG-43
B4050604
5/6/04 @ 0852

	ACD	ECD
TCE	—	—
PCE	0.005	0.03[illegible]

SG-44
B4050605
5/6/04 @ 0912

	PID	ECD
TCE	—	—
PCE	.004	—

SG 46
B4050606
5/6/04 @ 0954

	PID	ECD
TCE	—	—
PCE	0.016	0.028

SG 45
B4050607
5/6/04 @ 0931

	PID	ECD
TCE	0.003	—
PCE	0.002	—

SG 46 (repeat)
5/6/04 @ 0954
B4050608

	PID	ECD
TCE	0.004	—
PCE	0.009	0.201

013

5/6/04

(1) SG-52
5/6/04 @ 10:52
B4050609

	PID	ECD
TCE	0.005	—
PCE	0.047	0.052

SG 52 (repeat)
B4050610

	PID	ECD
TCE	.006	—
PCE	.046	.028

SG 53
B4050611
5/6/04 @ 10:30

	PID	ECD
TCE	.004	—
PCE	.003	—

SG 54
B4050612
5/6/04 @ 10:04

	PID	ECD
TCE	0.004	—
PCE	.010	0.047

STD B
B4050613

	PID	ECD
TCE	.0954	2.48
PCE	1.951	9.26

BLK
B4050614

	PID	ECD
TCE	—	—
PCE	—	—

SG-4B
B4050615
5/6/04 @ 1:25 PM

	PID	ECD
TCE	0.030	—
PCE	1.543	15.5

SG 4B repeat
B4050616

	PID	ECD
TCE	—	—
PCE	1.911	15.8

BLK
B4050617

SG 56
B4050618
5/6/04 @ 1:56 PM

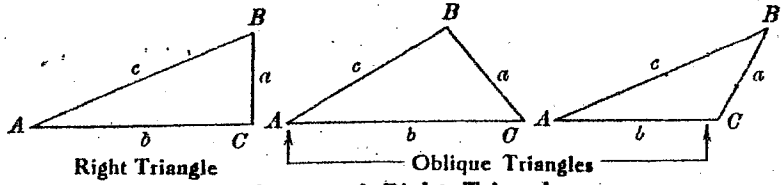
	PID	ECD
TCE	0.039	—
PCE	1.756 / 1.303	7.552 / 14.9

BLK
B4050619

	PID	ECD
TCE		
PCE		

SG 49	5/6/04 @ 12:59			
B4050620		PID	SCD	
	TCE	.003	—	
	PCE	0.066	0.703	
SG-50	5/6/04 @ 1235			
B 40506		PID	SCD	
B4050621	TCE	—	—	
	PCE	.345	4075	
SG-50 (repeat)		PID	SCD	
B4050622	TCE	0.004	—	
	PCE	.343	3.826	
BLC				
B4050623				
SG-51	5/6/04 @ 1207			
B4050624		PID	SCD	
	TCE	0.002	—	
	PCE	.055	0.436	

TRIGONOMETRIC FORMULAS



Right Triangle — Oblique Triangles

Solution of Right Triangles

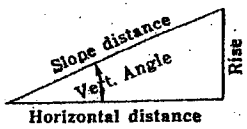
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B$, $c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B$, $b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90° - A$, $b = a \cot A$, $c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90° - A$, $a = b \tan A$, $c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90° - A$, $a = c \sin A$, $b = c \cos A$

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}$, $C = 180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}$, $C = 180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180° - C$, $\tan \frac{1}{2}(A - B) = \frac{(a-b)\tan \frac{1}{2}(A+B)}{a+b}$, $c = \frac{a \sin C}{\sin A}$.
a, b, c	A, B, C	$s = \frac{a+b+c}{2}$, $\sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}$, $\sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}}$, $C = 180° - (A+B)$
a, b, c	Area	$s = \frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

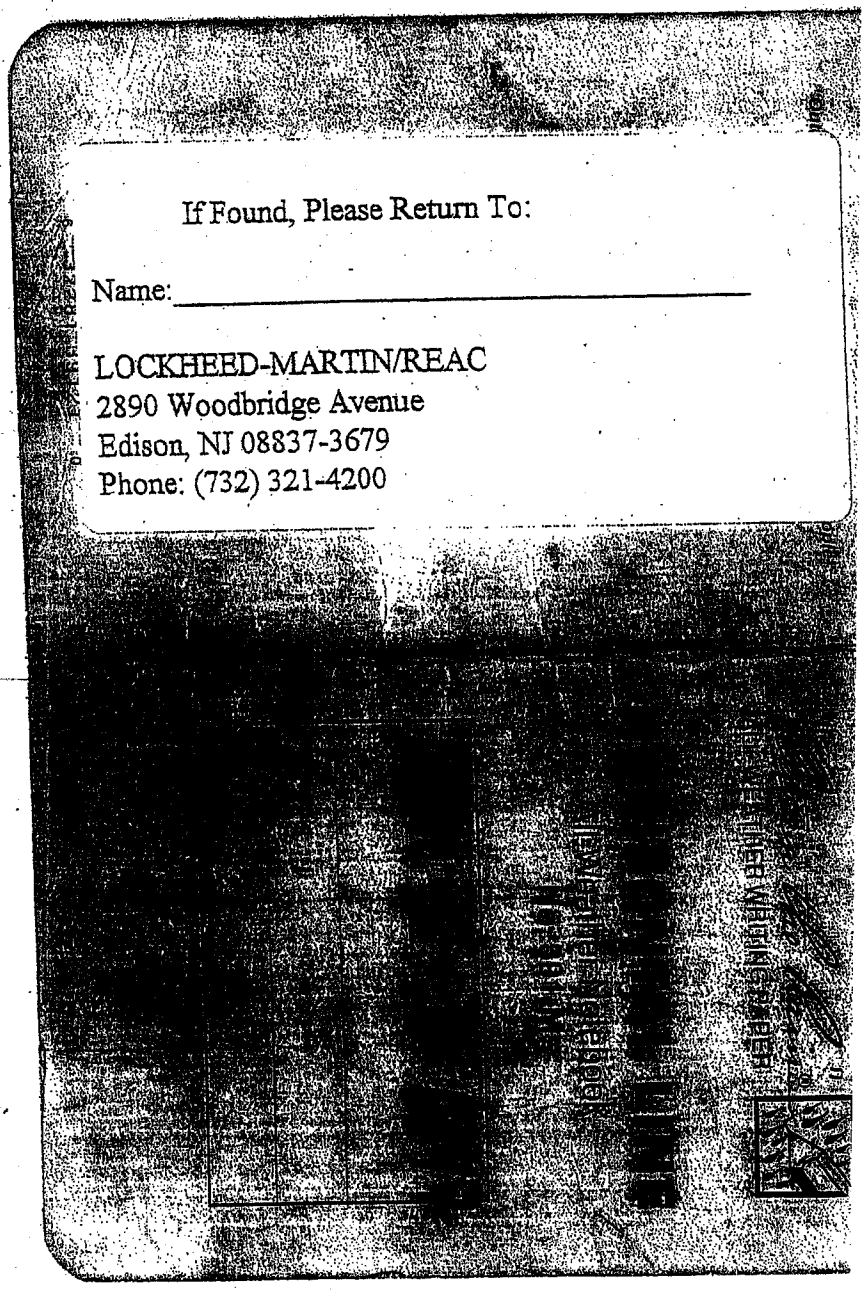
REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10′. Since cos 5° 10′ = .9959, horizontal distance = 319.4 × .9959 = 318.09 ft.

Horizontal distance also = Slope distance minus slope distance times (1 − cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cosine 5° 10′ = .9959. 1 − .9959 = .0041. 319.4 × .0041 = 1.31. 319.4 − 1.31 = 318.09 ft.

When the rise is known, the horizontal distance is approximately the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance $= 302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.


If Found, Please Return To:
Name:_____
LOCKHEED-MARTIN/REAC
2890 Woodbridge Avenue
Edison, NJ 08837-3679
Phone: (732) 321-4200

ALL-

Name

Addre

Phone

Projec

COC & Sample Shipping Procedures

Peer review COC record

Remove pink copy for the Task Leader

Place original COC in a plastic bag, seal, and secure to the lid inside the cooler.

Tape and seal the cooler.

Call Sample Receiving Hotline at (732) 632-9345 or SRT's Cell Phone (609) 234-5318. Give
- -FedEx tracking #
- -Chain of Custody Record #s
- -# of Coolers
- -# of samples and matrices
- -Analytes requested
- -Subcontract lab info

Fax COC record to (732) 494-4021 (RBAC analyses) or (732) 494-4020 (subcontract analyses) Follow-up to confirm sample receipt.

Clear Vi... ...ils style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

CONTENTS

PAGE	REFERENCE	DATE

Soil Gas

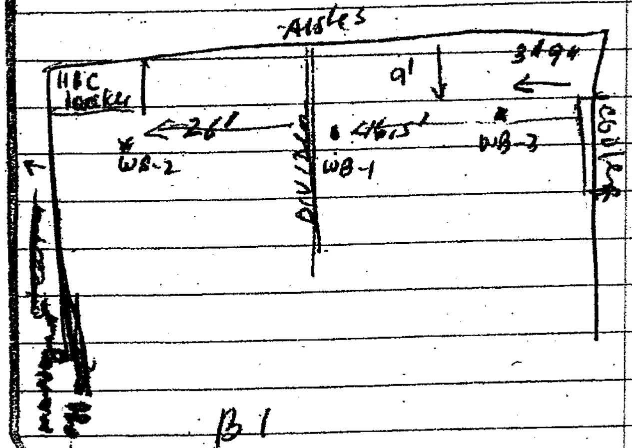
Waldbaum

WB-1

WB-2

WB-3

Waldbaum Back room



B1

500 sec PID

ECD ? TCE 1

PCE 50sec 2

PC-1 Run 6

ECD

30 sec no PID

~ 500 ↑ ~ 500 PID ↑

17,000 Test

17 505 Geo

SG #	PLE
SG 48	1543
56	1307
49	66
50	345
51	55
57	921
58	304
59	502
55	

18 21 37

R050608A

(21)	(1) SG 29	(2) SG-26
SG-39	30	25
40	31	24
41	32	23
42	33	22
43	34	21
44	35	20
45	SG-36	28
41		38
37		47
19		SG-30
		6
		9
		12

Need to GPS
SG 27

GPS

36, 9, 12, 19
20 - 26 (27) 28 → 47
need + 27
need
48 → 64

R050709A
SG 27
SG 54
SG 53, 52
SG 51 ~10 ft E of pt
SG 52 ~10 feet E of pt
SG 53 ~ 10 feet E of pt
SG 50
SG 49 SG 48, 56, 59

(57) (51) (48)

R050709A - Cont'd
SG 60, SG 61, SG 62
SG 63, 64, 58, 57, 55

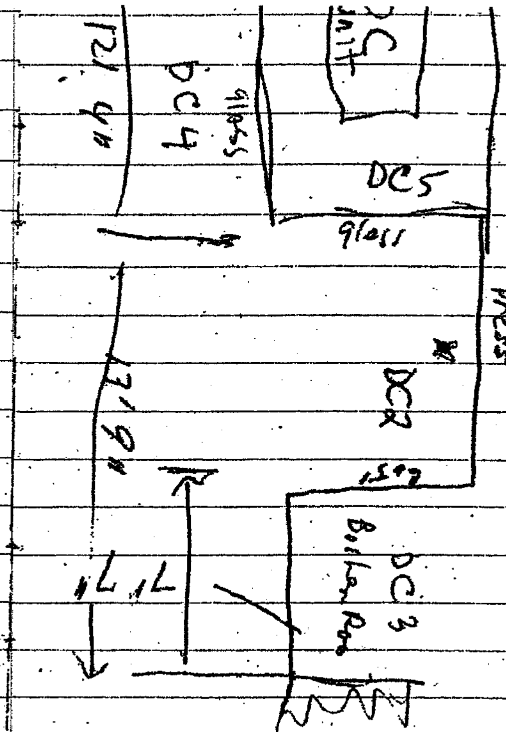
SG 52 (at pt)
SG 51 ↓ 70 lower
SG 53 71

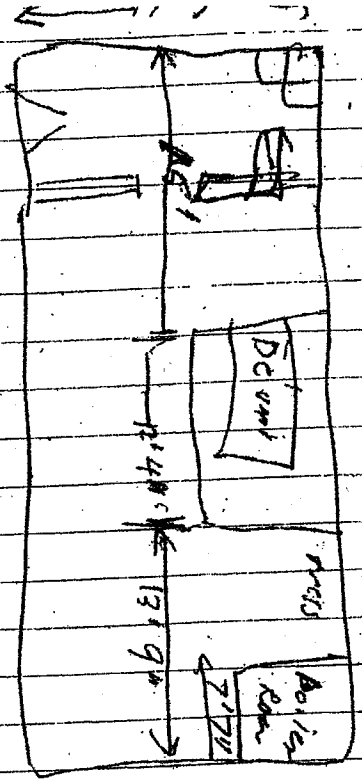
SG 65 [illegible]
SG 66, 67, 68, 70, 69
SG 71

need to GPS
72 → 78

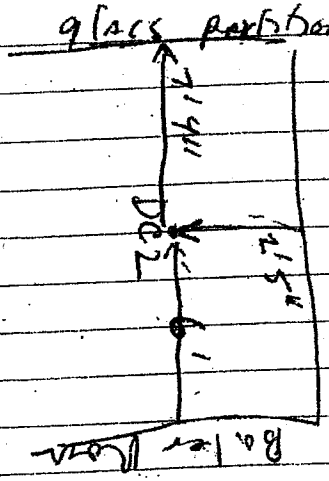
79 parker
78, 72, 74, 72
91 → lawn
73, 75, 77
lawn
~~Hard~~ scrabble
RO 50716A
SG 78, SG 72
SG 74, 72

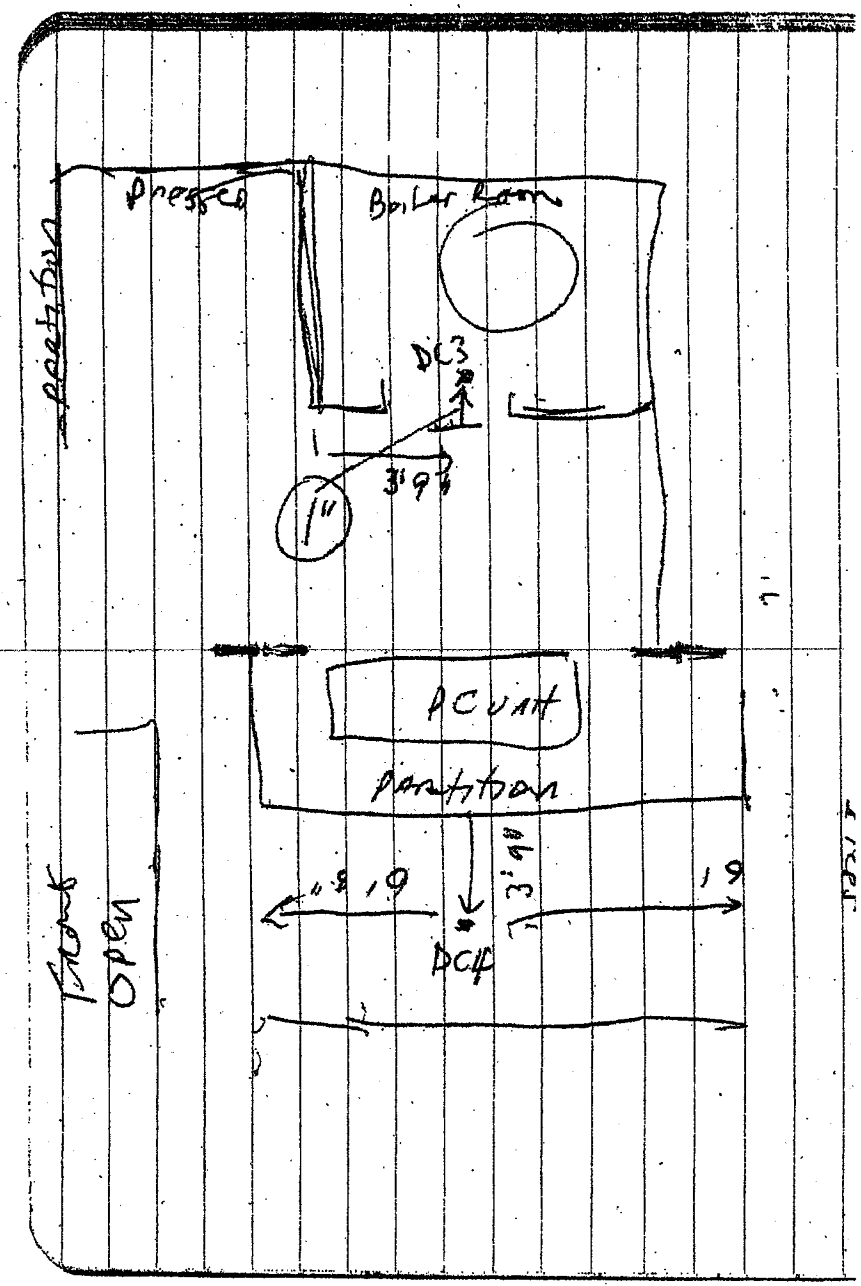
SG 73 lawn
SG 79 parking lot
SG 75 lawn

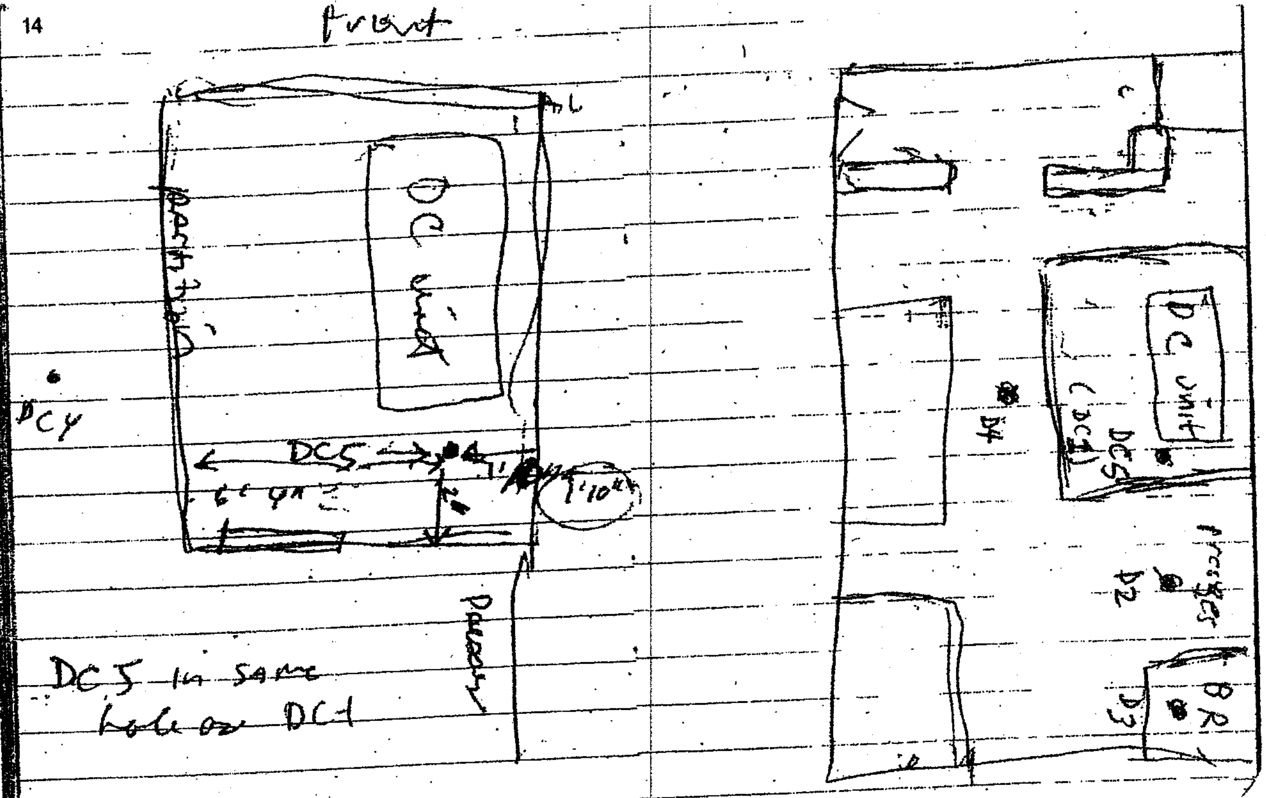




151 glass toward
191 3" wide




Pressed
Boiler Room
DC3
3'9"
1"
AC unit
partition
3'9"
DC4
Front
Open



DC5 in same hole as DC1

... lines.

R050808A

before SG 4M part

SG19 to Main St

perimeter of P Lot

(1 car bulge) front

of Walgreens

loading place, next to

Apts to Fulton St

(SG 3) back past

MacDonalds

R050808B

Island 1

R050808C

Island 2

R050808D THS access

start at main St, back of

Bld brown (parking area)

cold de sac (SG65)

back to SG69 (not the first

exit of access Rd)

to mini p. lot (SG79)

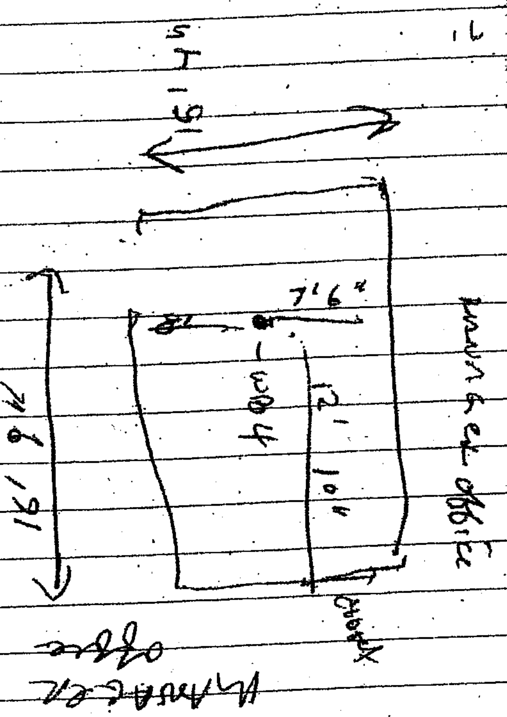
R050808E

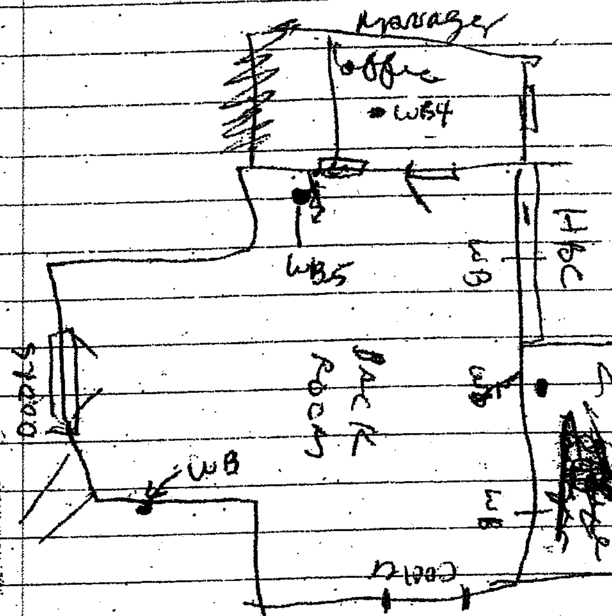
line 78-69, line 40, line 30

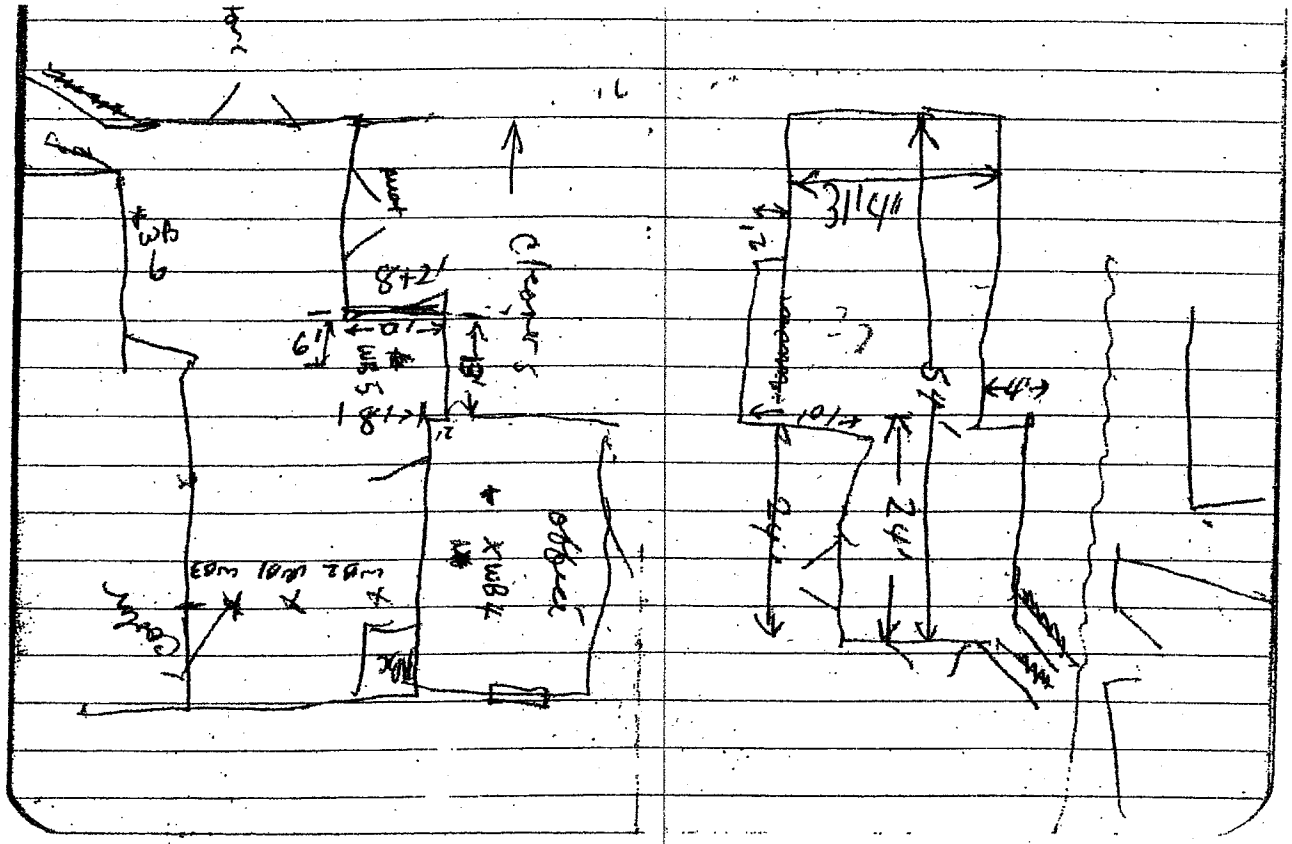
line 27-20 (19)

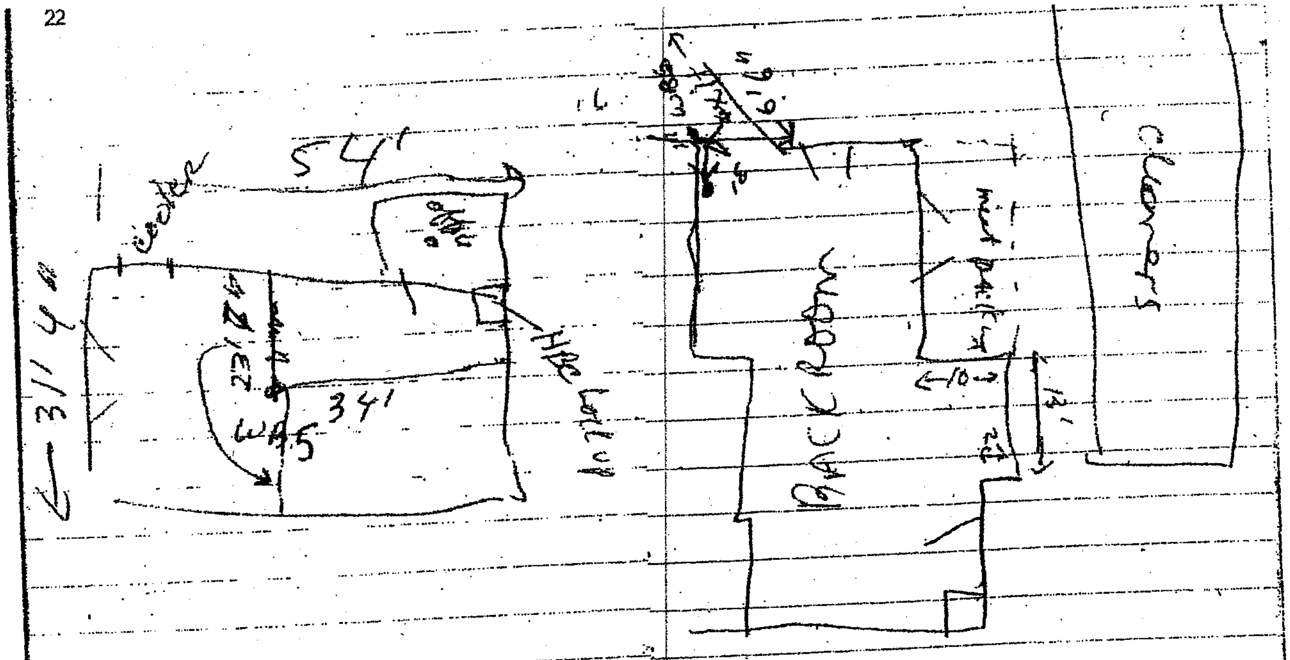
line 60 (18-65)

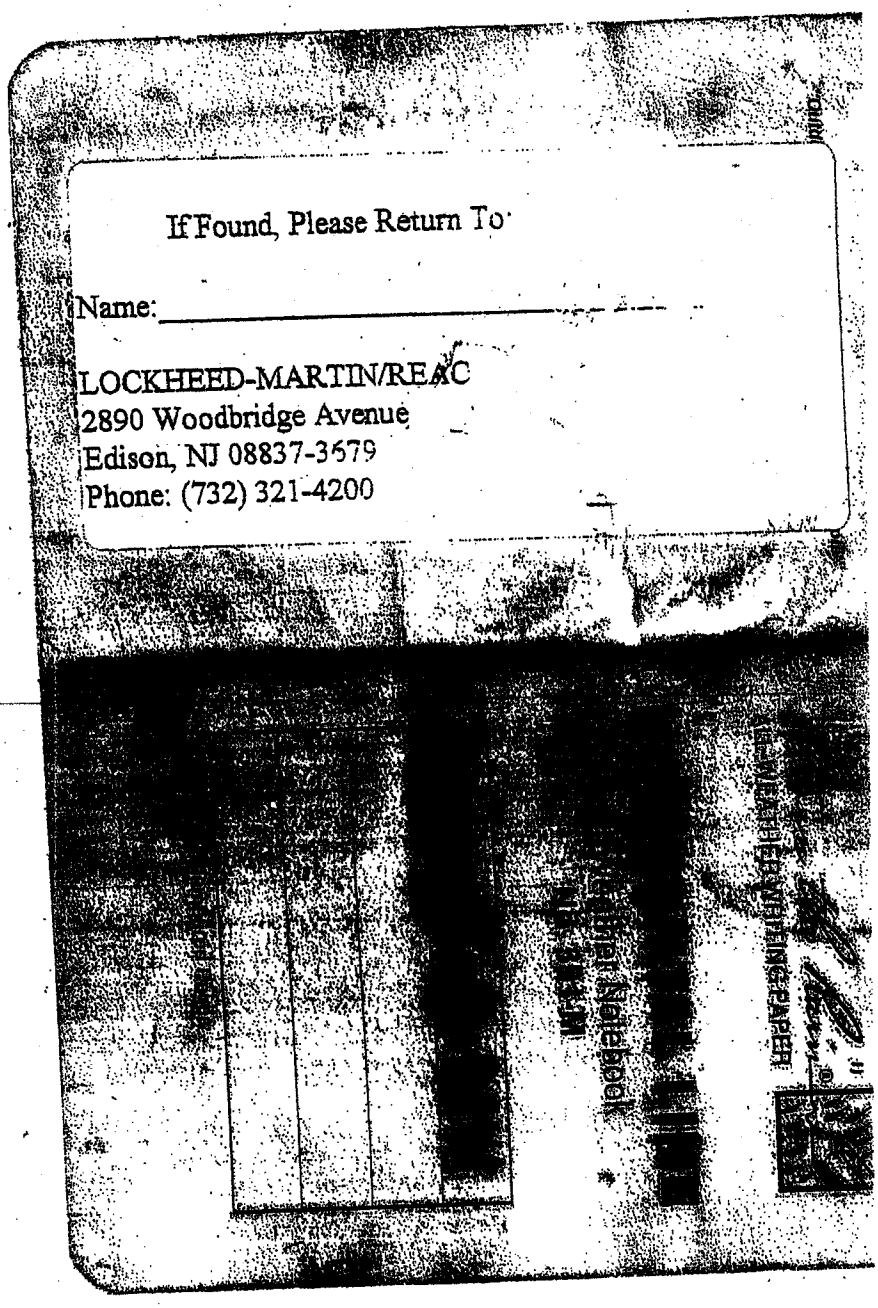
R050809A


7'6"
12'
10'
WB4
manager office


Manager
office
WB4
WB5
WB
BACK ROOM




center
54'
34'
BACK ROOM
Cleaners
10
13'


If Found, Please Return To
Name:
LOCKHEED-MARTIN/REAC
2890 Woodbridge Avenue
Edison, NJ 08837-3679
Phone: (732) 321-4200

"
A
ALL

Nam

Addi

Pho

Proj

Clie
of in
your

COC & Sample Shipping Procedures

Peer review COC record	Call Sample Receiving Hotline at (732) 632-9345 or SRT's Cell Phone (609) 234-5318. Give -FedEx tracking # -Chain of Custody Record #s -# of Coolers -# of samples and matrices -Analyses requested -Subcontract lab info Fax COC record to (732) 494-4021 (REAC analyses) or (732) 494-4020 (subcontract analyses). Follow-up to confirm sample receipt.
Remove pink copy for the Task Leader	
Place original COC in a plastic bag, seal, and secure to the lid inside the cooler.	
Tape and seal the cooler.	

or this style
or Contact

CONTENTS

PAGE #	REFERENCE	DATE
WB-1	4ft	5/3
WB-2	4ft	5/3
WB-3	4ft	5/3
DC-1	4ft	5/3
SG-3	4ft	5/4
SG-6	4ft	5/4
SG 9	4ft	5/4
SG 12	4ft	5/4
SG 19	4ft	5/4
SG 20	4ft	5/4
SG 21	4ft	5/4
SG 22	4ft	5/4
SG 23	4ft	5/4
SG 25	4ft	5/4
SG 26	4ft	5/4

SG27 4ft 5/4

SG28 4ft 5/4

SG29 3½ft 5/4

SG31 4ft 5/4

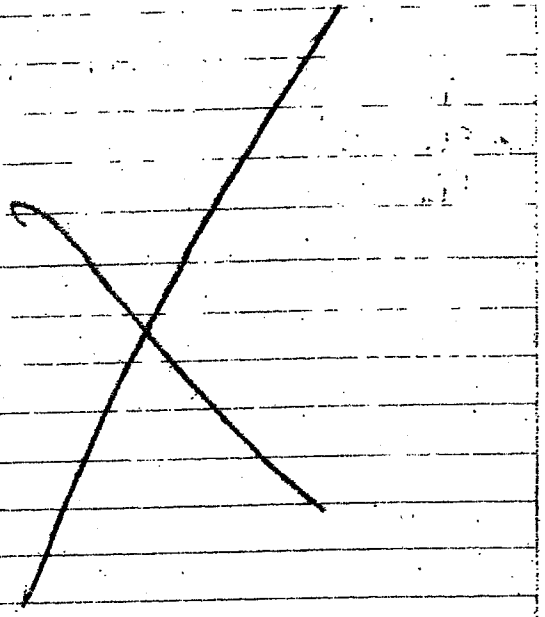
SG30 4ft 1:40 5/5

SG32 4ft 10:30 5/5

SUMMA 69 - SG40 17:55
5/5 4ft

SUMMA 82 - SG41 17:25
5/5 4ft

SUMMA 55 - SG35 12:34
5/5 4ft



APPENDIX B
GPS Documentation
Liberty Industries and Finishing Site - Upgradient Source
Trip Report
September 2004

Latitude	Longitude	Sample ID
-73.44656867	40.72826851	sg-3
-73.44648087	40.728400505	sg-6
-73.446392702	40.728537839	sg-9
-73.446322014	40.728659277	sg-12
-73.444978273	40.728589537	sg-19
-73.445019768	40.728712903	sg-20
-73.445064538	40.728845091	sg-21
-73.445112314	40.728979347	sg-22
-73.445164654	40.729111409	sg-23
-73.44520905	40.729245443	sg-24
-73.445261569	40.729376805	sg-25
-73.44530957	40.729510515	sg-26
-73.44534642	40.729646297	sg-27
-73.445208	40.728578143	sg-28
-73.445264192	40.728711479	sg-29
-73.445306545	40.728845427	sg-30
-73.445355644	40.728975687	sg-31
-73.445401381	40.729106514	sg-32
-73.445454379	40.729239287	sg-33
-73.445498815	40.729376409	sg-34
-73.445537639	40.729507351	sg-35
-73.445582766	40.729642228	sg-36
-73.445620507	40.72974909	sg-37
-73.445481239	40.728639363	sg-38
-73.445512418	40.728755861	sg-39
-73.445553109	40.728891132	sg-40
-73.445604582	40.729020287	sg-41
-73.445649365	40.729151699	sg-42
-73.445696762	40.72928687	sg-43
-73.445748937	40.729419124	sg-44
-73.445798902	40.729550723	sg-45
-73.445845357	40.729678554	sg-46
-73.445576466	40.72866228	sg-47
-73.445632317	40.728809201	sg-48
-73.445677878	40.728937647	sg-49
-73.445715313	40.72907299	sg-50
-73.445756434	40.729211388	sg-51
-73.445799062	40.729339548	sg-52
-73.445853133	40.729468905	sg-53
-73.445911551	40.729604024	sg-54
-73.445664699	40.72867582	sg-55
-73.445736774	40.728845445	sg-56
-73.445810132	40.728765891	sg-57

Latitude	Longitude	Sample ID
-73.445912164	40.728710261	sg-58
-73.445923589	40.728821027	sg-59
-73.446031925	40.728896977	sg-60
-73.446182789	40.72886368	sg-61
-73.446329016	40.728836524	sg-62
-73.446184517	40.728735935	sg-63
-73.44605129	40.728735627	sg-64
-73.446510456	40.728836735	sg-65
-73.446554	40.729100307	sg-66
-73.446607193	40.729373769	sg-67
-73.446657309	40.729640839	sg-68
-73.446873681	40.729686948	sg-69
-73.446897106	40.729784419	sg-70
-73.446693383	40.729790912	sg-71
-73.446511491	40.729728852	sg-72
-73.446334837	40.729839814	sg-73
-73.446159599	40.729765439	sg-74
-73.445978872	40.729893736	sg-75
-73.445798052	40.729795408	sg-76
-73.445440342	40.729836098	sg-78
-73.446070069	40.729985572	sg-79

APPENDIX C
Analytical Report
Liberty Industries and Finishing Site - Upgradient Source
Trip Report
September 2004

ANALYTICAL REPORT

Prepared by
LOCKHEED MARTIN

Liberty Industrial Upgradient Source Assessment
Farmingdale, New York

July 2004

EPA Work Assignment No. 0-048
LOCKHEED MARTIN Work Order No.EAC00048
EPA Contract No. EP-C-04-032

Submitted to
T. Johnson
EPA-ERTC

L. Kaelin — Date 07/30/04
Task Leader

V. Kansal — Date 8/4/04
Analytical Section Leader

D. Miller — Date 8/6/04
Program Manager

Analysis by:
REAC

Prepared by:
J. Johnson

Reviewed by:
J. Soroka

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Appendices will be furnished on request.

Introduction

REAC in response to WA #0-048, provided analytical support for environmental samples collected from the Liberty Industrial Upgradient Source Assessment, in Farmingdale, New York as described in the following table. The support also included QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results, and the QA/QC results.

COC #	Number of Samples	Sampling Date	Date Received	Matrix	Analysis	Laboratory	Data Package
365-0002	2	5/05/04	5/13/04	Air	TCE/PCE	REAC	N165
365-0003	2	5/06/04	5/13/04				
365-0004	1 1	5/05/04 5/06/04	5/13/04				
365-0005	2	5/06/04	5/13/04				
18240	2	5/07/04	5/13/04				
18242	2	5/07/04	5/07/04				
18241	2	5/08/04	5/13/04				
18243	2	5/08/04	5/13/04				

Case Narrative

The data contained in this report has been validated to two significant figures. Any other interpretation of the data is the responsibility of the user.

Data Package N165 VOCs in Air (Summa Canisters)

Only trichlorethene and tetrachloroethene compounds were requested for analysis. The data were reviewed and are acceptable.

AA	Atomic Absorption
B	The analyte was found in the blank
BFB	Bromofluorobenzene
C	Centigrade
cont.	Continued
D	(Surrogate Table) this value is from a diluted sample and was not calculated
	(Result Table) this result was obtained from a diluted sample
Dioxin and/or PCDD and PCDF	denotes Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	Estimated maximum possible concentration
ICAP	Inductively Coupled Argon Plasma
ISTD	Internal Standard
J	The value is below the method detection limit and is estimated
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MDL	Method Detection Limit
MI	Matrix Interference
MS (BS)	Matrix Spike (Blank Spike)
MSD (BSD)	Matrix Spike Duplicate (Blank Spike Duplicate)
MW	Molecular Weight
NA	either Not Applicable or Not Available
NC	Not Calculated
NR	Not Requested
NS	Not Spiked
% D	Percent Difference
% REC	Percent Recovery
PPB	Parts per billion
PPBV	Parts per billion by volume
PPMV	Parts per million by volume
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
QL	Quantitation Limit
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SIM	Selected Ion Monitoring
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compound
U	Denotes not detected
W	Weathered analyte; Aroclor pattern displays a degradation of earlier eluting peaks

m^3	cubic meter	kg	kilogram	µg	microgram
L	liter	g	gram	pg	picogram
mL	milliliter	mg	milligram	ng	nanogram
µL	microliter				

*	denotes a value that exceeds the acceptable QC limit
	Abbreviations that are specific to a particular table are explained in footnotes on that table

Revision 7/16/03

Analytical Procedure for VOC in Air (REAC-Method TO-14)

The samples were analyzed with procedures consistent with those described in REAC SOP#1814 and detailed in the SUMMA canisters analytical report(Appendix A). The VOC results are listed in Table 1.1.

Table 1.1 - Results of the Analysis for VOCs in Air(Summa Canister)
WA# 0-048 Liberty Industrial Upgradient Source Assessment

Sample Number	Method Blank		Trip Blank		SG-42		SG-49		SG-35	
Sample Location	040513-1		Trip Blank		SG-42		SG-49		SG-35	
Analyte	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv
Trichloroethene	U	0.80	U	0.80	U	1.7	U	1.6	U	0.80
Tetrachloroethene	U	0.80	U	0.80	130	1.7	120	1.6	10	0.80

Sample Number	SG-41		DC-2		DC-3		SG-50		SG-51	
Sample Location	SG-41		DC-2		DC-3		SG-50		SG-51	
Analyte	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv
Trichloroethene	U	1.6	36	1.6	9.0	1.6	U	1.6	U	1.6
Tetrachloroethene	90	1.6	14000	1.6	4000	1.6	740	1.6	76	1.6

Sample Number	DC-5		SG-56		Method Blank		AMB-1		Method Blank	
Sample Location	DC-5		SG-56		040514-1		AMB-1		040517-1	
Analyte	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv
Trichloroethene	66	1.6	35	1.6	U	0.80	U	0.80	U	0.8
Tetrachloroethene	39000	1.6	2400	1.6	U	0.80	U	0.80	U	0.8

Sample Number	WB-4		WB-5		WB-6		Method Blank		DC-0	
Sample Location	WB-4		WB-5		WB-6		040519-1		DC-0	
	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv	Conc ppbv	MDL ppbv
Trichloroethene	U	160	U	110	U	16	U	0.80	U	0.80
Tetrachloroethene	11000	160	2700	110	560	16	U	0.80	15	0.80

QA/QC for VOC in Air

Results of the MS/MSD Analysis for VOC in Air (Summa Canisters)

Sample SG-35 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analyses. The percent recoveries, listed in Table 2.1, were 92 and 99. The relative percent differences, also listed in Table 2.1, were 0 and 1. There are no established QC limits for these analyses.

Results of the Replicate Analysis for VOC in Air (Summa Canisters)

Sample SG-42 was chosen for the replicate analysis. The relative percent difference, reported in Table 2.2 was 2 . One RPD was within acceptable QC limits , the other RPD was not calculated because the compound was not detected above the MDL.

Results of the Internal Standard Areas for VOC in Air (Summa Canisters)

The internal standard areas(for bromochloromethane, 1,4-difluorobenzene, and chlorobenzene-d5) are listed in Table 5A. All eighty seven areas were within the acceptable limits.

Table 2.1 Results of MS/MSD Recovery Analysis for VOCs in Air (Summa Canisters)
WA# 0-048 Liberty Industrial Upgradient Source Assessment

Sample Number		SG-35	SG-35 MS		SG-35 MSD		
Sample Location		SG-35	SG-35		SG-35		
Concentration	Spike Amount nL	nL	nL	% Rec.	nL	% Rec.	RPD
Analyte							
Trichloroethene	5.1	U	4.70	92	4.68	92	0
Tetrachloroethene	5.1	2.58	7.62	99	7.56	98	1

Table 2.2 Results of the Replicate Sample Analysis for VOCs in Air (SUMMA Canister)
WA# 0-048 Liberty Industrial Upgradient Source Assessment

Sample	SG-42	SG-42 Rep			QC**
Compound	Conc. ppbv	Conc. ppbv	MDL ppbv	RPD	Limit RPD
Trichloroethene	U	U	1.7	NC	20
Tetrachloroethene	129	131	1.7	2	20

** QC Limit applies to results greater than MDL.

FIELD

EPA Contract #:

CHAIN OF CUSTODY RECORD

Site #: 365
Contact Name:
Contact Phone:

No: 365-0002
COC #: 365-0002
Lab: REAC
Lab Phone:

Lab #	Sample #	Location	Analyses	Matrix	Collected	Numb Cont	Container	Preservative	MS/MSD
									NA
5016	SG-35	SG-35	TCE/PCE	Soil Gas	5/5/2004	1	SUMMA 55	none	NA
5017	SG-41	SG-41	TCE/PCE	Soil Gas	5/5/2004	1	Summa 82	none	NA

Special Instructions: TO15, for TCE, PCE

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
all/Analysis		5/18/04		5/13/20	10:20						

0048-DAR-073004

Page 1 of 1

FIELD

EPA Contract #:

CHAIN OF CUSTODY RECORD

Site #: 365

Contact Name:

Contact Phone:

No: 365-0003

COC #: 365-0003

Lab: REAC

Lab Phone:

Lab #	Sample #	Location	Analyses	Matrix	Collected	Numb Cont	Container	Preservative	MS/MSD
5022	SG-50	SG-50	TCE/PCE	Soil Gas	5/6/2004	1	Summa 260	none	NA
5023	SG-51	SG-51	TCE/PCE	Soil Gas	5/6/2004	1	Summa 74	none	NA

Special Instructions: TO 14 (5 FOR TCE, PCE)

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
2 (Analysis)		5/8/07		5/13/04	1:20						

0048-DAR-073004

FIELD

EPA Contract #:

CHAIN OF CUSTODY RECORD

Site #: 365

Contact Name:

Contact Phone:

No: 365-0004

COC #: 365-0004

Lab:

Lab Phone:

Lab #	Sample #	Location	Analyses	Matrix	Collected	Numb Cont	Container	Preservative	MS/MSD
5014	SG-42	SG-42	TCE/PCE	Soil Gas	5/5/2004	1	Summa 69	None	NA
5015	SG-49	SG-49	TCE/PCE	Soil Gas	5/6/2004	1	Summa 42	NONE	NA

Special Instructions: TO14s for TCE, PCE (JBC)

SAMPLES TRANSFERRED FROM

CHAIN OF COSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
2/analysis	[signature]	5/8/04	[signature]	5/13/04	10:30						

010

0048-DAR-073004

FIELD

CHAIN OF CUSTODY RECORD

Site #: 365

Contact Name:

Contact Phone:

No: 365-0005

COC #: 365-0005

Lab: REAC

Lab Phone:

EPA Contract #:

Lab #	Sample #	Location	Analyses	Matrix	Collected	Numb Cont	Container	Preservative	MS/MSD
5026	SG-56	SG-56	TCE/PCE	Soil Gas	5/6/2004	1	Summa 274	NONE	NA
5027	TRIP BLANK	TRIP BLANK	TCE/PCE	Soil Gas	5/6/2004	1	Summa 108	none	NA

Special Instructions: TO14 FOR TCE, PCE

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
2 analysis		5/8/07		5/12/07	10:30						

011

0048-DAR-073004

REAC, Edison, NJ
(732) 321-4200
EPA Contract 68-C99-223

CHAIN OF CUSTODY RECORD

Project Name: 365
Project Number: 365
LM Contact: L. Kellin Phone: 4250

No: 18240
Sheet **01** of **01** (Do not copy)
(for addnl. samples use new form)

Sample Identification

REAC#	Sample No	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	Analyses Requested: TO15 (502)
5024	AMB-1	AMB-1	A	5/7/04	1	SUMMA / NONE	✓
5025	DC-5	DC-5	A	"	"	"	✓

012

Matrix:

A- Air	PW- Potable Water
AT-Animal Tissue	S- Soil
DL- Drum Liquids	SD- Sediment
DS- Drum Solids	SL- Sludge
GW- Groundwater	SW- Surface Water
O- Oil	TX-TCLP Extract
PR-Product	W- Water
PT-Plant Tissue	X- Other

Special Instructions:

(502) TO15 for TCE, PCE

SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #:

Items/Reason	Relinquished by	Date	Received by	Date	Time
2/analysis		5/6/04		5/7/04	10:30

Items/Reason	Relinquished by	Date	Received by	Date	Time

0048-DAR-073004

REAC, Edison
(732) 321-4200
EPA Contract 68-C99-223

CHAIN OF CUST[illegible] RECORD

Project Name: 36[illegible]
Project Number: 365
LM Contact: L. Kaelin Phone: x4250

No: 18242
Sheet **01** of **01** (Do not copy)
(for addnl. samples use new form)

Sample Identification | **Analyses Requested**

REAC#	Sample No	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	TO14/15 JRC				
5017	DC-2	DC-2	A	5/7/04	1	Summa/none	✓				
5019	DC-3	DC-3	A	5/7/04	1	" "	✓				

013

Matrix:

A- Air
AT-Animal Tissue
DL- Drum Liquids
DS- Drum Solids
GW- Groundwater
O- Oil
PR-Product
PT-Plant Tissue
PW- Potable Water
S- Soil
SD- Sediment
SL- Sludge
SW- Surface Water
TX-TCLP Extract
W- Water
X- Other

Special Instructions:

TO 14/15 (JRC) for TCE, PCE

SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #:

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished by	Date	Received by	Date	Time
2/[illegible] 514	[signature]	5/8/04	[signature]	5/10/04	10:[illegible]						

0048-DAR-073004

REAC, Edison, NJ
(732) 321-4200
EPA Contract 68-C99-223

CHAIN OF CUSTODY RECORD

Project Name: 365
Project Number: 365
LM Contact: L. Knepka Phone: x42250

No: 18241
Sheet 01 of 01 (Do not copy)
(for addnl. samples use new form)

Sample Identification | **Analyses Requested**

REAC#	Sample No	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	TO14A (SIM)
5023	DC-Ø	DC-Ø	A	5/8/04	1	summa/none	L
5024	WB-5	WB-5	A	5/8/04	1	" "	L

014

Matrix:

A- Air	PW- Potable Water
AT-Animal Tissue	S- Soil
DL- Drum Liquids	SD- Sediment
DS- Drum Solids	SL- Sludge
GW- Groundwater	SW- Surface Water
O- Oil	TX-TCLP Extract
PR-Product	W- Water
PT-Plant Tissue	X- Other

Special Instructions:

TO14A (SIM) for TCE, PCE

Note: PCE @ high level (1-10 ppmv/v)

DC-Ø → Can # 103
WB-5 → Can # 76

SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #:

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished by	Date	Received by	Date	Time
2/analysis		5/8/04		5/13/04							

0048-DAR-073004

REAC, Edison,
(732) 321-4200
EPA Contract 68-C99-223

CHAIN OF CUST / RECORD

Project Name: 365
Project Number: 365
LM Contact: L. Kaelin Phone: X4250

No: 18243
Sheet **01** of **01** (Do not copy)
(for addnl. samples use new form)

Sample Identification | **Analyses Requested**

REAC#	Sample No	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	TO14 5 day
5012	WB-4	WB-4	A	5/8/04	1	summa / none	✓
5013	WB-6	WB-6	"	"	"	" "	✓

015

Matrix:

A- Air	PW- Potable Water
AT-Animal Tissue	S- Soil
DL- Drum Liquids	SD- Sediment
DS- Drum Solids	SL- Sludge
GW- Groundwater	SW- Surface Water
O- Oil	TX-TCLP Extract
PR-Product	W- Water
PT-Plant Tissue	X- Other

Special Instructions:

5 18 04
TO14 for TCE, PCE
PCE @ high levels (1 → 10 ppmv/v)

WB-4 in Can # 25
WB-6 in Can # 70

SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #:

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished by	Date	Received by	Date	Time
2 Analysis	JH	5/8/04	[illegible]	5/13/04	10:15						

0048-DAR-073004

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1.0 INTRODUCTION

Fifteen air samples and a trip blank were collected at the Liberty site in Long Island, New York on 05, 06, 07 and 08 May 2004. The samples were collected in 6-liter passivated Summa canisters. The air samples were transported back to the Environmental Response Team Center (ERTC) facility in Edison, New Jersey. Before sampling, the Summa canisters were cleaned and certified using REAC Standard Operating Procedure (SOP) #1703, "Summa Canister Cleaning Procedures". The samples were analyzed according to REAC SOP #1814, "GC/MS Analysis of Sorbent Tubes and Summa Canisters", using gas chromatography/mass spectrometry (GC/MS).

2.0 GC/MS CANISTER PROCEDURES

2.1 Sample Pressurization

Before analysis, all canisters were pressurized. A pressurizing train with an in-line pressure gauge accurate to ± 0.1 pounds per square inch absolute (psia) was used. The gauge and train were purged with nitrogen gas (Ultra High Pure grade) for 5 minutes. The train was connected to the Summa canister and an initial pressure reading was recorded. The Summa canisters were pressurized with nitrogen and a final pressure readings were recorded. The canister samples were pressurized 2 times the initial reading. Some samples needed further dilution due to high concentration of tetra-chloro-ethene (PCE)

2.2 Summa Canister Analysis

The air samples were prepared for GC/MS analysis by cryogenically trapping an aliquot from the Summa canister. The canisters were attached to an Entech Model 7016 Summa Canister Autosampler connected to an Entech Model 7100A Concentrator. Sample analysis was initiated by cooling the first cryotrap, module M-1, to -120 degree Celsius (℃). Once M-1 was cooled, an aliquot of sample or standard was cryotrapped on it. This aliquot was transferred to a Tenax trap, M-2, to eliminate most of the water, and then cryofocussed on a third trap, M-3, before injection by direct heating into a Hewlett-Packard 6890N gas chromatography (GC) and 5973N mass selective detector (MSD) running ChemStation software. The cryogenic trap and GC/MS conditions are listed in Table 1A.

2.3 Calibration and Sample Spiking

A standard mixture (Scott Specialty Gases, Inc. cylinder No. ALM017223) containing twenty-seven (27) target compounds at concentrations of 1.04 to 1.09 parts per million in volume (ppmv) (listed in Table 2) was diluted to two nominal concentrations of 2 and 20 parts per billion (ppbv) in two Silco-steel passivated canisters. An initial calibration was run by varying the volume of the nominal 2 and 20 ppbv standards from 100 to 1250 milliliters (mL), equivalent to 0.2 nanoliter (nL) to 25 nL. A daily standard was analyzed using the nominal 20 ppbv standard at 250 mL (equivalent to 5 nL).

Internal standards, bromochloromethane (BCM), 1,4-difluorobenzene, and chlorobenzene-d5 (Spectra Gases cylinder No. AB17389), were added to both samples and standards. These standards were diluted from a nominal concentration of 1 ppmv to 100 ppbv in a Silco-steel passivated canister. An aliquot of 100 mL (equivalent to 10 nL) was added to all standards and samples. Instrument performance check standard p-bromofluorobenzene (Spectra Gases cylinder No. AB17359) was diluted from a nominal concentration of 1 ppmv to 100 ppbv in a Silco-steel passivated canister. An aliquot of 70 mL of BFB (equivalent to 50 nanograms of BFB) was analyzed to validate the mass spectrometer tuning. Standard cylinder I.D. numbers, concentrations, and the quantitation ions are listed in Table 2A.

2.4 Compound Identification/Quantitation

Target Compo unds in the samples were identified and quantitated using ChemStation software. This software was used to tentatively i dentify and quantitate target compounds using reconstructed and extracted ion chromatogram which were matched with retention time windows. The report format includes the identified compound mass spectra (both raw and background subtracted), quantitation, and qualifier ion chromatogram.

Target compound results were initially reported in nL. The lower calibration standard nominal volume of 0.2 nL was used as the limit of qunatitation (LOQ) for all the target compounds. Target compounds detected at less than twenty-five percent of the LOQ were not reported. The target compound results were calculated in ppbv using the following equation:

Concentration (ppbv) = Quant Result (nL) x 1000 / Undiluted Sample Volume (mL)

Non-target compounds were identified by a library search of all peaks in a chromatogram. The library search report prints out the sample spectrum along with the ten best library matches and the three best library match spectra. These matches were used along with mass spectral interpretation techniques to tentatively identify the unknowns. Estimated concentrations were calculated based on the total ion response of internal standards in each samples. Non-target compounds with total ion response greater than ten percent of the internal standards' total ion response in each samples were reported; however, non-target compounds appearing in the method blank and compounds, such as siloxanes and carbon dioxide, were not reported.

2.5 QA/QC

The following QA/QC procedures were performed for this analysis:

- The HP 5973N was tuned daily for perfluorotributylamine (PFTBA) to meet abundance criteria for p-bromofluorobenzene as listed in EPA Method TO15. Tuning results are included in the QA/QC data section (Appendix B).
- An initial calibration by automated injection of varying volumes of 2 and 20 ppbv standard were performed on 04 May 2004. All compounds met the relative standard deviations (RSD) of less than 30 %.
- Five continuing calibrations by injection of volume of 250mL of 20 ppbv standard were performed on 13, 14, 15, 18, and 19 May 2004. All compounds met the relative percent difference (RPD) of less than 30 %.
- Internal standards were added to all standards and samples. Percent recoveries were calculated against the daily standard, and are listed in Table 6. Recoveries should be within 40% to 160% for the internal standards.
- Five method blanks were analyzed after the continuing calibrations to check for carry over and to ensure that the system was clean
- A duplicate was analyzed on sample SG-42.
- A set of matrix spike and matrix spike duplicates (MS/MSD) was analyzed on sample SG-35 by spiking the samples with 250 mL of the 20 ppbv standard.

3.0 RESULTS

Summa canister target results are listed in Tables 3A. All results are reported in ppbv for Summa canister samples and blanks. MS/MSD recoveries are presented in Table 4A. Internal standards recoveries are reported in Table 5A. The chain-of-custody is in Section 3. The Summa canister data is in Appendix B.

In Appendix B, the Analysis Log is followed by the calibration package for each day of analysis. The calibration package includes the daily analysis log, canister pressurization log, BFB tune, and initial or continuing calibration quant report. The quant report lists the retention time, quantitation ion, peak area, and concentration in nL. Concentrations listed on this quant reports are generated by using the average response factors of the initial calibration and the response factors of the continuing calibrations.

Samples SG-42, SG-49, SG-35, SG-41, SG-50, SG-51, and SG-56 contained tetrachloroethene(PCE) at the concentrations ranging from 10ppbv to 2400ppbv. Samples DC-2, DC-3, and DC-5 had TCE and PCE at the concentrations ranging from 9ppbv to 39000ppbv. Samples WB-4, WB-5, and WB-6 also contained PCE at the concentrations ranging from 560ppbv to 11200ppbvNon-target compounds are not requested to report.

A replicate was analyzed on the sample SG-42. The results of the replicate analysis were consistent.

The recoveries of MS/MSD on sample SG-35 ranged from 82.5 to 98.8 % and the relative percentage deviations (RPD) ranged from 0 % to 1.8 %.

TABLE 1A - GC/MS Instrument Conditions

B. Preconcentrator Conditions:

M-1 Cryotrap Temperature	: -120°to -150°C
Internal Standard Trap Time	: 1.0 minute
Sample flow	: 150 mL/min
M-1 Cryotrap Desorb Temperature	: 10°C
M-2 Cryotrap Temperature	: -20°to -30°C
Transfer (M-1 to M-2) Time	: 4.5 minutes
M-2 Cryotrap Desorb Temperature	: 180°C
M-3 Cryotrap Temperature	: -150°C to -160°C
Transfer (M-2 to M-3) Time	: 3.5 minutes
Injection Time	: 2.5 minutes

B. GC/MS Conditions, Sample Analysis:

Initial Temperature	: 35.0°C
Initial Time	: 4.0 minutes
Ramp Rate	: 8.0°C/min to 90'C 9.0'C/min to 120'C 12.0'C/min to 155'C 20.0'C/min to 180'C 40.0'C/min to 200'C
Final Temperature	: 200.0°C
Final Time	: 1.0 minutes
Run Time	: 23.88 minutes
Mass Scan Range:	: 35 to 350 AMU

Column: 0.32 mm x 60 meter Restek Rtx-1, 1.0 µm film thickness (Restek Corporation)

TABLE 2A - Air Toxic Standards (Concentrations and Quantitation Ions)

Compound	Cylinder	Conc. (ppmv)	Quant. Ion
chloromethane	ALM017223	1.03	50
vinyl chloride	ALM017223	1.03	62
chloroethane	ALM017223	1.04	64
trichlorofluoromethane	ALM017223	1.08	101
1,1-dichloroethene	ALM017223	1.02	61
dichloromethane	ALM017223	1.02	49
trans-1,2-dichloroethene	ALM017223	1.02	61
1,1-dichloroethane	ALM017223	1.03	63
cis-1,2-dichloroethene	ALM017223	1.02	61
trichloromethane	ALM017223	1.02	83
1,1,1-trichloroethane	ALM017223	1.02	97
carbon tetrachloride	ALM017223	1.02	117
1,2-dichloroethane	ALM017223	1.02	62
benzene	ALM017223	1.03	78
trichloroethene	ALM017223	1.02	95
bromodichloromethane	ALM017223	1.03	83
dibromomethane	ALM017223	1.03	93
toluene	ALM017223	1.02	91
1,1,2-trichloroethane	ALM017223	1.02	97
tetrachloroethene	ALM017223	1.02	166
ethylbenzene	ALM017223	1.02	91
meta-xylene	ALM017223	1.03	91
ortho-xylene	ALM017223	1.04	91
styrene	ALM017223	1.02	104
1,1,2,2-tetrachloroethane	ALM017223	1.02	83
1,3,5-trimethylbenzene	ALM017223	1.03	120
1,2,4-trimentylbenzene	ALM017223	1.02	105
Internal Standards			
bromochloromethane	AB17389	0.98	49
1,4-difluorobenzene	AB17389	1.00	114
chlorobenzene-d5	AB17389	1.00	117
Instrument Performance Check Standard			
p-bromofluorobenzene (BFB)	AB17359	0.98	95

Table 3A - Air Toxic Target Compound Results forSumma Canister Samples
Liberty TCE Site, Long Island, New York, WA# 0-048
(Concentration in ppbv)

Sample Number	Method Blank	Trip Blank	SG-42	SG-42 Rep	SG-49
Sample Location	040513-1	Trip Blank	SG-42	SG-42	SG-49
Date Sampled	N/A	05/06/04	05/05/04	05/05/04	05/06/04
Date Analyzed	05/13/04	05/13/04	05/13/04	05/13/04	05/13/04
Data File	LTS003	LTS004	LTS008	LTS019	LTS009
Chloromethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Vinyl Chloride	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Chloroethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Trichlorofluoromethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
1,1-Dichloroethene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Methylene Chloride	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
trans-1,2-Dichloroethene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
1,1-Dichloroethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
cis-1,2-Dichloroethene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Trichloromethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
1,2-Dichloroethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
1,1,1-Trichloroethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Benzene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Carbon Tetrachloride	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Dibromomethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Bromodichloromethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Trichloroethene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
1,1,2-Trichloroethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Toluene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Tetrachloroethene	0.8 U	0.8 U	129	131	118
Ethylbenzene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
m&p-Xylene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Styrene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
1,1,2,2-Tetrachloroethane	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
o-Xylene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
1,3,5-trimethylbenzene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
1,2,4-Trimethylbenzene	0.8 U	0.8 U	1.72 U	1.72 U	1.6 U
Pressure Sample Volume(mL)	250	250	250	250	250
Initial Pressure (psia)			13.9	13.9	14.0
Final Pressure (psia)			29.8	29.8	28.0
Quantitation Limit (ppbv)	0.8	0.8	1.7	1.7	1.6

A - Assumed volume for Blanks
B - <3 times Method Blank value
C - Compound Calibration >30% RSD
D - Compound Calibration Check >30% RPD
E - Concentration exceeded calibration limit (25nL)
J - Below 0.8 nL Quantitation Limit
U - Not Detected
N/A - Not Applicable

Table 3A (Cont.) - Air Toxic Target Compound Results forSumma Canister Samples
Liberty TCE Site, Long Island, New York, WA# 0-048
(Concentration in ppbv)

Sample Number	SG-35	SG-41	DC-2	DC-3	SG-50
Sample Location	SG-35	SG-41	DC-2	DC-3	SG-50
Date Sampled	05/05/04	05/05/04	05/07/04	05/07/04	05/06/04
Date Analyzed	05/13/04	05/13/04	05/13/04	05/13/04	05/13/04
Data File	LTS010	LTS011	LTS012	LTS013	LTS014
Chloromethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Vinyl Chloride	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Chloroethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Trichlorofluoromethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
1,1-Dichloroethene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Methylene Chloride	0.8 U	1.6 U	1.6 U	3.4	1.6 U
trans-1,2-Dichloroethene	0.8 U	1.6 U	1.6 U	2.8	1.6 U
1,1-Dichloroethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
cis-1,2-Dichloroethene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Trichloromethane	0.8 U	1.6 U	3.7	3.0	1.6 U
1,2-Dichloroethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
1,1,1-Trichloroethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Benzene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Carbon Tetrachloride	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Dibromomethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Bromodichloromethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Trichloroethene	0.8 U	1.6 U	35.7	9.0	1.6 U
1,1,2-Trichloroethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Toluene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Tetrachloroethene	10.3	89.9	14000 *	4000 **	740 ***
Ethylbenzene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
m&p-Xylene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Styrene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
1,1,2,2-Tetrachloroethane	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
o-Xylene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
1,3,5-trimethylbenzene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
1,2,4-Trimethylbenzene	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
Pressure Sample Volume(mL)	500	250	250	250	250
Initial Pressure (psia)	14.1	14.5	14.3	14.5	14.0
Final Pressure (psia)	28.2	29.0	28.6	29.0	28.0
Quantitation Limit (ppbv)	0.8	1.6	1.6	1.6	1.6

A - Assumed volume for Blanks
B - <3 times Method Blank value
C - Compound Calibration >30% RSD
D - Compound Calibration Check >30% RPD
E - Concentration exceeded calibration limit (25nL)
J - Below 0.8 nL Quantitation Limit
U - Not Detected
N/A - Not Applicable
* - Results from dilution run: LTS037
** - Results from dilution run:LTS032
***-Results from dilution run:LTS026

Table 3A (Cont.) - Air Toxic Target Compound Results forSumma Canister Samples
Liberty TCE Site, Long Island, New York, WA# 0-048
(Concentration in ppbv)

Sample Number	SG-51	DC-5	SG-56	Method Blank	AMB-1
Sample Location	SG-51	DC-5	SG-56	040514-1	AMB-1
Date Sampled	05/06/04	05/07/04	05/06/04	N/A	05/07/04
Date Analyzed	05/13/04	05/13/04	05/13/04	05/14/04	05/14/04
Data File	LTS015	LTS017	LTS018	LTS023	LTS027
Chloromethane	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Vinyl Chloride	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Chloroethane	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Trichlorofluoromethane	1.6 U	2.7	1.6 U	0.8 U	0.8 U
1,1-Dichloroethene	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Methylene Chloride	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
trans-1,2-Dichloroethene	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
1,1-Dichloroethane	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
cis-1,2-Dichloroethene	2.2	1.6 U	1.6 U	0.8 U	0.8 U
Trichloromethane	1.6 U	2.3	1.6 U	0.8 U	0.8 U
1,2-Dichloroethane	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
1,1,1-Trichloroethane	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Benzene	1.6 U	2.2	1.6 U	0.8 U	0.8 U
Carbon Tetrachloride	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Dibromomethane	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Bromodichloromethane	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Trichloroethene	1.6 U	65.8	34.8	0.8 U	0.8 U
1,1,2-Trichloroethane	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Toluene	1.6 U	2.72	1.6 U	0.8 U	0.8 U
Tetrachloroethene	75.6	39000 *	2400 **	0.8 U	0.8 U
Ethylbenzene	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
m&p-Xylene	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Styrene	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
1,1,2,2-Tetrachloroethane	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
o-Xylene	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
1,3,5-trimethylbenzene	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
1,2,4-Trimethylbenzene	1.6 U	1.6 U	1.6 U	0.8 U	0.8 U
Pressure Sample Volume(mL)	250	250	250	250	500
Initial Pressure (psia)	13.7	11.1	14.0		14.3
Final Pressure (psia)	27.4	22.2	28.0		28.6
Quantitation Limit (ppbv)	1.6	1.6	1.6	0.8	0.8

A - Assumed volume for Blanks
B - <3 times Method Blank value
C - Compound Calibration >30% RSD
D - Compound Calibration Check >30% RPD
E - Concentration exceeded calibration limit (25nL)
J - Below 0.8 nL Quantitation Limit
U - Not Detected
N/A - Not Applicable
* -Results from dilution run:LTS038
** - Results from dilution run: LTS035

Table 3A (Cont.) - Air Toxic Target Compound Results forSumma Canister Samples
Liberty TCE Site, Long Island, New York, WA# 0-048
(Concentration in ppbv)

Sample Number	Method Blank	WB-4	WB-5	WB-6	Method Blank
Sample Location	040517-1	WB-4	WB-5	WB-6	040519-1
Date Sampled	N/A	05/08/04	05/08/04	05/08/04	N/A
Date Analyzed	05/18/04	05/18/04	05/18/04	05/18/04	05/19/04
Data File	LTS039	LTS044	LTS047	LTS049	LTS053
Chloromethane	0.8 U	160 U	107 U	16 U	0.8 U
Vinyl Chloride	0.8 U	160 U	107 U	16 U	0.8 U
Chloroethane	0.8 U	160 U	107 U	16 U	0.8 U
Trichlorofluoromethane	0.8 U	160 U	107 U	16 U	0.8 U
1,1-Dichloroethene	0.8 U	160 U	107 U	16 U	0.8 U
Methylene Chloride	0.8 U	160 U	107 U	16 U	0.8 U
trans-1,2-Dichloroethene	0.8 U	160 U	107 U	16 U	0.8 U
1,1-Dichloroethane	0.8 U	160 U	107 U	16 U	0.8 U
cis-1,2-Dichloroethene	0.8 U	160 U	107 U	16 U	0.8 U
Trichloromethane	0.8 U	160 U	107 U	26.4	0.8 U
1,2-Dichloroethane	0.8 U	160 U	107 U	16 U	0.8 U
1,1,1-Trichloroethane	0.8 U	160 U	107 U	16 U	0.8 U
Benzene	0.8 U	160 U	107 U	16 U	0.8 U
Carbon Tetrachloride	0.8 U	160 U	107 U	16 U	0.8 U
Dibromomethane	0.8 U	160 U	107 U	16 U	0.8 U
Bromodichloromethane	0.8 U	160 U	107 U	16 U	0.8 U
Trichloroethene	0.8 U	160 U	107 U	16 U	0.8 U
1,1,2-Trichloroethane	0.8 U	160 U	107 U	16 U	0.8 U
Toluene	0.8 U	160 U	107 U	16 U	0.8 U
Tetrachloroethene	0.8 U	11200	2660	562	0.8 U
Ethylbenzene	0.8 U	160 U	107 U	16 U	0.8 U
m&p-Xylene	0.8 U	160 U	107 U	16 U	0.8 U
Styrene	0.8 U	160 U	107 U	16 U	0.8 U
1,1,2,2-Tetrachloroethane	0.8 U	160 U	107 U	16 U	0.8 U
o-Xylene	0.8 U	160 U	107 U	16 U	0.8 U
1,3,5-trimethylbenzene	0.8 U	160 U	107 U	16 U	0.8 U
1,2,4-Trimethylbenzene	0.8 U	160 U	107 U	16 U	0.8 U
Pressure Sample Volume(mL)	250	500	750	250	250
Initial Pressure (psia)		2.0	2.0	2.0	
Final Pressure (psia)		800.0	800.0	40.0	
Quantitation Limit (ppbv)	0.8	160.0	107.0	16.0	0.8

A - Assumed volume for Blanks
B - <3 times Method Blank value
C - Compound Calibration >30% RSD
D - Compound Calibration Check >30% RPD
E - Concentration exceeded calibration limit (25nL)
J - Below 0.8 nL Quantitation Limit
U - Not Detected
N/A - Not Applicable

Table 3A (Cont.) - Air Toxic Target Compound Results forSumma Canister Samples
Liberty TCE Site, Long Island, New York, WA# 0-048
(Concentration in ppbv)

Sample Number	DC-0
Sample Location	DC-0
Date Sampled	05/08/04
Date Analyzed	05/19/04
Data File	LTS054

Chloromethane	0.8 U
Vinyl Chloride	0.8 U
Chloroethane	0.8 U
Trichlorofluoromethane	0.8 U
1,1-Dichloroethene	0.8 U
Methylene Chloride	0.8 U
trans-1,2-Dichloroethene	0.8 U
1,1-Dichloroethane	0.8 U
cis-1,2-Dichloroethene	0.8 U
Trichloromethane	0.8 U
1,2-Dichloroethane	0.8 U
1,1,1-Trichloroethane	0.8 U
Benzene	0.8 U
Carbon Tetrachloride	0.8 U
Dibromomethane	0.8 U
Bromodichloromethane	0.8 U
Trichloroethene	0.8 U
1,1,2-Trichloroethane	0.8 U
Toluene	0.8 U
Tetrachloroethene	15.2
Ethylbenzene	0.8 U
m&p-Xylene	0.8 U
Styrene	0.8 U
1,1,2,2-Tetrachloroethane	0.8 U
o-Xylene	0.8 U
1,3,5-trimethylbenzene	0.8 U
1,2,4-Trimethylbenzene	0.8 U
Pressure Sample Volume(mL)	500
Initial Pressure (psia)	11.9
Final Pressure (psia)	23.8
Quantitation Limit (ppbv)	0.8

A - Assumed volume for Blanks
B - <3 times Method Blank value
C - Compound Calibration >30% RSD
D - Compound Calibration Check >30% RPD
E - Concentration exceeded calibration limit (25nL)
J - Below 0.8 nL Quantitation Limit
U - Not Detected
N/A - Not Applicable

Table 4A - Air Toxic MS/MSD Recovery Summary for Summa Canister Samples
Liberty TCE Site, Long Island, NY WA # 0-048
(concentrations in nL)

Sample Number		SG-35	SG-35 MS		SG-35 MSD		
Sample Location		SG-35	SG-35		SG-35		
Date Sampled		05/08/04	05/08/04		05/08/04		
Date Analyzed	Spike	05/13/04	05/13/04	%	05/13/04	%	
Data File	Amount	LTS010	LTS021	Recovery	LTS022	Recovery	RPD
Chloromethane	5.2	0.00	4.40	85.4	4.37	84.9	0.7
Vinyl Chloride	5.2	0.00	4.51	87.6	4.46	86.6	1.1
Chloroethane	5.2	0.00	4.34	83.5	4.29	82.5	1.2
Trichlorofluoromethane	5.4	0.00	5.00	92.6	4.91	90.9	1.8
1,1-Dichloroethene	5.1	0.00	4.79	93.9	4.8	94.1	0.2
Methylene Chloride	5.1	0.00	4.88	95.7	4.85	95.1	0.6
trans-1,2-Dichloroethene	5.1	0.00	4.90	96.1	4.89	95.9	0.2
1,1-Dichloroethane	5.2	0.00	4.87	94.6	4.85	94.2	0.4
cis-1,2-Dichloroethene	5.1	0.00	4.89	95.9	4.89	95.9	0.0
Trichloromethane	5.1	0.00	4.88	95.7	4.85	95.1	0.6
1,2-Dichloroethane	5.1	0.00	4.97	97.5	4.95	97.1	0.4
1,1,1-Trichloroethane	5.1	0.00	4.72	92.5	4.72	92.5	0.0
Benzene	5.2	0.00	4.93	95.7	4.89	95.0	0.8
Carbon Tetrachloride	5.1	0.00	4.65	91.2	4.64	91.0	0.2
Dibromomethane	5.2	0.00	4.99	96.9	4.96	96.3	0.6
Bromodichloromethane	5.2	0.00	4.85	94.2	4.81	93.4	0.8
Trichloroethene	5.1	0.00	4.70	92.2	4.68	91.8	0.4
1,1,2-Trichloroethane	5.1	0.00	4.67	91.6	4.66	91.4	0.2
Toluene	5.1	0.00	4.70	92.2	4.71	92.4	0.2
Tetrachloroethene	5.1	2.58	7.62	98.8	7.56	97.6	1.2
Ethylbenzene	5.1	0.00	4.68	91.8	4.65	91.2	0.6
m&p-Xylene	5.2	0.00	4.67	90.7	4.69	91.1	0.4
Styrene	5.1	0.00	4.91	96.3	4.9	96.1	0.2
1,1,2,2-Tetrachloroethane	5.1	0.00	5.02	98.4	4.99	97.8	0.6
o-Xylene	5.2	0.00	4.67	89.8	4.66	89.6	0.2
1,3,5-trimethylbenzene	5.2	0.00	4.63	89.9	4.62	89.7	0.2
1,2,4-Trimethylbenzene	5.1	0.00	4.70	92.2	4.7	92.2	0.0

#N/A - Not Available

Table 5A - Air Toxic Internal Standard Recovery Summary for Summa Canister Samples

Tune File : D:\0365LIBERTY\040513\TO15M001.D
Tune Time : 13 May 2004 10:49 am

Daily Calibration File : D:\0365LIBERTY\040513\TO15M001.D

			12238500	41653800	33259700
File	Sample	Surrogate Recovery %	Internal Standard Responses		
LTS003.D	Method Blank	12427137	41211773	35260701	
LTS004.D	Trip Blank	12187447	41113859	35381375	
LTS008.D	SG-42	11901279	39529313	34677987	
LTS009.D	SG-49	12069716	40085382	34469859	
LTS010.D	SG-35	11669413	39026537	33878038	
LTS011.D	SG-41	11775771	39963407	34082146	
LTS012.D	DC-2	11711796	39007046	26688970	
LTS013.D	DC-3	11527386	38835376	30698499	
LTS014.D	SG-50	11548397	38824813	32630343	
LTS015.D	SG-51	11555327	38945286	33474721	
LTS017.D	DC-5	11689231	39268845	22486876	
LTS018.D	SG-56	10968862	37965890	31448708	
LTS019.D	SG-42 Rep	11414987	39135485	33688734	
LTS021.D	SG-35 MS	11751949	40859052	35039651	
LTS022.D	SG-35 MSD	11943471	41540175	35504538	

t - fails 24hr time check * - fails criteria

Created: Fri May 14 14:56:53 2004 Instrument

Table 5A(Cont.) - Air Toxic Internal Standard Recovery Summary for Summa Canister Samples

Tune File : D:\0365LIBERTY\040514\TO15M001.D
Tune Time : 14 May 2004 9:52 am

Daily Calibration File : D:\0365LIBERTY\040514\TO15M001.D

10939700 36947300 29843300

File	Sample	Surrogate Recovery %	Internal Standard Responses		
LTS023.D	Method B	11331711	38697469	32641372	
LTS026.D	SG-50(dilution)	11202300	37491719	32001143	
LTS027.D	AMB-1(dilution)	11053163	36916527	32158988	
LTS032.D	DC-3 (dilution)	10146429	33425545	30356511	
LTS035.D	SG-56 (dilution)	10113947	33140476	28726942	

t - fails 24hr time check * - fails criteria

Created: Sat May 15 10:23:18 2004 Instrumen

Table 5A(Cont.)-Air Toxic Internal Standard Recovery Summary for Summa Canister Samples

Tune File : D:\0365LIBERTY\040515\TO15M001.D
Tune Time : 15 May 2004 11:00 am

Daily Calibration File : D:\0365LIBERTY\040515\TO15M001.D

9539080 31224600 25475700

File	Sample	Surrogate Recovery %	Internal Standard Responses		
LTS036.D	Method B	10088795	32775383	28098002	
LTS037.D	DC-2(Dilution)	10240130	33533600	28459729	
LTS038.D	DC-5(Dilution)	10136474	33157654	28036623	

t - fails 24hr time check * - fails criteria

Created: Mon May 17 10:00:26 2004 Instrumen

Table 5A(Cont.)- Air Toxic Internal Standard Recovery Summary for Canister Samples

Tune File : D:\0365LIBERTY\040518\TO15M001.D
Tune Time : 18 May 2004 10:32 am

Daily Calibration File : D:\0365LIBERTY\040518\TO15M001.D

			11853500	39933400	33514000
File	Sample	Surrogate Recovery %	Internal Standard Responses		
LTS039.D	Method Blank	12084676	40910124	35441141	
LTS044.D	WB-4	11512175	38127759	33034355	
LTS047.D	WB-5	11109442	36945754	31522947	
LTS049.D	WB-6	10813971	34853014	30314954	

t - fails 24hr time check * - fails criteria

Created: Wed May 19 10:15:53 2004 Instrumen

Table 5A(Cont.)- Air Toxic Internal Standard Recovery Summary for Canister Samples

Tune File : D:\0365LIBERTY\040519\TO15M001.D
Tune Time : 19 May 2004 9:49 am

Daily Calibration File : D:\0365LIBERTY\040519\TO15M001.D

		10085800	31898900	26538700
File	Sample	Surrogate Recovery %	Internal Standard Responses	
LTS053.D	Method B	10137607	32382376	27587304
LTS054.D	DC-0	10347589	32809832	28374815

t - fails 24hr time check * - fails criteria

Created: Wed May 19 11:46:39 2004 Instrumen